EF-1 Sump #10 2008

# FERMI 1 NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Log Number N/B		
Task	Performed By	Date
1. Representative sample collected.  Date/Time 4/29/08 / 1000  Container Number Sump # 10  Storage Location FF-1	Ferry 1 (signature)  B 330 8  Employee ID Number	4/29/28
2. Sample secured against tampering.	Southwork Fermi I (signature)  B 3306 Employee ID Number	4/29/08
3. Tritium LLD <= 2 E-6 uCi/ml Actual tritium LLD = 1.222 CuCi/ml No tritium activity detected. (If tritium activity detected do not sign, and explain in Remarks.)	Chemistry (signature)  53441  Employee ID Number	5,2,08
4. Gamma spectroscopy count completed on system suitable for MRP18 evaluations.	Regignature)  B 5387  Employee ID Number	4/4/08
5. Gamma spectroscopy report shows no identified peaks above critical level due to licensed radioactive material. (Note disposition of unidentified peaks on gamma spectroscopy report.  If licensed material detected, do not sign, and explain in Remarks.)	Radiological Engineering (signature)  Z - //5/ Employee ID Number	6.10-08

## FERMI 1 NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Log Number	:		
Task	5	Performed By	Date
6. Fluid approved for release.	:	N/H Radiological Engineering (signature)	NA
		Employee ID Number	 
Remarks:			

Sample Information Sump #10 1. Sample Location 2. Date Sampled 04/29/2008 3. Time Sampled 10:20 4. Sample Volume, (ml) 4 ml Instrument Count Data 1. Date Sample Counted 05/01/2008 2. Time Sample Counted 16:18 3 . Background Inf.: Minutes Counted 10 min. Background Count Rate (cpm) 8.1 cpm (Daily Spike Source ID # 111) 4 . Efficiency Inf.: Gross Spike Count Rate (cpm) 3031,8 cpm Net Spike Count Rate (cpm) 3023.7 cpm H3 Spike Activity (dpm on count date) 7776.1 dpm Counter Efficiency 0.3888 cpm/dpm 5 . Sample Info: Sample Gross Count Rate (cpm) 8.6 cpm Sample Count Time (min.) 10.0 min. Net Sample Count Rate (cpm) 0.5 cpm 6 . Critical Level: Critical Level Count Rate (cpm) 2.1 cpm Minimum Detectable Activity (Bkg cpm) (Bkg cpm) Minimum Detectable Activity (uCi/mI) = 3.3 x (Bkg min.) (Smpl mln.) 1.22E-06 uCi/ml Efflolency x 2.22E6 dpm/uCl x Sample Volume Sample Activity Sample Activity (uCi/ml) = MDA Sample Net cpm Efficiency x 2.22E6 uCl/ml x Sample Volume Date 5-2,08 Technician

Form 76,000.39 Att 1 P1/1

DTC: TGCHEM

File: 1319.02

#### DETROIT EDISON FERMI-2 POWER PLANT

4-JUN-2008 15:11:27.84

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#### RADIATION PROTECTION DEPARTMENT

### OAMMA SPECTROSCOPY ANALYSIS REPORT

#### HIGH EFFICIENCY DETECTOR

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	i
Sample ID Number: EF-1	SUMP#10
,	
Sample End Time: 29-APF	2
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100, 1944 9, 1 PC 100, 1 PC 100,	
REMARKS	
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SIGNATURE REVIEWED BY

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#### Fermi 2 Radiation Protection Gamma Spectroscopy Report

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Sample ID Number: EF-1 SUMP#10

Sample collection start date: 29-APR-2008 10:20:00.00 Sample collection end date : 29-APR-2008 10:20:00.00

Type of sample : 1 L Mari. Liquid Sample quantity : 1.00000E+03 cc

Sample geometry : M2LL

- Operator: JNS

инининининининининининининин Acquisition Parameters инининининининининининин

Detector number : DET 4 . Acquire date : 4-JUN-2008 14:41:25.94

APreset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00 Elapsed real time : 0.05 %

Detector number : DET 4 Yearly call date : 20-JUN-2007 12:16:46.16

Kev/channel : 5.00091E-01 Zero offset: -1.34794E-01

Daily cal date : 4-JUN-2008 06:32:04.62

www.www.ww.ww.ww.ww.ww.ww.ww.pmak Smarch Parameters www.ww.ww.ww.ww.ww.ww.ww.ww.

Start channel: 100 End channel: 4096

Height sensitivity : 5.00000 Shape sensitivity : 10.00000

Maximum number of iterations to resolve multiplets : 5

Energy tolerance : 2.00000 Half-life ratio : 10.00000 Abundance limit : 75.00000 Library : dacmaster.nlb

Efficiency file : EFFD4\_m211 | Efficiencies at : Peak energy

Ph.	It	Energy	Arrea	Elegand	FWHM	Channel.	Left	PW	Cts/Sec	%Err	Fit
	•••		tr	:		411 om en - en - en					
3.	(2)	139.82	52	51	lin lita	279.86	276	9	2.91E-02	27.9	
2	(2)	199.11	26	57	0.99	3961,42	394	9	1.475-02	56.0	
3	<b>Ø</b>	511.53	157	73	2.85	1023.13	1013	25	8.74E-02	16.8	
47	(a)	558.46	45	30	0.95	1116.98	1112	1.0	2.50E-02	27.2	
.5	Ø	1461.09	48	9	2.12	2921.82	2914	1.4	2.645-02	20.3	

Sample Title : EF-1 SUMP#10 Decay Time = 36 04:21:25.94 Page : 1 Acquisition Time = 4-JUN-2008 14:41:25.94

## Post-NID Peak Search Report

T to	Energy	Area	Blegnd	FWHM	Channel	Left	Pw %Err	Fit	Nuclides
(2)	139.82	52	51	1.16	279.86	276	9 27.9		Mar 125/ HIVE
<b>(2)</b>	199-11-		57	<del>-0.99</del>	398,42	394	<u>9 56.</u> 0		Resect
<b>Ø</b>	511153	1.57	73	2.85	1023.13	1013	25 16.8		ANNPrall
0	558.46	45	30	0.95	1116.98	1.1.1.22	10 27.2		HWL
Ø	14611.09	48	9	2.12	2921.82	2914	14 20.3		K40

Nuclide Line Activity Report Sample ID : EF-1 SUMP#10 Page : 2 Acquisition date : 4-JUN-2008 14:41:25

Nuclide Types natural

Uncorrected Decay Corr 1-Sigma Area ŻAlbn %Eff uCi/cc uCi/cc %Error Nuclide Energy 10.67% 2.678E-07 2.678E-07 20.34 1460.81 48 2.501E+00 K--40-

Flags "w" = Keyline

Summary of Muclide Activity Sample ID : EF-1 SUPP#10

Page : Acquisition date : 4-JUN-2008 14:41:25

Total number of lines in spectrum

5

Number of unidentified lines

0 5

Number of lines tentatively identified by NID

100.00%

Nuclide Type : natural

Uncorrected Hlife Decay

1.00

Decay Corr

1-Sigma

Muclide K-40 1.00E+05Y

uCi/cc 2.678E-07 Decay Corr uCi/cc 2.678E-07

1-Sigma Error %Error Flags 0.545E-07

20.34

Total Activity : 2.6785-07

2.678E-07

Grand Total Activity : 2.678E-07

2.678E-07

Flags: "K" = Keyline not found!

"E" = Manually edited

"M" = Manually accepted

"A" = Nuclide specific abn. limit

Nuclide F-18	Half-life 109.74r	474.91	Activity 1—Sigma Energy %Abund (uCi/cc) %Error Rejected by 511.00%193.46 1.0>0E+35 16.00 Decay Found = 100.00
SE-75	119.78%	. 0.30	66.05 1.02 Not Found Abun. 96.73 3.41 Not Found 121.12 16.70 Not Found 136.00* 59.20 Not Found 198.60 1.45 5.122E-07 56.03 264.65 59.80 Not Found 279.53 25.20 Not Found
•	<b>%</b>	Abundances	303.91 1.32 Not Found 400.65 11.40 Not Found Found = 0.81
AS-76	26.32H	33 <b>.</b> 00	559.10** 44.70 2.774E+02 27.22 Decay, Abun. 563.23 1.17 — Not Found — 571.30 0.14 — Not Found — 657.03 6.10 — Not Found — 665.31 0.39 — Not Found — 740.12 0.12 — Not Found — 771.76 0.12 — Not Found — 867.63 0.12 — Not Found — 1129.87 0.14 — Not Found — 1212.72 1.63 — Not Found — 1216.02 3.84 — Not Found —
<b>〈</b> i	%	Abundances	1228.52
MO-99	66. 02H %	13,16 Abundances	140.51 3.80 2.957E-03 27.94 Decay, Abun. 181.06 6.20 — Not Found — 366.43 1.37 — Not Found — 739.58* 12.80 — Not Found — 778.00 4.50 — Not Found — Found = 13.25
TC-99M	6.02H %		140.50% 89.07 1.000E+35 27.94 Decay Found = 100.00
TE-131M ·	30.00H	28.95	102.06 7.90 Not Found Decay, Abun. 149.72 5.10 Not Found 200.63 7.56 4.142E+01 56.03 240.93 7.59 Not Found 334.27 9.60 Not Found
		0 .	773.67* 38.20 Not Found 782.49 7.79 Not Found 793.75 13.90 Not Found 822.78 6.12 Not Found 852.21 20.70 Not Found 1125.46 11.40 Not Found

Nuclide TE-131M		Half-Life Ratio 28.95 Abundances	Energy 1206.60 Found =	Activity 1-Sigma  %Abund0 (uCi/cc) %Error Rejected by 9.80 Not Found Decay, Abun. 5.19
CS-138	32.20M	1618.52	138.10 227.76 408.98 462.79 546.94 871.80 1009.78 1147.22 1343.59 1435.86% Found	1.49 1.000E+35 27.94 Decay, Abun. 1.51 — Not Found —  30.70 — Not Found —  10.80 — Not Found —  5.11 — Not Found —  29.80 — Not Found —  1.24 — Not Found —  1.14 — Not Found —  76.30 — Not Found —  0.92

Flag: "\*" = Keyline

Unidentified Energy Lines Sample ID : EF-1 SUMP#10

Page : 6 Acquisition date : 4-JUN-2008 14:41:25

It	Energy	Arrea	Blegnd	FWHM	Channel	Left	₽w	Cts/Sec	%Err	%Eff	Flags
Ø	139.82	52	51	1.16	279.86	276	9	2.915-02	27.9	6.39E+00	Τ
Ø	199.11	26	57	0.99	398.42	394	9	1.475-02	56.0	6.59E+00	Ϋ
0	511.53	157	73	2.,85	1023.13	1013	25	8.74E-02	16.8	4.88E+00	Ϋ́
0	558.46	45	30	$095^{\circ}$	1116.98	1112	10	2.50E-02	27.2	4.69E+00	T

Flags: "T" = Tentatively associated

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#### Minimum Detectable Activity Report

•	Destroyed	Energy	ACP
Nuclide	Bekgnd Sum	(IceV)	(uCi/cc)
PROCES A GRAN	cotam	, Crewy)	(mervee)
BE-7		477. 59	1.11606-07
F-18	Ø.	511.00	Half-Life too short
NA22	4	1274.54	6.7812E-09
NA24	0	1368.53	Half-Life too short
MO27	ë.	1014.44	Half-Life too short
CL-38	ë.	1642.42	Half-Life too short
AR-41	Ö.	1293.64	Half-Life too short
SC-46	1.4.	889,25	1.2606E-08
CR-51	34.	320.08	1.91378-07
MN-54	12.	834.83	8.8901E-09
CO-56	1.3.	1238, 25	2.1597E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	54.	158.38	5.1186E-07
CO-57	36.	122.06	1.0214E-08
CO-58	1. 🗷	810.76	1.0552E-08
FE-59	4 n	1099.22	1.9469E-08
00-60	9.	1332.49	9. 7429E-09
CU64	Ø.	1345.90	Half-Life too short
NI-65	Ø	1481.84	Half-Life too short
ZN-65	1.2.	1115.52	2.1459E-08
ZN-69M		438.63	Half-Life too short
SE-75	39.	136.00	1.5802E-08
AS-76	Ø.	559.10	Half-Life too short
BR-82	Ø.	776.49	Half-Life too short
BR-83	(2) <sub>n</sub>	529.64	Half-Life too short
BR-84	Ø.,	881.50	Half-Life too short
BR85	Ø <b>.</b>	802.41	Half-Life too short
KR85	40.	513.99	2.3182E-06
KR-85M	Ø.,	151.18	Half-Life too short
SR-85	40.	513.99	1.4691E-08
RB-86	1.00	1076.63	3.9332E-07
KR-87 :	Ø.,	402.58	Half-Life too short
SR-87H	Ø "	388.40	Half-Life too short
KR-88	Ø.	196.32	Half-Life too short
RB-88	Ø.,	1382.39	Half-Life too short
Y88	S.	1836.01	1.13785-08
KR-89	Ø.,	,220.90	Half-Life too short
RB-89	(¿) n	1031.88	Half-Life too short
KR-90	Ø.,	1118,69	Half-Life too short
RB90	Ø.	831.69	Half-Life too short
RB-90M	. O .	-824.23	Half-Life too short
Y-90M	Ø.,	202.51	Half-Life too short
SR-91	(I	1024.30	Half-Life too short
Y-91	1.2.	1204.90	5.2637E-06
Y-91M !	Ø.,	:555.60	Half-Life too short
SR92	Ø.,	1383.94	Half-Life too short
Y-92	Ø.,	934.46	Malf-Life too short

Acquisition date : 4-JUN-2008 14:41:25

•			· · · · · · · · · · · · · · · · · · ·
	Bekand	Energy	MDA
Muclide	Sum	(keV) (	(uCi/cc)
SR-93	€)	590.28	Half-Life too short
Y93	Ø.,	266.90	Half-Life too short
NB-94	1.4.	702.63	7.2206E-09
NB-95	1.4.,	765.79	1.6390E-08
MB-95M		235.69	Half-Life too short
ZR-95	10.	756. 72	1.8477E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	Ø.,	743.36	Half-Life too short
MO99	· Ø.	739.58	Half-Life too short
TC99M		140.50	Half-Life too short
TC-101	ø.	306.81	Half-Life too short
RU-103	20.	497.08	1.5279E-08
TC-104	. O.,	357.99	Half-Life too short
RH-105	Ø.	318.90	Half-Life too short
RU-105	Ø.,	724.50	Half-Life too short
RU-106	12.	621.84	6.8871E-08
CD-109	31.	88.03	3.4374E-07
AG110M	8.	937.48	2.4233E-08
SN-113	19.	391.69	1.20975-08
SN-117M	52.	158.56	5.9640E-08
SB-122	Ø.	563.93	Half-Life too short
SB-124	ző.	602.71	1.2090E-08
SB-125	21.	427.89	2.4014E-08
TE-125M	38.	109.28	5.0570E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	35.	57.60	3.2257E-05
XE-127	34.	202.84	1.9872E-08
TE-129	B.	459.60	Half-Life too short
TE-129M	17.	695.88	5.0045E-07
XE-129M	45.	196.56	2.7418E-06
1-130	0.	536.09	Half-Life too short
BA-131	38.	123.80	2.3085E-07
1-131	ze.	364.49	2.0249E-07
TE-131	0.	149.72	Half-Life too short
TE-131M	Ø.,	773.67	Half-Life too short
XE-131M	42.	163.93	3.1053E-06
1-132	Ø.,	; 667.69	Half-Life too short
TE-132	· Ø.,	228.16	Half-Life too short
BA-133	33.	302.84	4.1410E-08
BA-133M	Ø.	276.09	Half-Life too short
1-133	Ø.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	31.	81.00	4.8514E-06
XE-133M	Ø.	233.22	Half-Life too short
CS-134	20°.	604.70	8.1969E-09
I-134	20 a	884.09	Half-Life too short
TE-134		210.47	Half-Life too short
BA-135M	en e O a	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	Ø.	249.79	Half-Life too short
XE-135M	Ø.,	526.56	Half-Life too short
exportation of Advantage	W.F.H	AMAGA AMA	imaimmaiw coo snort

cinued) Page : 3 Acquisition date : 4-JUN-2008 14:41:25

•	Bekynd	1	Energy	MDA
Nuclide	Sum	•	(keV)	(uCi/cc)
CS-136	1.8.		818.50	6.3348E-08
1-136	0.		313.02	Half-Life too short
CS-137	1.85		661,65	8.3629E-09
XE-137	Ø.,		455.49	Half-Life too short
CS-138	0.	1.	43586	Half-Life too short
XE-138	Ø.		250.31	Half-Life too short
BA-139	Ø.,	1.	420.50	Half-Life too short
CE-139	37.		165.85	1.0359E-08
CS-139	Ø.,	1.7	283.23	Half-Life too short
BA-140	9.		537.32	1.4891E07
LA-140	Ø)	1.3	596.49	Half-Life too short
BA-141	Ø "	1 1	190.22	Half-Life too short
CE-141	33.		14544	3.0238E-08
LA-141	0.	1.	354.52	Half-Life too short
BA-142	Ø.,	í	255.12	Half-Life too short
LA-142	Ø.,		541.17	Half-Life too short
CE-143	Ø.	1	293.26	Half-Life too short
CE-144	41	!:	133.54	7.9053E-08
PR-144	(I) <sub>a</sub>	1.4	489.15	Half-Life too short
ND-147	29.	1	91.10	3.0849E-07
PM-148M	3.55	E.	550.27	1.2616E-08
EU-152	25.	;	344 27	2.5619E-08
EU-154	1. 1	1. 0	304.76	5.0344E-08
EU-156	14.	16	546.29	4.9693E-07
HF-181	1.6.		402.03	1.4007E-08
TA-182	17.	1.8	221.42	5.5149E-08
W187	. Ø.,	. 6	585.81	Half-Life too short
RE-188	Ø.,		155.03	Half-Life too short
HG-203	41	i ä	279.19	1.7425E-08
BI-207	26.	i	569.67	8.8202E-09
TL-208	, Ø.,	155 5-	583.14	Half-Life too short
PB-212	· Ø. Ø	) :8	238.63	Half-Life too short
BI-214	Ø.		609.31	Half-Life too short
PB-214	: Ø •		351.92	Half-Life too short
RA-224	46		240.98	2.1037E-04
RA-226	47.		.86.21	2.3601E-07
AC-228	22.	13	338.32	5.6909E-08
TH-228	50.	:	84.37	1.4313E-06
PA-234	. Ø.	1.	31.20	Half-Life too short
TH-234	40.		63.29	3.2983E-06
U-235	42.		.4376	7.2843E-08
MD539	Ø.,		.06.13	Half-Life too short
AM-241	35.	:	59.54	1.8607E-07

## FERMI 1 NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Log Number		
Task	Performed By	Date
1. Representative sample collected.  Date/Time ///3/08 / /000  Container Number Sump # 10  Storage Location EF-/	Frimi 1 (signature)  B 330 8  Employee ID Number	<u>11/3/</u> 08
2. Sample secured against tampering.	Feyni 1 (signature)  B 3505  Employee ID Number	11/3/08
3. Tritium LLD <= 2 E-6 uCi/ml Actual tritium LLD = £1.166-6 3-27-49  No tritium activity detected. (If tritium activity detected do not sign, and explain in Remarks.)	Chemistry (signature)  Employee ID Number	8-21-04
4. Gamma spectroscopy count completed on system suitable for MRP18 evaluations.	RP (orgnature)  B 3307  Employee ID Number	<u> </u>
5. Gamma spectroscopy report shows no identified peaks above critical level due to licensed radioactive material. (Note disposition of unidentified peaks on gamma spectroscopy report.  If licensed material detected, do not sign, and explain in Remarks.)	Radiological Engineering (signature)  50027  Employee ID Number	5-14.09

# FERMI 1 NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Log Number MA	•	
Task	Performed By	Date
6. Fluid approved for release.	Radiological Engineering (signature)  MA  Employee ID Number	_ <i>M/A</i> _

Remarks:

		Sample Information			. '
2 . 3 .	Sample Location Date Sampled Time Sampled Sample Volume, (ml)			Sump #10 11/03/2008 10:00 4	ml
		Instrument Count Data			
				<del></del>	
2.	Date Sample Counted Time Sample Counted			03/20/2009 14:00	
	Background Inf.: Minutes Counted Background Count Rate (cpm) Efficiency Inf.: (Daily Spike Source	ND # 111\		10 7.8	min. cpm
٠,	Gross Spike Count Rate (cpm) Net Spike Count Rate (cpm) H3 Spike Activity (dpm on count date) Counter Efficiency			2972.5 2964.7 7397.6 0.4008	cpm cpm dpm cpm/dpm
	Sample Info: Sample Gross Count Rate (cpm) Sample Count Time (min.) Net Sample Count Rate (cpm)			7.3 10.0 0.0	cpm min. cpm
6.	Critical Level: Critical Level Count Rate (cpm)	!		2.0	cpm
	Minim	num Detectable Activity			
Miniդրւ չ	um Detectable Activity (uCl/ml) = 3.3 x	(Bkg cpm) (Bkg cpm) (Bkg mln.) + (Smpl mln.)  Efficiency x 2,22E6 dpm/uCl x Sample Volume	=	1.16E-06	uCi/ml
	,	Sample Activity			
	Sample Activity (uCi/ml) =	Sample Net cpm Efficiency x 2.22E6 uCl/ml x Sample Volume	<b>-</b>	MDA	
	Technician		Date	3-21-0	<u> </u>

DTC: TGCHEM

File: 1319.02

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#### RADIATION PROTECTION DEPARTMENT

#### GAMMA SPECTROSCOPY ANALYSIS REPORT

#### HIGH EFFICIENCY DETECTOR

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PERFORMED BY:

| SIGNATURE
| REVIEWED BY:

SGLD 5-6-09 SIGNATUREZDATE

PAGE\_\_\_of\_\_

#### 

#### Fermi 2 Radiation Protection Gamma Spectroscopy Report

иникимининининининининининининин Sample Parameters инининининининининининининининин

Sample ID Number: SUMP#10

Sample collection start date: 3-NOV-2008 10:00:00.00 Sample collection end date : 3-NOV-2008 10:00:00.00

Type of sample : 71 L Mari. Liquid Sample quantity : 1.00000E+03 cc

Sample geometry: MELL

Operator: JMS

миниминиминиминиминиминимини Acquisition Parameters иниминиминиминиминиминимини

Detector number : DET 4 | Acquire date : 23-MAR-2009 10:20:33.12

Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00

Elapsed real time : 0 00:30:01.52 Percent dead time : 0.11 %

makementarementarementarementare Calibration Parameters менекиминения иниститивний

Detector number : DET 4 ; Yearly cal gate : 20-JUN-2008 12:00:00.00

Key/channel : 4.99924E-01 Zero offset: 2.36636E-01

Daily cal date : 23-MAR-2009 10:11:24.69

eenceneenceneenceneenceneence Pak Saarch Parameters eenceenceneenceneenceneen

Start channel: 100 End channel: 4096

Height sensitivity: 5.00000 Shape sensitivity: 10.00000

Maximum number of iterations to resolve multiplets : 5

necessaries and the contraction of the contraction

Energy tolerance : 2.00000 Half-life ratio : 10.00000 Abundance limit : 75.00000 Library : dacmaster.nlb

Apprix participating and produce the contraction of the contraction of

		ı		i							
ppg	It	Enwrgy	Area	Blegnd	FWHM	Channel	Left	$p_{\boldsymbol{W}}$	Cts/Sec	%Err	F i. t:
1	0	354.04	38	71	4.16	797.71	700	1.5	2.09E-02	52.6	
22	()	511.47	136	32	1., 75	1022.62	1016	1.7	7.66E-02	12.9	
3	(2)	558.47	69	20	1.52	1116.64	1110	1.22	3.865-02	17.7	
Ą	Ø	609.40	71.	20	1.53	1218.50	1211	1.3	3.95E-02	17.5	
5	0	768.54	1.7	Ø	0.78	1536.82	1532	11.	9.44E-03	24.3	
6	0	1460.56	62	3	2.59	2921.03	2914	1.4	3.42E-02	14.3	

, . . Sample Title : SUMP#10 Decay Time = 140 00:20:33.12

Page: 1 Acquisition Time = 23-MAR-2009 10:20:33.

### Post-NID Peak Search Report

II to	Energy	Area	Bkgrid	F.MHA !	Channel	Looft	Pho	%Err	Fit	Nuclides
(2)	354.04	38	71	4.16	707.71	700	1.5	52.6		H. Great
(2)	511.47	138	32	175	1022.62	1016	1.7	12.9		ANNI
(ž)	558.47	69	20	1.52	1116.64	1110	122	1.77		Hure
Ø	609.40	71	20	1.53	1218.50	1211	1.3	17.5		B214
Ø	768.54	1.7	<b>(</b> 2)	0.78	1536.82	1532	1.1.	24.3		B-214
Ø	1460,56	62	3	2.59	2921.03	2914	1.4	14.3		K-40

Nuclide Line Activity Report Sample ID : SUMP#10

Acquisition date : 23-MAR-2009 10:20:33

Muclide Type: natural

Nuclide Energy 1460.81 K-40 .

Area 62

%Abn 10.67%

METT 2.502E+00

Uncorrected Decay Corr uCi/cc 3.461E-07

uCi/cc -3.461E-07

1-Sigma **METTOT** 14.28

Page :

Flag: "\*" = Keyline

Summary of Nuclide Activity Sample ID : SUMP#10

Page : 3 - Acquisition date : 23-MAR-2009 10:20:33

Total number of lines in spectrum Number of unidentified lines

()

Number of lines tentatively identified by NID 6

100.00%

Muclide Type : natural

Uncorrected Decay Corr Decay Corr 1-Sigma Nuclide Hlife Decay uCizee

1-Sigma Error MError Flags

1.00 3.461E-07 1.00E+05Y K--40

uCi/cc 3.461E-07

0.494E-07 14.28

3.461E-07 | Total Activity : 3.461E-07

Grand Total Activity : 3.461E-07

3.461E-07

Flags: "K" = Keyline not found;

"E" = Manually edited

"M" = Manually accepted

, "A" = Muclide specific abn. limit

•		Half-Life			Activity 1-Sigma	
Nuclide	Half-life	Ratio	Energy 511.00*			Rejected by
F-18	109.74M *	1837.39 Abundances			1.000E+35 12.87	Decay
	γ"	PACKET OF SCHOOL OF STATE	1,505501153	3, 50 50 11 50 13		
A8-76	26.32H	127.68	559.10%	44.70	1.3596+31 17.75	Decay, Abun.
•	,		563.23		Not Found	
			571.30		Not Found	•
			(657.03		Not Found	
			665.31		Not Found	
	•		740.12	0.12		
¥ .	:		771.76	0.12	Mot Found	
			867.63	0.12	Not Found	
			1129.87	0.14	· · · · · · · · · · · · · · · · · · ·	
			1212.72	1,63	Mot Found	
			1216.02	3.84		
į	ļ		1228.52		Mot Found	•
	<u> </u> 		1439.13		Not Found	
		,	1453.60		Not Found	
į	, n.e.	Δ In	1787.67		Mot Found	
,	<i>7</i> 6	Abundances	r,ound **	73.70		
ZR-97	16. 90Ĥ	198.85	254.15	1 (0.05)	Not Found	Decay, Abun.
3.45 26	30 West 10 West 1	AC 2852 W 5252	355.39	2.27	1.000E+35 52.59	averagely d hippartin
			507.63	5.30	Mot Found	
		·	602.52			
			743.36%		Not Found	
			1021.30		Not Found	
			1147.95		Not Found	
			1362.66		Not Found	
		·	1750.46		Not Found	
	%	Abundances	found ==	1.90		
	<b>4.</b> 411. 414 No. 114.	NS 401 41		A An PLAY		
RU-103	39., 35D	3.56				Abun.
		A1 .	_610.33	5.60	4.976E-06 17.45	
	76	Abundances	Found ==	5.92		•
100/S 4 10 10	9.00 19000	0.04	2200 6 60	es name	Not Found	A learne
BA-133	10.50Y	KJ n KJ <sup>n</sup> f	79.62			Abun.
•			81.00 276.40		Not Found	
1	·		302.84%		Not Found	
			356.00	60.00	1.6956-08 52.59	
i			383.85		Not Found	
	%	Abundances		46.53	t the search meant that	
	• "		1	. ,		,
I-134	52.60M	3833.38	1.35.40	3.76	Not Found :	Decay, Abun.
			235.47		Not Found	
			405.45		Not Found	
			540.83	780		•
			595.36	11.40	Not Found	
•	•		621.79		Not Found	
			677.34		Not Found	
			766.68	4.10	1.000E+35 24.25	•
		•	847.03	95.41	Not Found	
			*			

Rejected Report (continued) Page a Sample ID : SUMPW10 Acquisition date : 23-MAR-2009 10:20:33 Half-Life Activity 1-Sigma Muclide Half-life Ratio Energy %Abund (uCi/cc) %Error Rejected by 3833,38 857.29 6.96 --- Not Found --- Decay, Abun. I-134 52.60M 884.09% 65.30 --- Not Found ----947.86 4.04 --- Not Found ---1072.55 15.30 --- Not Found ----1136,16 9.70 ---- Not Found ----1613.80 4.36 --- Not Found ---1806.84 5.70 ---- Not Found ----

1.56

41.80M 4823.82 79.45 21.00 --- Not Found ---TE-134 Decay, Abun. 180.89 18.00 --- Not Found ---201.24 8.70 --- Not Found ----210.47% 21.90 --- Not Found ----277.95 21.30 --- Not Found ----435.06 18.60 --- Not Found ---461.00 10.80 ---- Not Found ----464.64 5,10 --- Not Found 565.99 18.90 --- Not Found ---742.59 14,70 --- Not Found ----767.20 30.00 1.000E+35 24.25 % Abundances Found == -15.87 -

% Abundances Found =

249.79\* 89.98 --- Not Found --- Decay, Abun. 9.11H 368.89 XE-135 2.89 1.0006+35 17.45 608.19 % Abundances Found = -3.11

PM-148M 41130D 3.39 0 200.11 12.56 --- Not Found ---414.07 18.66 --- Not Found ---432,78 5.35 --- Not Found ---501.26 6.75 --- Not Found ---550.27% 94.90 --- Not Found ---599.74 12.54 --- Not Found ----611.26 5.48 4.526E-06 17.45

629.97 89.00 --- Not Found ---725.70 32.80 --- Not Found ---0 < 915.33 17.17 --- Not Found ----20.30 --- Not Found ---1013.81 % Abundances Found = 1.74

BI-214 19.90M 10132,44 609.31% 46.30 1.000E+35 17.45 Decay 768.36 5.04 1.000E+35 24.25 934.06 3.21 --- Not Found ---1120.29 15.10 --- Not Found ---5.94 --- Not Found ---1238.11 4.11 --- Not Found ---1377.67

1764.49 15.80 --- Not Found ----% Abundances Found = 53.76 (Abn. Limit = 48.48%)

Flag: "W" = Keyline

It	Energy	Area	Blegnd	EMHIN	Channel	Loft	₽₩	· Cts/Sec	%Err	» WETT	Flags
0	354.04	36	71	4116	707.71	. 700	1.55	2.09E-02	52.6	5.696+00	γ
0	511.47	138	32	1.75	1022.62	1016	17	7.66E-02	12.9	4.88E+00	T
(2)	558.47	69	20	1152	1116.64	1110	1.62	3.86E-02	17.7	4.69E+00	Ϋ́
<b>(</b> 2)	609.40	71	20	1.,53	1218.50	1.21.1	1.3	3.95E-02	17.5	4.52E+00	Ţ
0	768.54	1.7	(2)	0.78	1536.82	1532	1.1.	9.44E-03	24.3	3.77E+00	Τ.

Flags: "T" = Tentatively associated

are are ster for the first the first

#### Minimum Detectable Activity Report

	1	Bekgnd	Energy	MDA			
Muchide		Sum	(KeV)	(uCiZee)			
t tacas an angara	•	W 2514		V 505 See de 7 - See See 7			
BE-7		1.9.	477.59	4.06755-07			
F-1.8		0.	511.00	Half-Life too short			
NA-22		1.4.	1274.54	1.2235E-08			
NA-24		0.	:1368.53	Half-Life too short			
MG-27		(?) "	1014.44	Half-Life too short			
CL-38		. (3).	1642.42	Half-Life too short			
AR-41		Ø.	1293.64	Half-Life too short			
SC-46		8.	889.25	2.3037E-08			
CR-51		39.	320.08	2.71326-06			
MM-54.		15.	834.83	1.22655-08			
CO-56		10.	1238.25	4.8746E-08			
MN-56		Ø.	1810.69	Half-Life too short			
NI-56	•	Ø.	158.38	Half-Life too short			
CO-57		48.	122.06	1.5103E-08			
CO-58		1.1.	810.76	3.00655-08			
FE-59		1.2.	1099.22	1.4780E-07			
CO-60	,	1.3.	1332.49	1.18608-08			
CU64		0.	1345.90	Half-Life too short			
NI-65		Ø.	1481.84	Half-Life too short			
ZN-65		16.	1115.52	3.2637E-08			
ZN69M			438.63	Half-Life too short			
SE-75	ı	he he	136.00	3.0425E-08			
AS-76		Ci.	559.10	Half-Life too short			
BR-82		Ø.	776.49	Half-Life too short			
BR-83	•	Ø.,	529.64	Half-Life too short			
BR-84		Ø.	881.50	Half-Life too short			
BR-85		0.	802.41	Half-Life too short			
KR-85		50 50	513.99	2.6656E-06			
KR-85M		(ð.,	151.18	Half-Life too short			
SR-85	·	52,	513.99	5.0322E-08			
RB-86		1.6.	1076.63	2.2346E05			
KR-87		0.	402.58	Half-Life too short			
SR-87M		0.	388.40	Half-Life too short			
KR-88		0.	196.32	Half-Life too short			
RB-88		Ø.	1382.39	Half-Life too short			
Y-88		1.	1836.01				
KR-89		Ö.	220.90	1.3017E-08 Half-Life too short			
RB-89		Ø.	1031.88				
KR-90	45	0.	1118.69				
RB-90	:	0.	831.69	Half-Life too short			
RB-90M		Ø.,	824.23	Half-Life too short Half-Life too short			
Y-90M			202.51				
1-90n 8R-91		Ø.,	1024.30				
ore-91		0. 7.	1204.90	Half-Life too short 1.3951E-05			
791M		Ø.,	555.60	Half-Life too short			
SR-92		Ø.	1383.94	Half-Life too short			
Y-92		Ö.	934.46	Half-Life too short			
		*** **	, where the the	The second transfer of the second of the sec			

 $\approx$ 

Sample ID : SUMP#10 Bek Muclide SR-93 Y-93 NB-94 MB-95 NB--95M ZR-95 MB-97 ZR--97 MO-99 TC-99M TC-101 RU-103 TC-104 RH-105 RU-105 RU-106 CD~109 AG~110M SN-113 SN-117M 98-122 SB-124 SB-125 TE-125M TE-127 TE-127M XE-127 TE-129 TE-129M XE-129M I = 1.30. BA-131 1-131 TE-131 TE-131M XE-131M 1-132 TE-132 BA~133 MEE:1-AQ 1-133 TE-133M XE-133 XE-133M 09-134 1 - 134

TE-134 BA-135M I-135 XE-135 XE-135M

	1	•
ekgnd	Energy	MDA
Sum	(k@V)	(uCi/ce)
0.	590.28	Half-Life too short
Ø.	266.90	Half-Life too short
9.	702.63	6.1784E-09
, 5.	765.79	8.2559E-08
0.	235.69	Half-Life too short
12.	756.72	5.9769E-08
 (3).	657.90	Half-Life too short
() .	743.36	Half-Life too short
0.	739.58	Half-Life too short
Õ.	140.50	Half-Life too short
0.	306.81	Half-Life too short
14.	497.08	8.0660E-08
9.	357.99	Half-Life too short
	318.90	
0.		Half-Life too short
0	724, 50	Half-Life too short
11.	621.84	. 0673E-08
48.	88.03	4.9379E-07
14.	937.48	4.0924E-08
25.	391.69	2.5488E-08
0.	158.56	Half-Life too short
(2) <sub>ii</sub>	563.93	Half-Life too short
20.	602.71 427.89	4.3810E-08
24. 38.	109.28	2.6920E-09
	417.90	1.7615E-05 Half-Life too short
0. 30.	57.60	mair-Lire too short 5.8406E-05
47.	202.84	1.6780E-07
0.	459.60	Half-Life too short
18.	695.88	4,4480E-06
0	196.06	Half-Life too short
0.	536.09	Half-Life too short
0.	123.80	Half-Life too short
(3 n	364.48	Half-Life too short
Ø.	149.72	Half-Life too short
0.	773.67	Half-Life too short
0.	163.93	Half-Life too short
0.	667.69	Half-Life too short
0.	228.16	Half-Life too short
27.	302.84	3,8726E-08
0.	276.09	Half-Life too short
Ø.	, 529.87	Half-Life too short
Ø.	912.58	Half-Life too short
() n	< 81.00	Half-Life too short
0.	233.22	Half-Life too short
21.	604.70	9.2102E-09
9.	884.09	Half-Life too short
0.	210.47	Half-Life too short
0.	K268.24	Half-Life too short
0.	1260.41	Half-Life too short
0.	249.79	Half-Life too short
Ø.,	526.56	Half-Life too short
517 H	•	resessing that I we constail BH 1563 Co.
	Port	

tinued) Page : 3 Acquisition date : 23-MAR-2009 10:20:33

	Bekgnd	Energy	ACM
Muc Lide	Sum	· (keV)	(uCi/cc)
CS-136	Ø.,	818.50	Half-Life too short
1-136	<b>.</b>	1313.02	Half-Life too short
CS-137	17.	661.65	8.8376E-09
	э. С н () н	455,49	Half-Life too short
XE-137			
08-130	Ø.,	1435.86	Half-Life too short
XE-130	Ø.	258.31	Half-Life too short
BA-139	0.,	1420.50	Half-Life too short
CE-139	51.	165.85	2.0205E-08
C8-139	Ø.	1283.23	Half-Life too short
BA140	· Ø.,	537.32	Half-Life too short
L.A140	Ø.,	1596.49	Half-Life too short
BA-141	Ø.,	190.22	Half-Life too short
CE-141	48.	145.44	3.3062E-07
1	Ø.	1354.52	Half-Life too short
BA-142	Ø.,	255.12	Half-Life too short
LA-142	8.	641.17	Malf-Life too short
CE-143	ø.	293.26	Half-Life, too short
CE-144	44.	133.54	1.0521E-07
PR-144	0.	1489.15	Half-Life too short
ND-147	: 0	91.10	Half-Life too short
	1.6.	550,27	7.53726-08
PM±48M			
EU-152	32.	344.27	2.9063E-08 ·
EU-154	12.	1004.76	5.2959E-06
EU-155	50.	105.31	5.6178E-08
EU-156	1.9	646.29	6.3983E-05
HF-181.	. 19.	482.03	8.1324E-08
TA182	10.	1221.42	8.0446E-08
W-107	Ø.,	685.81	Half-Life too short
RE-188	Ø.,	155.03	Half-Life too short
HG-203	46.	279,19	8.6164E-08
BI-207	23.	569.67	9.3332E-09
TL-208	Ø.	583.14	Half-Life too short
PB-818	0.	230.63	Half-Life too short
BI-214	Ø.,	609.31	Half-Life too short
PB-214	Ø.,	351.92	Half-Life too short
RA-224	0	240.98	Half-Life too short
RA-226	44,	186.21	2.3038E-07
AC-228	222	338.32	6.9330E-08
TH-228	No 144 H	₹84#37	1.2952E-06
PA-234	Ø., *	131.20	Half-Life too short
TH-234	36.	63.29	6.2600E-05
U-235	43.	143.76	7.2960E-08
NP-239	©., ⇔ <i>c</i>	106.13	Half-Life too short
AM-241	26.	59.54	1.61556-07
	•	•	

EF-1 Sump #10 2009

# FERMI 1 NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Log Number/V//H		
Task	Performed By	Date
1. Representative sample collected.  Date/Time $\frac{12/3/67}{1500}$ Container Number $\frac{5in\varphi \# 10}{1500}$ Storage Location $\frac{1500}{1500}$	Fermi 1 (signature)  B 3308  Employee ID Number	12/7/19
2. Sample secured against tampering.	Sauthwerk  Fermi 1 (signature)  B 330 &  Employee ID Number	12/7/09
3. Tritium LLD <= 2 E-6 uCi/ml Actual tritium LLD = 1 + 15 & uCi/ml  No tritium activity detected. (If tritium activity detected do not sign, and explain in Remarks.)	Chemistry (signature)  Cos 80  Employee ID Number	12-10-09
4. Gamma spectroscopy count completed on system suitable for MRP18 evaluations.	RP (signature)  RP (signature)  Employee ID Number	12-16-09
5. Gamma spectroscopy report shows no identified peaks above critical level due to licensed radioactive material. (Note disposition of unidentified peaks on gamma spectroscopy report.  If licensed material detected, do not sign, and explain in Remarks.)	Radiological Engineering (signature)  Employee ID Number	1247.09

# FERMI I NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Log Number	<del></del>			• )	
Task	/		. Performed By	. /	Date
1	(-0	1			
6. Fluid approved for	release.	·			
1	ţ	:	Radiological-Engine (signature)	eering	•
		,		T	
		,	Employee ID Numb	per	
	, market and the second				•
Remarks:		:	•		

, , , , , , , , , , , , , , , , , , ,	Sample information		·
	·		
1 . Sample Location	•	EF-1 Sump #10	
2.Date Sampled	•	12/03/2009	
3.Time Sampled	· · · · · · · · · · · · · · · · · · ·	15:00	
4 . Sample Volume, (ml)		4	ml
	•		
	Instrument Count Data		
		A-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	
1 . Date Sample Counted	1	12/09/2009	
2 . Time Sample Counted		06:03	-
3 . Background Inf.:		•	
Minutes Counted		10	min.
Background Count Rate (cpm)	•	7.1	cpm
4 . Efficiency Inf.: (Daily Spike Sou	rce ID # 111)		
Gross Spike Count Rate (cpm)	, , , , , ,	2747.5	cpm
Net Spike Count Rate (cpm)		2740.4	cpm
H3 Spike Activity (dpm on count date)		7101.9	dpm
Counter Efficiency		0.3859	
		0,3659	cpm/dpm
5 . Sample Info:		0.0	
Sample Gross Count Rate (cpm)		6.9	cpm
Sample Count Time (min.)		10.0	min.
Net Sample Count Rate (cpm)	4	0.0	cpm
6 . Critical Level:	1 •		
Critical Level Count Rate (cpm)	•	1.9	cpm
		•	
Min	imum Detectable Activity	<del></del>	
•	,		
	(Bkg cpm) (Bkg cpm)		
Minimum Detectable Activity (uCi/ml) = 3.3 x	(Bkg min.) + (Smpl min.)	= 1.15E-06	uCi/ml
•	Efficiency x 2.22E6 dpm/uCl x Sample Volume	-	
	1		
	Sample Activity		
	Sample Activity	,	
T. Comments of the Comments of			
	•		
Sample Activity (uCi/ml) =	Sample Net cpm	_< MDA	
	Efficiency x 2.22E6 uCi/ml x Sample Volume	1	
	· ·		
	•	•	
f	•		
Technician V		Date 12-10-09	
1.621-1		- 10 U	
₹ .			

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December with the experience with a resolution of the experience of which was a major and resolution in the experience of the

Detain DECOTROSOPES ARRIVOIS REPORT

RING EFFECTION NETERIOR

Cample ID Hambert EF-1 SUMPS 10

(Dample End Time: 3-DED; 2009 it:60:60:00

REMARKO AMO, HWG

Chapes Prophi

REVIEWAN IN

100, 20, 200,000	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
1 1	***

Cample ID & EF-1 SCHPM 10

Fermi 2 Sadiation Probection Gamma Spectroscopy Report

Qample ID Number: EF-1 OUTPH 18

Sample collection start date: 3-DED-2009 15:00:00.00 Pample collection and date ::3-DEC-8289 15:00:00.28

Type of sample : 1 L Mart. Liquit

Sample quartity : 1.00000E+01 oc 7.23 Sperature Sap Sample neometry a

an porce. Acquire date : 15-DEC-2009 14:15:50.15 Darbenton mumber :

Freset live time : 2 22:32:30.00 Elapsed live time : 3 92:38:09.88

Elapswd real time : 0 99:02:02:02: Percent dead time : 2:25 %

инчинчения инивидинивичения Calibration Parameters инивический инивический инивический и

Detector number : DET 4 Yearly cal date : 3-JUA-2209 17:37:08.80 Key/Athemical 5.000632-01 Zero bffeet: 1.48835E-01

Dadly bal date : 15-DEC-2299 13:22:22:22:92

иниминительниминиминиминими Разії. Вазгові Разіверена иниминиминициненциниминицин

Start channel : 128 End Shammel : 4295

Height swnsitivity & 5.00000 | Shape remaitivity a 10.00000

Maximum ramber of iterations to resolve multiplets : 5

REFERENCE REFERENCE REPORTED BLOCKER ADDITION Thoughton Parameters and expenses and a consideration of the conference of

Erergy bilerance a 1.75298 Half-life vable : 12.28208 Abundance limit : 75.00000

Ruibyary r dammasberinib

Efficiency file : EFFD4\_m211 Efficiencies at a Peak energy

<u>an manana manang kanang kanang manang manang kanang kanang</u>

PO.	I t	Energy	Parima.	What od	**************************************	and a silver of silver	1.674	2144	men and state and the	MCT B	
2.14 2.14	<b>::</b>	516140 611.66 655.51	50 65 54	en Co	22 L - 2. 2.		1.05:11	4.4.	1.000 /05 4.600 /08 1.000 /25	:5.4	1.001101

Bample Tible : 25-1 OUNF# 12 Decay Time : 18 80:16:55:15

### Sust-MID Peak Search Report

2.5	Energy	Arma	Megnet	Total Cart	$\mathbb{Z}^{n},\mathbb{R}^{n}\mathbb{N}^{n}\mathbb{R}^{n}$	L. (2 4 . 5	$\mathbb{P}_{M}$	762 CT	F1.45	Muclides
2 # 9	510.40 511.85 558.65		260		1028.46 1822.64 1117.62	1011	#15	19.4	1.691.420	> ANN. HWC.
		·								1-12-11-09

Nuclide Line Activity Report Sample ID : EF-1 SUMPH 10

2 : egst 20:81:4: 2008-080-61 : edst mainialipag

Flag: "W" = Keyline

Summary of Muclide Activity Sample ID : THE DUMPN 10

- Acquisivion dator a 18-7879-2079 larresto

Total number of lines in spectrum Manbar of whidentified lines Munber of lines tembetively identified by NID 2 86 868 There are no naclides usebing summary criteria 8888 ;

Flags: "K" = Keyline bot found;

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"M" = Mamually accepted ( "A" = Nuclide apecific similation

Rejected Report Sample ID : IF-1 SUMPY 10

Acquisition date : 16-DEC-2229 14:16:5

Mac11de 7-18	Malf-lifa - 105.7AM	del (-lite Ratio 178. ob Obundances	Theray Sis. 85* Found =	193.46	Activity   (uCi/cc)  1.860E+35	1-81 gaa WEATOY VD. 17	Rejected by Decay
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Flags "2" = Keyling

Uniferbilled Energy Lines -Sample ID / EF-1 SUMPH 10

Page 4 D Acculation date 4 10-200-2009 14-18402

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### Minimum Detectable Artivity Report

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7-13	67) 113 11	57.2.22	Half-Life was short
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15-40	A 12 G	1460.51	1.88491-87
AR-41	Ø.,	1291.64	Half-Life too short
80-45	20.	009.25	1.8100E-88
CR-51	क्षा व क्षा के म	320.80	1.61.595-67
MN- 654	8.	834.83	S. 69245-09
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Minimum Detectable Activity Report (continued) Page : 2 Dample ID : EF-1 SUMPH 10 Acquisition date : 16-DEC-2009 14:16:55

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minimum Detectable Activity Report (continued) Page 3 3 Sample ID : EF-1 SUMPH 16 Acquisition date : 16-DEC-2889 14:16:50

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EF-1 Sump #10 2010

# FERMI 1 NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Log Number		
Task	Performed By	Date
1. Representative sample collected.  Date/Time <u>S/(0/10 1 1450</u> Container Number <u>Sump # 10</u> Storage Location <u>EF-1</u>	Employee ID Number	5/10/10
2. Sample secured against tampering.	Fermi I (signature)  B 3 30 8  Employee ID Number	<u> 5/10/10</u>
3. Tritium LLD <= 2 E-6 uCi/ml Actual tritium LLD = <1.21 = uCi/ml No tritium activity detected. (If tritium activity detected do not sign, and explain in Remarks.)	Chemistry (signature)  S1922 Employee ID Number	5-17-10
4. Gamma spectroscopy count completed on system suitable for MRP18 evaluations.	Ry (signature)  B3308  Employee ID Number	<u>(e/15/10</u>
5. Gamma spectroscopy report shows no identified peaks above critical level due to licensed radioactive material. (Note disposition of unidentified peaks on gamma spectroscopy report.  If licensed material detected, do not sign, and explain in Remarks.)	Radiological Engineering (signature)  50027  Employee ID Number	<u> </u>

# FERMI 1 NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Task	Performed By	Date
6. Fluid approved for release.	N/A  Radiological Engineering (signature)  N/A	NIA
	Employee ID Number	· · ·

#### Tritium Activity Calculation

Sample Information 1. Sample Location Sump #10 05/10/2010 2. Date Sampled 14:50 3. Time Sampled 4 . Sample Volume, (ml) 4 ml **Instrument Count Data** 1 . Date Sample Counted 05/17/2010 2. Time Sample Counted 13:40 3. Background Inf.: Minutes Counted 10 min. Background Count Rate (cpm) 8.1 cpm 4 . Efficiency Inf.: (Daily Spike Source ID # 111) Gross Spike Count Rate (cpm) 2723.9 cpm Net Spike Count Rate (cpm) 2715.8 cpm H3 Spike Activity (dpm on count date) 6929.6 dpm Counter Efficiency cpm/dpm 0.3919 5 . Sample Info: Sample Gross Count Rate (cpm) 9.2 cpm Sample Count Time (min.) 10.0 min. Net Sample Count Rate (cpm) 1.1 cpm 6 . Critical Level: Critical Level Count Rate (cpm) 2.1 cpm **Minimum Detectable Activity** (Bkg cpm) (Bkg cpm) Minimum Detectable Activity (uCi/ml) = 3.3 x (Bkg mln.) (Smpl min.) 1.21E-06 uCi/ml Efficiency x 2.22E6 dpm/uCl x Sample Volume Sample Activity Sample Activity (uCi/ml) = Sample Net cpm MDA Efficiency x 2.22E6 uCi/ml x Sample Volume Date 5-17-10

Form 76.000.39 Att 1 P1/1

DTC: TGCHEM

File: 1319.02

DETROIT EDISON FERMI-2 POWER PLANT

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#### Fermi 2 Radiation Protection Gamma Spectroscopy Report

Sample ID Number: EF-1 SUMP#18

Sample collection start date: 10-MAY-2010 14:50:00.00 Sample collection end date : 10-MAY-2010 14:50:00.00

Type of sample : 1 L Mari. Liquid Sample quantity : 1.00000E+03 cc

Sample geometry: M2LL

Operators JNS

Detector number : DET 4 Acquire date : 15-JUN-2010 11:34:25.80

Preset live time : 0 00:45:00.00 Elapsed live time : 0 00:45:00.00

Elapsed real bime : 0 00:45:00.69 Percent dead time : 0.03 %

иниминиминиминиминиминими Calibration Parameters ининиминиминиминиминиминими

Detector number: DET 4 Yearly cal date: 3-JUN-2009 17:37:00.00

Kev/channel : 4.99767E-01 Zero offset: 3.33491E-01

Daily cal date : 15-JUN-2010 08:23:12.97

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Start channel: 100 End channel: 4096

Height sensitivity: 5.00000 Shape sensitivity: 10.00000

Maximum number of iterations to resolve multiplets : 5

Environmental Paclice Identification Parameters иниципичения иниципичения

Energy tolerance : 1.75000 : Half-life ratio : 10.00000 Abundance limit : 75.00000 Library : dacmaster.nlb

Efficiency file : EFFD4\_m211 Efficiencies at : Peak energy

ACCRECATE AND AC

, P94	It	Energy	Area	Blegnd	FWHM	Channel	Left	Pω	Cts/Sec	WErr	Fit
1.	0	511.00	148	59	2.47	1021.85	1042	21	5.49E-02	15.2	
2	0	558.06	53	21	4.14	1116.02	1107	21	1.96E-02	25.6	
.3	(2)	1119.85	34	10	3.14	2240.27	2231	19	1.245-02	28.0	
1,	72)	4 A C Ch COCh	4.07.4	Cit	$\mathcal{O} = \mathcal{O} \mathcal{O}$	papp pa	\$2.40 ft 197	4 85	20 (C) (C) (C)	$C_0 = C_0$	

Sample Title : EF-1 SUMFW16 . Decay Time = 35 20:44:25.88

Page : 1 Acquisition Time = 15-JUM-2010 11:34:25.6

## Post-NID Peak Search Report

It	Energy	Area	Ekgnd	FWHM	Champel	Left	Phy	SETT	Fit	Muclides
Ø	511.00	148	59	2.47	1021.85	1012	21	15.2		Anri Reak
(2)	556.06	53	21	4,14	1116.02	1107	21	25.6		Have
(2)	1149.85	34	1.00	3.14	2240.27	2231	1.9	28.0		13214
(2)	1460.90	1.04	0	2.38	2922.80	2915	1.5	9.8		K-40

9.81

Nuclide Types natural

Uncorrected Decay Corr 1-Sigma ME III uCi/aa %Albm MError Area uCi/cc Huclide. Energy 10.67\* 2.501E+00 3.901E-07 3.9018-07 K-40 1460.81 1.034

Flags "" = Keyling

Summary of Muclide Activity Sample ID : EF-1 SUMP#10

Acquisition date : 15-JUN-2010 11:34:25

Total number of lines in spectrum

Number of unidentified lines .

(2) 14

Number of lines tertatively identified by NID

100.00%

Nuclide Type : natural -

Uncorrected

Decay Corr 1-Signa

Nuclide

Hlife.

uCi/cc . Decay 1.00

Decay Corr uCiZee

1-Sigma Error MError Flags

K--40 1.00E+05Y

3.901E-07

3.901E-07

0.302E-07

9.81

- Total Activity :

3.9018-07

3.901E-07

Grand Total Activity : 3.901E-07

3.901E-07

Flags: "K" = Keyline not found

"E" = Manually edited

"H" = Manually accepted

"A" = Nuclide specific abn. limit

Nuclide F-18	Half-life 109.74M %	470.81	Energy %At 511.00%193 Found = 100	3.46 1.000E+35 15.24 Decay
SC-46	83.83D	0.43	_ 889.25% 99	2.70 Not Found Abun. 2.98 Not Found 2.99 1.556E-08 28.02
`	61.7 70	Abundances		9.99 1.556E-08 28.02 3.07
AS-76	26.324	32 <b>.</b> 72	571.30 0 657.03 6	3.70 1.785E+02 25.61 Decay, Abun. 3.17 Not Found 3.14 Not Found 3.10 Not Found 3.39 Not Found
	, .		740.12 0 1771.76 0 967.63 0	0.12 Not Found 0.12 Not Found 0.12 Not Found
			1212.72 1 1216.02 3	63 Not Found L84 Not Found L39 Not Found
	<b>1</b> %	Abundances	1453.60 0 1787.67 0	L33 Not Found L13 Not Found L33 Not Found
KR-90	32. 329	95916.34	121.82 32 539.49 29	.00 Not Found Decay, Abun. .00 Not Found .00 1.000E+35 28.02
	26	Abundances		.76
BI-214	19.90M	2596. 33	768.36 5 934.06 3 1120.29 15 1238.11 5 1377.67 4	.30 — Not Found — Decay, Abun04 — Not Found — .10 1.000E+35 28.02 .94 — Not Found — .11 — Not Found —
	%	Abundances		.80 Not Found .81 (Abn. Limit = 48.48%)

Flags "w" = Keyline

Unidentified Energy Lines Sample ID : EF-1 SUMP#10 Page: 5 Acquisition date : 15-JUN-2010 11:34:25

rt	Energy	Area	Etcynd	FWHM	Channel	Left	Pω	Cts/Sec	marr	26E 7 7	Flags
0	511.08 558.06	148	,,	2.47						4.88E+00 4.69E+00	
	1119.85	34	****	3.14						2.90E+00	

Flags: "T" = Tentatively associated

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### Minimum Detectable Activity Report

	Bokgnd	Energy	MDA
Muclide	Sum	· (keV)	(uCi/cc)
		•	•
EE-7	en e	47759	7.4644E-08
F-18	÷ (3 ,	511.00	Half-Life too short
NA-22	9.	1274.54	6.466AE-09
MG-24	. O . O . O . O . O . O . O . O . O . O	1368.53	Half-Life too short
MG-27	Ø.,	1014.44	Half-Life too short
CL-38	Ø. ´ .	1642.42	Half-Life too short
AR-41	() <b>.</b> .	1293.64	Half-Life too short
SC-46	1.6.	889.25	8,7491E-09
CR-51	35.	320. 08	1.27256-07
MH-54	on the Carolin	834.83	7.7556E-09
CO-56	12.	1230.25	1.4040E-08
MH-56	∅.	1810.69	Half-Life too short
NI-56	41	158.38	2.9114E-07
CO-57	31.7	122.06	6.3577E-09
CO-58	16.	810.76	8.52246-09
FE-59	1.2.	1099.22	1.99236-08
CO-60	1.62	1332.49	7.1566E-09
CU-64	Ø "	1345.90	Half-Life too short
MI-65	a.	1481.84	Half-Life too short
ZN-65	1.1.	1115.52	1.3776E-08
ZN-69FI	Ø.,	438.63	Half-Life too short.
9E-75	49.	136.00	1.1668E-08
A9-75	er va Øa	559.10	Half-Life too short
BR-82	, (9 <sub>n</sub>	776.49	Half-Life too short
BR-83	,	529.64	
BR-84	(2) <b></b>	881.50	Half-Life too short Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR85	0740 0740 0740	513.99	1.7472E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	### #272 ii	513.99	1.1036E-08
RB-86	9,	1076.63	
KR-87	0.	402.58	2.4067E-07 Half-Life too short
9R-97M	0.	388, 40	Half-Life too short
KR-88	() "	196.32	Half-Life too short
RB-98	(3 n	1302.39	Half-Life too short
Y-88	4	1836.01	
			6.9801E-09
KR-89	Ø.,	220.90	Half-Life too short
RB-89	Ø.,	1031.88	Half-Life too short
KR-90	0	1118.69	Half-Life too short
RB90	(2) a	831.69	Half-Life too short
RB90H	Ø	824.23	Half-Life too short
Y-90M	. <u> </u>	200.51	Half-Life too short
SR-91	2	1024.30	Half-Life too short
Y91	12.	1204.90	3.4780E-06
Y-91M	Ø.,	555.80	Half-Life too short
SR-92	<u>@</u> .	1383.94	Half-Life boo short
Y-92	O <sub>.</sub> ,	934.46	Half-Life too short

Acquisition date : 15-JUN-2010 11:34:25

	Bekgnd	Energy	MDA
Nuclide	Sum	(k@V) Î	(uCi/ce)
SR-93	Ø.,	, 590.28	Half-Life too short
Ÿ-93	0.	266.90	Half-Life too short
NB-94	16.	702.63	5.24715-09
NB-95	20.	765.79	1.25556-08
NB-95M	49.	235.69	2.1855E-05
ZR-95	15.	756.72	1.4514E-08
MB-97	4.57 n Ø 6	657.90	Half-Life too short
ZR97	8) " 8) "	743.36	Half-Life too short
MO-99		739.58	Half-Life too short
TC-99M	2)	140.50	Half-Life too short
TC-101	0. 0.	306.81	Half-Life too short
RU-103	34	497.08	1.2718E-08
TC-104		357.99	Half-Life too short
RH-105	Ø.*	318.90	Half-Life too short
RU-105	a.	724.50	Half-Life too short
RU-106	1.7.	62184	5.3972E-08
CD-109	36.	98.03	2.4547E-07
AG-110M	18.	937,49	2.2959E-08
81-113	24.	391.69	0.9411E-09
SN-117M	42.	158.56	3.5536E-08
SB-122	Ø.,	563.93	Half-Life too short
SB-124	22 a	602.71	8.35286-09
SB-125	30.	427.89	1.67238-06
TE-125M	30.	109.28	3.3710E-06
TE-127		417.90	Half-Life too short
TE-127M		57.60	1.9734E-05
XE-127	48 a	202.84	1.55506-08
TE-129		459.60	Half-Life too short
/TE-129M	ya e gyan Kusa e	695.88	4.0022E-07
XE-129M	60.	196.56	2.0656E-06
1-130	Notice in the second of the se	536.09	Half-Life too short
BA-131	49.	123.80	1.7009E-07
1-131	30.	364.48	1.3669E-07
TE-131	· Ø.	149.72	Half-Life too short
TE-131M	. O.	773.67	Half-Life too short
XE-131M.	49,	163.93	2.1930E-06
1-132	0.	667.69	Half-Life too short
TE-132	Ø.	220.16	Half-Life too short
BA-133	43.	302.84	3.1024E-08
BA-133M	. 0.	276.09	Half-Life too short
1-133	Ø.	529.67	Half-Life too short
TE-133M	Ø.	912.58	Half-Life too short
XE-133	30.	81.00	3.0736E-06
XE-133M	Ø.,	233.22	Half-Life too short
CS-134	23.	604.70	5.8431E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	Ø.	268.24	Half-Life too short
I-135	Ø.	1260.41	Half-Life too short
XE-135	Ø.	249.79	Half-Life too short
XE-135M	Ø.	586.56	Half-Life too short
	12.7 16	Sal ho Sal II Sal Sal	CONTRACT CONTRACTOR SOLUTION SOLUTION OF

	Bokgnd	Energy	MCA .
Nuclide	Stun	(kaV)	(CaCazee)
Patternal actions	SOUTH	VE:88/4/7	COUNTY COUNTY
CS-136	6.	819.50	2.620 <i>0</i> E-08
1-136	Ø.	1313.02	Half-Life too short
CS-137	20.	661.65	6.4242E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	
			Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	Ø.	1420.50	Half-Life too short
CE-139	51.	165.85	7.9896E09
CS-139	0.	1203.23	Half-Life too short
BA-140	<b>26.</b>	537.32	1.5463E-07
LA-140	Ø.,	1596.49	<ul> <li>Half-Life too short</li> </ul>
BA141	Ø	:190.22	Half-Life too short
CE-141	48.	145.44	2.3756E-08
LA141	Ø.,	1354.52	Half-Life too short
BA-148	Ø.	255.12	Half-Life too short
LA-142	: O.,	641.17	Half-Life too short
CE-143	0.,	293.26	Half-Life too short
CE-144	57 45 57 160 a	133.54	5.8685E-08
PR-144	Ø.	1489.15	Half-Life too short
ND-147	37.	91.10	2.8093E-07
PM-148M	21.	550.27	•
EU-152	30.		9.0244E-09
EU-154	122	344.27	1/8632E-08
,		1004.76	3.4125E-00
EU-155	36.	105.31	3./0890E08
EU-156	19.	,646,29	3.7930E-07
HF-181	£ 25.	482.03	1.0093E-08
TA-182	. B.	1221,42	2.6413E-08
W-187	(i)	635.81	Half-Life too short
RE-188	. Ø.	155.03	Half-Life too short
HG203	43.	[279, 19]	1.1906E-08
BI-207	Control of the Contro	569.67	5.89556-09
TL-208	Ø.,	583.14	Half-Life too short
PR-212	. Ø.	238.63	Half-Life too short
BI-214	: Ø.,	609.31	Half-Life too short
PB-214 .	ø.	351.92	Half-Life too short
RA-224	53.	240.98	1.4068E-04
RA-226	56.	186.21	
AC-228	35.		1.7164E-07
TH-228		336.32	4.6481E-08
	15 H	84.37	9.9306E-07
PA-234 /	Ø,,	131.20	Half-Life too short
TH-234	43.	63.29	2.2602E-06
U-235	64.	143.76	5.8647E-08
MP-239	Ø.,	106.13	Half-Life too short
AM-241	31.	59.54	1.1663E-07
	•	F	•

# FERMI 1 NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Log Number	,	
Task	Performed By	Date
1. Representative sample collected.  Date/Time 12/7/10 1 0840  Container Number 54 10  Storage Location EF-1	Fermi 1 (signature)  B 3 30 8  Employee ID Number	12/7/10
2. Sample secured against tampering.	Fermi 1 (signature)  B 330 8  Employee ID Number	2/7/10
3. Tritium LLD < = 2 E-6 uCi/ml Actual tritium LLD =  No tritium activity detected. (If tritium activity detected do not sign, and explain in Remarks.)	Chemistry (signature)  5 k z 3 c  Employee ID Number	12/11/10
4. Gamma spectroscopy count completed on system suitable for MRP18 evaluations.	RP (signature)  RP (signature)  2 1 2 2 5  Employee ID Number	1-18-()
5. Gamma spectroscopy report shows no identified peaks above critical level due to licensed radioactive material. (Note disposition of unidentified peaks on gamma spectroscopy report.  If licensed material detected, do not sign, and explain in Remarks.)	Radiological Engineering (signature)  Employee ID Number	<u>1-/8-//</u>

## FERMI 1 NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

	·
Performed By	Date
Radiological Engineering (signature)	1-18-11
Employee ID Number	<u>.</u>
	Radiological Engilbeering (signature)

	Sample Information			
<ol> <li>Sample Location</li> <li>Date Sampled</li> <li>Time Sampled</li> <li>Sample Volume, (ml)</li> </ol>		E	EF1 SUMP 10 12/07/2010 08:40 4	ml
4 . Sample volume, (mi)			-1	
	Instrument Count Data		-	
1 . Date Sample Counted			12/10/2010	
2 . Time Sample Counted			19:30	
3 . Background Inf.:	· ·		, 0,00	
Minutes Counted			10	min.
Background Count Rate (cpm)			9.3	cpm
4. Efficiency Inf.: (Daily Spike Sou	rce ID # 111)		0.0	Орт
Gross Spike Count Rate (cpm)	•		2435,0	cpm
Net Spike Count Rate (cpm)			2425.7	cpm
H3 Spike Activity (dpm on count date)			6711.4	dpm
Counter Efficiency			0.3614	cpm/dpm
5 . Sample Info:		•		-
Sample Gross Count Rate (cpm)			7.0	cpm
Sample Count Time (min.)	:		10.0	min.
Net Sample Count Rate (cpm)	t · · ·		0.0	cpm
6 . Critical Level:	•			
Critical Level Count Rate (cpm)			2.2	cpm
Mirlinimum Detectable Activity (uCi/ml) = $3.3 \times$	(Bkg cpm) (Bkg cpm) (Bkg mln.) + (Smpl mln.)	·	1.40E-06	uCi/ml
minipiditi Detectable Activity (domini) - 3.3 x	Efficiency x 2.22E6 dpm/uCl x Sample Volume		1.402-00	uomni
	Sample Activity			
Sample Activity (uCi/ml) =	Sample Net cpm	<	MDA	
	Efficiency x 2,22E6 uCl/ml x Sample Volume			
	•	•		
·	<b></b>			
				, _
Technician (		Date_	12/11/ 14	<u>10</u>
Reviewed By:		Date	12/18/ 1/18/	<u>//1</u> 0 //12
Form 76.000,39 Att 1 P1/1	DTC: 1	rgchen	file:	1319.02

With the distribution distribut DETROIT EDISON FERMI-2 POWER PLANT 10-JAN-2011 17:14:56.34 RADIATION PROTECTION DEPARTMENT GAMMA SPECTROSCOPY AMALYSIS REPORT HIGH EFFICIENCY DETECTOR Sample ID Number: SUMP #10 Sample End Time: 7-DEC-2010 08:40:00.00 REMARKS

PERFORMED BY:

PAGE\_\_\_of\_

Acquisition date : 18-JAN-2011 16:29:55

Sample ID : SUMP #10

### Fermi 2 Radiation Protection Gamma Spectroscopy Report

Sample ID Number: SUMP #10

Sample collection start date: 7-DEC-2010 08:40:00.00 Sample collection end date : 7-DEC-2010 08:40:00.00

Type of sample : 1 L Mari. Liquid Sample quantity : 1.00000E+03 cc

Sample geometry : M2LL Operator: DP

- and and a construction of the contraction of the

Detector number : DET 4 Acquire date : 18-JAN-2011 16:29:55.02

Preset live time : 0 00:45:00.00 Elapsed live time : 0 00:45:00.00

Elapsed real time : 0 00:45:00.70 Percent dead time : 0.03 %

emembers encommencement Calibration Parameters encommencementers encommencementers

Detector number: DET 4 Yearly call date: 23-JUN-2010 12:28:00.00

Kev/channel : 5.00027E-01 Zero offset: -4.98268E-02

Daily cal date : 18-JAN-2011 13:42:00.84

encommence encommence encommence of the second part of the second encommence of the second encom

Start channel: 100 End channel: 4096

Height sensitivity: 5.00000 Shape sensitivity: 10.00000

Maximum number of iterations to resolve multiplets : 5

жиниминиминиминиминим Muclide Identification Parameters ининиминиминиминиминим

Energy tolerance: 1.75000 Half-life ratio: 10.00000 Abundance limit: 75.00000 Library: dacmaster.nlb

ple	Τt	Energy	Area	Blegynd	EMMAN	Channel	Left	Pu	Cts/Sec	%Err	Fit
.1.	Ø	198.71	. 44	1.06	1.16	397.51	392	1.0	1.63E-02	465	
2	0	295.,38	102	gg	185	590.82	584	14	3.78E-02	18.4	
3	(3	352.46	1.694	94	136	704.98	698	1.5	3.74E-02	23.2	
4	.3	509.96	74	59	2.00	1019.96	1016	1.3	2.76E-02	22.3	1.05E+00
.53	.3	511.77	65	66	195	1023.50	1016	1.3	2.395-02	29.6	•
6	(2)	.558.47	56	40	1.14	1116.97	1112	12	2.08E-02	26.0	
7	(3)	609.35	1.66	. 39	164	1218.74	1212	1.4	6:16E-02	11.1	
8	(2)	1120.74	59	19	2.00	2241.45	2234	1.6	2.18E-02	22.4	
9	(2)	1460.82	91	1.4	3.22	2921.56	2913	1.8	3.30E-02	14.1	
10	(9)	1764.52	56	4	1.42	3520,93	3520	j. :::i	2.06E-02	15.4	

Sample Title : SUMP #10 Decay Time = 42 07:49:55.02

Page : 1 Acquisition Time = 18-JAN-2011 16:29:55.0

## Post-NID Peak Search Report

				•					•
It	Energy	Area	Blegnd	FWHM	Channel	Left	bilit	MErr	fit Nuclides
0	198.71	44	106	1,16	397.51	392	10	46,5-	HUSC
(a)	295.38	102	ww	1.85	590.82	584	1.4	18.4.	<u></u>
Ø,	352,46	3.Ø1	94	1.36	704.98	6 <u>98</u>	1.5	23.2	Pb-214
197	509.96	74	59	2,00	1019.96	1016	A37	22.3	1.05E+00 . Annofrek
	511.77	65	66	1.95	1023.58	(1916)		29.6_	77777 (61)
<b>(3</b> )	558.47	56	40	1.14	1116.97	1112	12	26.4	- Huse
Ø	609.35	166	39	1.64	1218.74	1212		11.1	Ringel
0	1120.74	59	. 19	2.00	2241,45	2234	16	22.4	81-214
(3)	1460.82	91	14	3.22	2921.56	2913	1.8	14.1	K-40
(9)	1764.52	56	4	1,42	3520.93	3520	15	15.4	Bi-2-14
	<u>.</u>			1	•				B-1-18-11
	•								

Nuclide Line Activity Report Sample ID : SUMP #10 Page: 2 Acquisition date: 18-JAN-2011 16:29:55

Muclide Type: natural

Uncorrected Decay Corr 1-Sigma 类Abn uCiZee uCi/cc Muclide 郑臣子子 Energy Area %Error K---4(2) 3.426E-07 10,67% 1460.81 91 2.5016+00 3.4266-07 14.09

Flag: "\*" = Keyline

Summary of Nuclide Activity
Sample ID : SUMP #10

Page : 3 Acquisition date : 18-JAN-2011 16:29:55

10

Total number of lines in spectrum Number of unidentified lines

Number of lines tentatively identified by NID 9 90.00%

Nuclide Type : natural

Uncorrected Decay Corr Decay Corr 1-Sigma uCi/cc 1-Sigma Error %Error Flags Hlife Decay uCizee Nuclide -0.483E-07 K--40 1.00E+05Y 1.00 3.426E-07 3.426E-07 14.09

Total Activity : 3.426E-07 3.426E-07

Grand Total Activity : 3.426E-07 3.426E-07

Flags: "K" = Keyline not found "F" = Manually accepted

"E" = Manually edited "A" = Nuclide specific abn. limit

		Half-Life			Activity 1-Sigma	
Nuclide	Half-life		Energy	%Aband		Rejected by
F-18	109.74M		511.00%		1.000E+35 £9.63	Decay
		Abundances	Found =	100.00		
115.115 1 P	75 PS - 75 PS TS	(m) 102 st	4 675 8773	2000 - 1200	Not Found	Za la
SC-46	03.630	0.51	142.53 889.95w		Not Found	Abun.
			1120.51	99.99	2,880E-00 22.45	
		Abundances		30.07		
					•	
SE-75	119.780	0.35	66.05		Not Found	Abun.
		•	96.73	3.41	Not Found	
			121.12		Not Found	
		,	136.00%		Not Found	
			198.60	1.45	5.879E-07 46.54	
			26465	591.80	Not Found	
	à .		279.53	25,20	Not Found	•
			303.91	. 1.32	Not Found	
	•		400.65	11.40	Not Found	
	74	Abundances	Found =	0,81		
AC"26	26.32H	38.61	559.10%	44.70	1.125E+04 26.00	Decay, Abun.
AS-76	mwa wmii	CONTRACTOR OF THE	563.23		Not Found	Assessed by the processing
			571.30		Not Found	
	•		657.03	,	Not Found	•
			665.31		Not Found	
		•	740.12	0.12		
			77176	0.12		
	•		867.63	0.12	Not Found	•
			1129.87		Not Found	•
			1212.72	1.63		
•		*			Not Found	
			1216.02 1228.52		Not Found	
•	1					
	•		1439.13		1116 16 1 16 16 17 17 17	
			1453.60		1 1507 57 1 30 205 7 1 10	•
	n.e	A ha a com of 11 an an an an	1787.67	73.70	Not Found	•
	94	Abundances	· ·	rson rso		_
RU-103	39.35D	1.08	497.08%	89.00	Not Found	Abun.
			610.33	5.60		
	7/4	Abundances	Found =	5.92		•
NATIONAL PRINT		111.55	9 4 G 7 7 G W	0.43 SIG	Not Found	Decay, Abun.
XE-135	9.11H	di di di 10 setted	608.19	2.89		war as he demonstrate
	96	Abundances		3.11	THE CONTRACTOR OF SOME COMME	
	ζ	1 1 10 3 5 1 1 5 1 5 1 5 1 5 1 5 1 6 5 6 6 6	- X3C 307 8 - 341			
B1-214	19.90M	3963.94	609.31%		1.000E+35 11.08	Decay .
			768.36		Not Found	
			934.06		Not Found	
			1120.29		1.000E+35 82.45	
			1230.11		Not Found	
					Not Found	
			1764.49	15.80		d Minds
	<b>%</b>	Abundances	Found ™	80.84	- (Abn. Limit = 48.	48%)

Rejected Report (continued) Sample ID : SUMP #10

Page : 5 Acquisition date : 18-JAN-2011 16:29:55

		Half-Life			Activity 1-Sigma		
Nuclide	Half-life	Ratio	Energy	%Abund	(uCi/cc) %Error	Rejected	by
PB214	26.801	2275.09	87.30	4.67	Not Found	Decay	
	1		241,98	7.49	Modo Found		
			295, 21	19,20	1.0005+35 18.41		
	1		351,92%	37.20	1.0006+35 23.17		
	•		785.91	1.10	Not Found		
	100	Abundances	Found =	80.96	(Abn. Limit = 37	. 20%)	

Flag: "" = Keyline

Unidentified Energy Lines Sample ID's SUMP #10

Page: 6 Acquisition date: 18-JAN-2011 16:29:55

It	Energy	Area	Blagnd	ғынм	Channel	Left	pin	Cts/Sec	%Err	%ETT	Flags
(3)	198.71	44	1.06	1.16	397.51	392	1.0	1.63E-02	465	6.606+00	ï
(2)	295.38	1.02	55	1.85	590.82	584	1.4	3.78E-02	18.4	6.09E+00	ΪΪ
(3)	352.46	101	94	1.36	70498	698	15	3.748-02	23.2	5.70E+00	γ
3	509.96	74	59	2.00	1019.96	1016	1.3	2.76E-02	22.3	4.88E+00	
3	511.77	65	66	195	1023.58	1016	1.3	2.396-02	29.6	4.88E+00	γ
(2)	55 <i>8</i> , 47	56	40	1.14	1116.97	1112	12	2.08E-02	26.0	4.69E+00	T
(2)	609.35	166	39	1.464	1218.74	1212	1.4	6.16E-02	11.1	4.52E+00	T
0	1120.74	59	19	2.00	2241.45	2234	16	2.185-02	22,4	2.90E+00	Ţ
(2)	1764.52	56	4	1.42	3528.93	3520	15	2.06E-02	15.4	2.26E+00	Ϋ́

Flags: "T" = Tentatively associated

nonnouncementation form 2 MDA Report, Generated 18-JAM-2011 17:15:00.34 a menseum mens

### Minimum Detectable Activity Report

	Bokgnd	Energy	MDA
Muclide	Sum	(keV)	(uCi/cc)
91.110 -4	1	A natural traction	
BE-7	30.	477.59	1.0352E-07
F-18	Ø.	511.00	Half-Life too short
NA22	14.	1274.54	7.69686-09
NA-24	Ø.	1368.53	Half-Life too short
MG27	<u>@.</u>	1014.44	Half-Life too short
CL-38	(2)	1642.42	Half-Life too short
AR-41	g. Ø.	1293.64	Half-Life too short
SC-46	22.	88925	1.0538E-08
OR-51	45°	320.08	1.6789E-07
MN54	40.	834.83	1.0129E-00
CO~56	31.	1230.25	2.2543E-00
MN-56	Ø.,	1810.69	Half-Life too short
MI-56	75.	158.38	7.9959E-07
00-57	58.	122.06	8.5542E-09
CO-58	23.	810.76	1.0679E-08
FE-59	15.	1099.22	2.4266E-08
00-60	21.	1332149	9.3461E-09
CU~64	() a	. 1345.90	Half-Life too short
NI-65	Ø.,	1481.84	Half-Life too short
ZN-65	21.	1115.52	1.03256-00
ZN-69M	0.,	438.63	Half-Life too short
SE-75	54,	136.00	1.2624E-08
AS-76	Ø.	559.10	Half-Life too short
BR-82	Ø.,	776.49	Half-Life too short
BR-83	Ø.	529.64	Half-Life too short
BR-84	Õ.	881.50	Half-Life too short
BR-85	ø.	802.41	Half-Life too short
KR85	68.	513.99	1.9739E-Ø6
KR-85M	Ø.	151.18	Half-Life too short
SR-85	68.	513.99	1.3345E-08
RB-86	18.	. 1076.63	4.1327E-07
KR-87		402.58	Half-Life too short
SR-87M	(i)	388.40	Half-Life too short
KR-88	Ω.	196.32	Half-Life too short
RB-88	. O.	1382.39	Half-Life too short
V0.0	*3	1836.01	6.5807E09
KR-89	ø.	,220.90	Half-Life too short
RB-89	0,	1031.88	
KR-90	Ø.,	1118.69	
RB-90		831.69	
RB-90M		-824.23	
Y-90M	0.	202.51	
SR-91	0	1024.30	
Y-91	167	1804.90	Half-Life too short 3.65205-06
Y-9im	4. 65. a (9. a	555.60	Half-Life too short
SR-92	Ö.	1383.94	Half-Life too short
Ÿ-92	ø.	934.46	- Half-Life too short
•			

inued) Page : 2 Acquisition date : 18-JAN-2011 16:29:55

	Contract of	. 1	16175.75
Nuclide	Bekgnd	Energy	PDDA
MOCATIFO ®	Sum	(keV)	(uCi/cc)
8R-93	Ca.	1 BELISTA - CS O	Lie Tefferel et effere de marie automatic
ormoo Y93	Ø.	'590.28	Half-Life too short
	. O.	266.90	Half-Life too short
NB-94	24.	702.63	6.2021E-09
NB-95	17.	765.79	1.3555E-08
NB-95M	(2) <sub>u</sub>	235,69	Half-Life too short
ZR-95	17.	756.72	1.6348E-08
MB97	Ø.,	657,90	Half-Life too short
- ZR-97	Ø.	743.36	Half-Life too short
P10-99	Ø.,	739.58	Half-Life too short
TC9911	Ø.	, 1.40.50	Half-Life too short
TC-101	() a	306.81	Half-Life too short
RU-103	26.	497.08	1.2650E-08
TC-104	. Ø.,	357.99	Half-Life too short
RH-105	Ø.,	318.90	Half-Life too short
RU-105	Ø.	724.50	Half-Life too short
RU-106	J. J	681.84	A N. H. D. A. 1114
CD-109	48.	88.03	
AG-110m	19.	937.48	2.8319E-07
SN-113	29.		2.3646E-08
SN-1170		391.69	1.0012E-08
	74.	159.56	6.3941E-08
SB-122	0.,	563.93	Half-Life too short
SB-124	41	, 602. 71	1.1896E-08
SB-125	33.	427,89	1.9404E-08
TE-125M	53.	. 109.28	4.2401E-06
TE-127	Ø.	417.90	Half-Life too short
TE-127M	47.,	57.60	2.5563E-05
XE-127	61.,	202.84	1.9608E-08
TE-129	Ø.	459.60	Half-Life too short
TE-129M	24.	695.88	4.4935E-07
XE-129M	79.	196.56	3.8091E-06
I-130	Ø.,	536,09	Half-Life too short
BA-131	61.	123.80	2.7594E-07
1-131	31.	364.48	2.3983E-07
TE-131	Ø.	149.72	Half-Life too; short
TE-131M	Ø.	773.67	Half-Life too short
XE-131M	66.	163.93	3,6863E-06
1-132	· Ø.	667,69	Half-Life too short
TE-132	. 0.	228.16	Half-Life too short
BA-133	60.	302.84	3.6360E-08
BA-133M	. O.,	:276.09	
I-133		1529.87	Half-Life too short
TE-133M			Half-Life too short
XE-133	Ø.	912.58	Half-Life too short
XE-133M	56. a	81.00	9.5637E-06
	0.	.233.22	Half-Life too short
CS-134	21.	604.70	5.6757E-09
I-134	Ø.	884.09	Half-Life too short
TE-134	Ø.,	210.47	Half-Life too short
36-1354	Ø.	268,24	Half-Life too short
1-135	(2) <sub>n</sub>	1260.41	Half-Life too short
XE-135	(3 <sub>4</sub>	249,79	Half-Life too short
XE-135M	Ø "	526.56	Half-Life too short

	Bekgnd	Energy	MDA
Nuclide	Sim	- (kœV)	(uCi/cc)
	<u> </u>		
CS-136	1.2.	818.50	4.9937E-08
1-136	Ø.	1313.02	Half-Life too short
CS-137	24.	661.65	6.8833E-09
XE-137	Ø.,	1.4551.49	Half-Life too short
09-138	Ø.,	1435.86	Half-Life too short
XE-138	Ø.	258.31	Half-Life too short
BA-139	· Ø.	1420.50	Half-Life too short
CE-139	46.	165.85	7.8950E-09
CS-139	0.	1283.23	
	625 a		Half-Life too short
BA-140			2.1694E-07
LA-140	Ø.,	1596.49	Half-Life too short
四角-141	Ø.	190,22	Half-Life too short
CE-141	56.	145.44	2.9484E-08
LA-141	Ø.	1354, 52	Half-Life too short
BA-142	€3	255.12	Half-Life too short
LA-142	Ø.,	641,17	Half-Life too short
CE-143	Ø.	293,26	Half-Life too short
CE-144	62.	133.54	6.5042E-08
FF-144	Ø.,	1489.15	Half-Life too short
ND-147	59.	91.10	5.2697E-07
PM-146M	29.	550.27	1.2668E-08
EU-152	45.	344.27	2.2401E-08
EU-154	14.	1004.76	3.7467E-08
EU-155	a, 14 a 1022) Willian	105.31	
EU-156	6.765 n ey ey 6.755 n	646.29	3.6769E-08
			5.3956E-07
HF-181	30.	482.03	1.50725-00
TA-182	1.3.	1221,42	3.4096E-08
W-187	Ø	685.81	Half-Life too short
RE-188	Ø.	155.03	Half-Life too short
HG-203	57.	279.19	1.4906E-08
BI-207	33.	569.67	6.5189E-09
TL-208	Ø.,	583.14	Half-Life too short
PB-212	Ø.	238.63	Half-Life too short
BI-214	Ø.,	609.31	Half-Life too short
PB-214	Ø.,	351.92	Half-Life too short
RA-224	Ø.	240.98	Half-Life too short
RA-226	76	186.21	1.9795E-07
AC-228	46.	330.32	5.2570E-0a
TH-228	54.	84.37	9.9075E-07
PA-234	Ø.	131.20	Half-Life too short
TH-234	47.	63,29	
u-235			2.8153E-06 ·
	62.	143.76	5.7868E-08
NP-239	Ø.,	106.13	Half-Life too short
AM-241	46	59.54	1.3976E-07

EF-1 Sump #10 2011

## FERMI I NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Log Number	·	
Task	Performed By	Date
1. Representative sample collected.	A	
Date/Time 5/13/11 1 1600	Fermi 1 (signature)	5.13.11
Container Number Sump #10	134016	
Storage Location 67	Employee ID Number	<del>.</del> .
2. Sample secured against tampering.	Λ ./ ·	
	Chaffee	5.13.11
	Fermi 1 (signature)	
	134016	
	Employee ID Number	•
3. Tritium LLD <= 2 E-6 uCi/ml		
Actual tritium LLD = 1.186-16 uCi/ml		
DT_ total	Chemistry (signature)	5-15-11
No tritium activity detected. (If tritium activity detected do not sign, and explain in Remarks.)	Chemistry (signature)	
	5792	
•	Employee ID Number	•
4. Gamma spectroscopy count completed on	$\sim$ $\sim$ $\sim$	
system suitable for MRP18 evaluations.	RP (signature)	5.15-17
	0	
	154016	
•	Employee ID Number,	
	AD:	
· Communication	1115	.*
. Gamma spectroscopy report shows no dentified peaks above critical level due to	//pet/X	- 12 1
icensed radioactive material. (Note disposition	(feet)	5-16-11
f unidentified peaks on gamma spectroscopy eport.	Radiológical Engineering (signature)	
flicensed material detected, do not sign,	Z-1151	
nd explain in Remarks.)	Employee ID Number	
	Pubtolog in Minnet	and the second s

# FERMI 1 NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Log Number <u>ECI-L</u>	110027	
Task	Performed By	Date
. 6. Fluid approved for release.	Radiological Engineering (signature)	<u>5-16-11</u>
	Z-115/	
	Employee ID Number	
Remarks:	distinction	erminations and g, not los
	625-16-1	11

Sample Information 1. Sample Location EF1-L-110027 05/13/2011 2. Date Sampled 16:00 3. Time Sampled 4. Sample Volume, (ml) 4 ml Instrument Count Data 1. Date Sample Counted 05/15/2011 2. Time Sample Counted 18:55 3. Background Inf.: Minutes Counted... 10 min. Background Count Rate (cpm) 6.7 cpm 4 . Efficiency Inf.: (Daily Spike Source ID # 111) Gross Spike Count Rate (cpm) 2397.9 cpm Net Spike Count Rate (cpm) 2391.2 cpm H3 Spike Activity (dpm on count date) 6551,6 mqb Counter Efficiency 0,3650 cpm/dpm 5 . Sample Info: Sample Gross Count Rate (cpm) 6.4 cpm Sample Count Time (min.) 10.0 min. Net Sample Count Rate (cpm) 0.0 cpm 6 . Critical Level: Critical Level Count Rate (cpm) 1.9 cpm Minimum Detectable Activity (Bkg cpm) (Bkg cpm) Minimum Detectable Activity (uCl/ml) = 3.3 x (Bkg min.) 1.18E-06 uCi/ml (Smpl min.) Efficiency x 2.22E6 dpm/uCi x Sample Volume Sample Activity Sample Activity (uCl/ml) = Sample Net cpm MDA Efficiency x 2.22E6 uCl/ml x Sample Volume Technician Date 5-15-11 Date 5-16-11 Reviewed By:

DTC: TGCHEM

File: 1319.02

DETROIT EDISON FERMI-2 POWER PLANT

15-MAY-2011 16:56:12.16

mandan mandan mandan mandan mandan mandan mandan mandan mandan mandan mandan mandan mandan mandan mandan mandan

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY AMALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFI-L-110027 SUMP #10

Sample End Time: 13-MAY-2011 16:00:00.00

REMARKS DETUNOS

preceded by

Wandfurd

1

SIGNATE

#### Fermi & Radiation Protection Gamma Spectroscopy Report

Sample | ID Number: EFI-L-110027 SUPP #10

Sample collection start date: 13-MAY-2011 16:00:00.00 Sample collection and date : 13-MAY-2011 16:00:00.00

Type of sample : 1 L Mari, Liquid

Sample quantity: 1.00000E+03 cc

Sample geometry: M2LL Operator: CLP

ининининининининининининининин Acquisition Parameters инининининининининининининининин

Detector number : DET 4 Acquire date : 15-MAY-2011 16:11:09.55

Preset live time : 0 00:45:00.00 Elapsed live time : 0 00:45:00.00

Elapsed real time : 0 00:45:00.63 Percent dead time : 0.03 %

managementary de la la bration Parameters de menerale de menerale de management de la la bration de la la bratian de la bratian de la la bratian de la la bratian de la bratian de la bratian de la bratian de la la bratian de la bratian

Detector number: DET 4 Yearly cal date: 23-JUN-2010 12:28:00.00

Kev/chammel : 4.99792E-01 Zero offset: 2.10929E-01

Daily cal date : 15-MAY-2011 08:18:27.54

Start channel: 100 End channel: 4096

Height sensitivity: 5.00000 Shape sensitivity: 10.00000

Maximum number of iterations to resolve multiplets : 5

nnunununununununununun Muclide Identification Parameters ининининининининин

Energy tolerance: 1.75000 Half-life ratio: 10.00000 Abundance limit: 75.00000 Library: dacmaster.nlb

Pk	It	Energy	Arrea	Blegnd	FWHM	Channel	Left	Pω	Cts/Sec	%Err	Fit
1.	0	198.57	51.	102	1.20	396.89	390	1.3	1.90E-02	48.7	
22	(ð	352.17	56	47	155	704.20	701	5	2.075-02	24.9	*
.3	(2)	511.32	192.	43	2.52	1022.65	1.01.4	22.1	7.09E-02	1.1.1	
4	0	559.31	33	. 40	1.98	1118.67	1112	12	1.20E-02	43.4	
5	<b>(2)</b>	610.29	62	81	2.34	1220.67	1213	21	2.30E-02	38.9	
6	0	1119.99	30	2.7	1.67	2240.49	2231	1.8	1.11E-02	44.6	
72	62	1461.45	6.6	1.79	തെത്ത	2923.7A	2916	1.4	O. SSC-GO	1 & 6	

Sample Title : EF1-1-110027 SUMP #10 Decay Time = 2 00:11:09.55

Page : 1 Acquisition Time = 15-MAY-2011 16:11:09.5

Post-MID Peak Search Report

I (;	Energy	Area	Elegnd	1514444	Channel	Lieo filt	Pw XE	rr Fit	Muclides
Ø	198.57 352.17	. 51	102 47	i.20 i.55	396.89 704.20	390 701	13 42. 8 24.		Cosput Englishbullul (il ga) Pb-214
0	511.32	56. 192	43	2.52	1022.65	1014	21 11.	.1.	ANN Pack cosmic ENTREBUNINT
(2) (2)	559.31 610.29	33 62	40 81	2.34	1118.67	1112 1213	- 12 43. - 21 30.	•	Bi-214
Ø Ø	1119,99 -1461,45	30 69	27 7		2240.49 2923.70	2231 2916	18 44. 14:14.		В"-214 К-40
									f -5.16-11

Nuclide Line Activity Report Sample ID : EF1-L-110027 SUM

Page # 2 Acquisition date # 15-MAY-2011 16:11:09

Nuclide; Type: natural

Uncorrected Decay Corr 1-Sigma Nuclide: Area %Albin METT uCi/cc uCi/cc ` Energy MError 69 2.579E-07 K-40 10.67% 2.579E-07 1460.81 2.501E+00 14,58

Flag: "%" = Keyline

Summary of Nuclide Activity
Sample ID : EF1-L-110027 SUM :

Page : 3 Acquisition date : 15-MAY-2011 16:11:09

Total number of lines in spectrum

7

Number of unidentified lines |

Ø

Number of lines tentatively identified by NID

100.00%

Muclide Type : natural

Muclide Hlife Decay

Decay Corr

Decay Corr

1-Sigma

K-40 1.00E+05Y

1.00

uCi/cc uCi/cc 2.579E-07 2.579E-07

umbigma erro 0.376E-07

1-Sigma Error %Error Flags

.

1414 1444 14

14.58

Total Activity :

2.579E-07

Uncorrected

2.579E-07

Grand Total Activity :

2.579E-07

2.579E-07

Flags: "K" = Keyline not found '

"E" = Manually edited

"M" = Manually accepted

"A" = Muclide specific abn. limit

•			•						
Nuclide F-18	109.74		511.00		(uCi. 1.990	Zee)	Bigm <i>a</i> %Error 11.14	Reject Decay	æd by
SC-46	83.831	0.02		62.70 69.98				Abum.	
!	34	4 Abundances	1120.51 = Found =	99.99 38.07	1., 059	E08 .	44.56		
SE-75	119.78r	0.62	66.05		Not			Abum.	
į		·	96.73		Not				
. ]			121.12		Not				<b>Y</b>
in the second se					Not				
			198.60	145	5.432E		42.72		
	•	,	264.65	) 59.80		Foun			
,	•		:279.53	25.20	Not				
•		4	.303.91	$1_{-32}$					
•			400.65	11.40	Not	Found			•
•	<i>7</i> %	Abundances	Found =	0.81				•	• .
	, pag . pag	4 25 1014	1					*	
A9-76 - 1	, 26. 32H	1.85	559.10%		5.5a5E		43.40	Abur.,	
i			563.23		Not				
			571.30		Not				
1. 3		,	657.03		Not				
1			665.31		Not			•	
1		•	740.12		Not				
			771.76			Found			
			:867.63		Mot				
			1129.87		Not				
į			1212.72		Not			*	
			1216.02			Found			
į	•	,	1228.52			Found			
			1439.13	0.0 11 117 114		Found			
.	V.		1453.60			found			
	and the same	Aborement a common of	1787.67		Not	Found	**** **** ****		
1	W.	Abundances	P VOLUMENT	73.70			*		•
KR-90	32.329	5409.03	121.82	32.00	Not	Found		Decay, Al	buos
,	•		539.49		Not			20 m m m 27 g 1 10	
1			1118:69%		1.000E		4.56	•	
·	% .	Abundances	',	3776		,,			
200, 8 2 20, 10 3	100,000, no. 400,400,000		4 512 912 - 515 34	41 41 41 41				•	
FU-103	39.35D	0.05	497.08%					Abum	
:	nd t	<b>61</b>	_618.33	5.60	2.548E-	07 3	8.90		
į	, ya	Abundances	m Otther ##	5.92					
PM-146M	41.30p	ð. 25	288.11	12.56 -	Not	Found		Abum.	
•			414.07	16.66 -		Found			•
			432.78		Not				
,	,		501.26		Not			-	•
;					Not		**** **** ****		
					Not		1000 1100 1100		
			611.86		2.599E-		9.90		

Rejected (Report (continued) Page : Acquisition date : 15-MAY-2011 16:11:09 Sample ID : EFI-L-110027 SUM Half-Life Activity 1-Sigma (uCi/cc) XError Rejected by Nuclide | Half-life Ratio Energy %Abund PM-148M 0.05 629.97 89.00 --- Not Found ---Abun. 41.300 225.70 32.80 --- Mot Found ----915.33 17.17 --- Not Found ----1013.81 20.30 --- Not Found ----% Abundances Found = 1.74 BI-214 19.90M 146.42 609.31% 46.30 1.000E+35 38.90 Decay 5.04 --- Not Found ---768.36 3.21 --- Mot Found ---934.06 1.000E+35 44.56 1120.29 15.10 5:94 --- Not Found ---1230.11 4.11 --- Not Found ---1377.67 15.80 --- Not Found ----1764.49 % Abundances Found = -64.29 (Abn. Limit = 48.48%) S 187.30 4.67 --- Mot Found ----PB-214. 26.80M 108.72 Decay 7.49 --- Not Found ----241.98 295.21 19.20 --- Not Found ---351.92\* 37.20 1.336E+25 24.94 1.10 --- Not Found ----785.91 % Abundances Found = 53.40 (Abn. Limit = 37.20%)

Flag: "\*" = Keyline

Unidentified Energy Lines Sample ID:: EF1-L-110027 SUM Page : 6 Acquisition date : 15-MAY-2011 16:11:69

It	Energy	Arwá	Biograd	e.mail	Chammel	Left	p <sub>to</sub>	Cts/Sec	METT	wee f f	Flags
(3)	198.57	51	1.00	1.20	396.89	390	1.3	1.906-08	42.7	6.60E+00	· 7
Ø	352.17	56	47	155	704.20	701	8	2.07E-02	24.9	5.70E+00	Ϋ
(3)	511.32	192	43	2.52	1022.65	1014	22.1	7.098-02	11.1	4.88E+80	. 7
(2)	559.31	88	40	1.98	1118.67	1112	12	1.20E-02	43,4	4.68E+00	ï
(2)	610.29	62	81	2.34	1220.67	1213	21	2.30E-02	38.9	4.58E+00	T
Ø	1119.99	30	27	1.67	2240.49	2231	1.8	1.11E-02	44.6	2.90E+00	T

Flags: "T" = Tentatively associated

with which we consider the continuous consideration of the continuous consideration of the continuous consideration and the continuous consideration and the consideration of t

#### Minimum Detectable Activity Report

	. Bekgnd	Enwegy	MDA
Nuclide	Sum	(keV)	(uCi/cc)
BE-7	33.	477.59	5.7530E-08
F 1. (3	Ø.	511.00	Half-Life too short
NA22	9.	1274.54	6.1702E-09
NA-24	13.	1368.53	7.0912E-08
MG27	Ø.	1014.44	Half-Life too short
CL-38	(?) <b></b>	1642.42	Half-Life too short
AR-41	Ø., ·	1293.64	Half-Life too short
SC-46	17.	. 609.25	6.7166E-09
CR-51	32.	320.08	5.29026-08
MN-54	37.	834.83	8.9029E-09
CO-56	21.	1230.25	1.3274E-08
MN-56	Ø.,	1810.69	Half-Life too short
NI-56	53.	158.38	6.9876E-09
CO-57	49.	122.06	7.1439E-09
CO-58	25.	810.76	7.4717E-09
FE-59	17.	1099.22	1.3663E-08
C0-60	1.3.	1332.49	7.4463E-09
CU-64	1.8.	1345.90	3.8966E-05
NI-65	Ø.,	1481.84	Half-Life too short
ZN-65	20.	1115.52	1.5882E-08
ZN-69M	Ee.	438.63	6.360GE-08
SE-75	50.	136.00	9,6529E-09
AS-76	62.	559.10	6.7649E-08
BR-82	21.	776.49	2.0179E-08
BR-83	(2) a	529.64	Half-Life too short
BR-84	Ø.	881.50	Half-Life too short
BR-85	Ø.	802.41	Half-Life too short
KR-85	terms With	513.99	1.0157E-06
KR-85M		151.18	
SR-85	. 57.	513.99	Half-Life too short 8.0342E-09
RB-86	1.3.	1076.63	8.1836E-08
KR-87		402.58	- Half-Life too short
SR-87M	0	388,40	Half-Life too short
KR-88	2 .	196.32	Half-Life too short
RB-88	· Ø	1382.39	Half-Life too short
Y-88	1.3.	1836.01	8.8575E-09
KR-89	Ø.,	1828.98	Half-Life too short
RB-39	Ø.	1031.88	
KR-90	The state of the s	#118.69	
RB-90	(A	831.69	Half-Life too short
RB-90M	(A)		Half-Life too short
	(2) a co	624.23 mmo ma	Half-Life too short
Y-90M	Ø.,	202.51	Half-Life too short
SR-91	4 (5) 2 (6) 6)	1024.30	6.6963E-07
Y-91 V-010	9. ~	1204.90	2.0410E-06
Y-91M SR-92	Ø., ∵	555.60	Half-Life too short
50 to 000 to 000	(2) m	1363.94	Half-Life too short

nnumeron menter 
#### Minimum Detectable Activity Report

	•		1
	Bekgnd	Energy	MDA .
Muclide	Sum	a#j∰ ¦ (keV)	(uCi/co)
yı, (m)	115, 115	A marma district	en source as so has seen
BE-7	33.	477.59	5.75386-08
F-18	8.	511.00	Half-Life too short
MA-22	9	1274.54	6.1702E-09
MA24	1	.1368.53	7.0912E-08
MG-27	Ø.,	1014.44	Half-Life too short
CL-38	(2)	1642.42	Half-Life too short
AR41	O'W	:1293.64	Half-Life too short
SC-46	. 17.	. 889.25	6.7166E-09
CR-5i	32.	320.08	5.2902E-08
MN54	37.	834,83	8.9029E-09
CO-56	21.	1230.25	1.3274E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	53.	158.38	6.9876E-09
CO-57	49.,	122.06	7.1439E-@9
CO-58		810.76	7.4717E-09
FE-59	1.77 a	1099.22	1.3663E-08
CO-60		1332, 49	7.4463E-09
CU64	1.37	1345.90	3.8966E-05
NI-65	. O.	4481,84	
2M-65	20.	. 1115.52	Half-Life too short
			1.5882E-08
ZN-69M '	20.0	438.63	6.3606E-08
SE-75 .	50.	136.00	9.6529E-09
AS-76	62.	559.10	6.7649E-08
BR-62	21.	776, 49	2.0179E-08
BR-43 .	Ø.,	, 529.64	Half-Life too short
BR64	0.	881.50	Half-Life too short
BR-65	Ø.,	802.41	Half-Life too short
KR-85	57.	513.99	1.8157E-06
KR85M	(Z) n	151.18	Half-Life too short
SR85	57.	513.99	. 8.0342E-09
F(B66	1.3.	1076.63	8.1836E-08
KR-87	Ø.,	402.58	Half-Life too short
SR87M	: Ø.,	388.40	Half-Life too short
KR-88	. Ø.	196.32	Half-Life too short
RB-88	Ø	. 1382.39	Half-Life too short
Y-88	1.3.	1836.01	8.8575E-Ø9
KR-89	p41.	222.90	Half-Life too short
RB-39	Ø.,	1031.88	Half-Life too short
KR-90	. On	1112.69	Half-Life too short
RB-90	Ø.	831.69	Half-Life too short
RB-96M	Ø.,	624.23	Half-Life too short
Y-90H	Ø.,	202.51	Half-Life too short
SR-91	123 a 1 23 a 2 23 a	1024.30	6.6963E-07
Y-91	, д. С. и С. С. С	1204.90	2.0410E-66
Y-91M	Ø	555.60	
			Half-Life too short
8R-92 V_qc	Ø.,	1363,94	Half-Life too short
* 1000 '101 (000	Ø	934.46	Half-Life too short

22

Acquisition date : 15-MAY-2011 16:11:09

	Bokgn	d Energy	r MDA
Nuclide			(uCi/cc)
		:	1 11 12 21 1
SR-93	Ø	. 590.28	Half-Life too short
Y-93	49	. 266.98	2.2942E-06
NB-94	22.1	. 702.63	
NB-95	13		
NB95M	45		
ZR-95	1.5		
MB-97	. 0		
ZR-97	1.3		
MO99	1.7		
TC-99M	61		
TC-101	Ø		Half-Life too short
RU-103	26.		6.2161E-99
TC-104	0.		Half-Life too short
RH-105	30,		6.6478E-08
RU-105	ø.		Half-Life too short
RU-106	26.		6.0429E-08
CD-109	30.		2.1675E-07
AG-110M	17.		2.0330E-08
8N-113	35.		8.5640E-09
SN-117M	54.		7.1130E-09
SB-122	29.		1.4186E-08
SB-124	33.		6.7682E-09
98-125	33,	427.89	1.9064E-08
TE-125M	42.	109.28	2.3470E-06
TE-127		417.90	1.9336E-05
TE-127M	28.	57.60	1.5517E-05
XE-127	51.	202.84	8.3552E-09
TE-129	G.	45960	Half-Life too short
TE-129M		695.88	1.9195E-07
XE-129M	69.	196.56	1.4525E-07
1-130	26.	536.09	8.4873E-08
BA-131	51.	123.80	2.3816E-08
1-131	37.	364.48	8.1085E-09
TE-131	0.	149.72	Half-Life too short
TE-131M	ee.	773.67	5.2248E-09
XE-131M	46.	163.93	2.9291E-07
1-132	Ø.	667.69	Half-Life too short
TE-132	45.	226.16	9.31685-09
BA-133	40.	302.84	2.9778E-08
BA-133M	40.	27609	6.8855E-08
1-133	26.	529.87	3.2144E-08
TE-133M	Ø.	912.58	Half-Life too short
XE-133	46.	81.00	4.2516E-08
XE-133M	45	233.22	9.8915E-08
CS-134	40.	604.70	7.25206-09
I-134	Ø.	884.89	Half-Life too short
TE-134	Ö.	216.47	Half-Life too short
BA-135M	46.	268.84	1.1345E-07
1-135	10.	1260.41	3.6504E-06
XE-135	4. 10 u E10 u	249.79	2.7570E-07
XE-135M	9.	526.56	Half-Life too short
- com in the book I	tor te	the part see, it was got	Company Command Comman

Minimum Detectable Activity Report (continued)
Sample ID : EFI-L-110027 SUM — Acquisit Acquisition date : 15-MAY-2011 16:11:09

	Bekgnd	Evergy	MDA
Muclide	Sum	(keV)	(uCi∕cc)
		<i>i</i> .	
08-136	1.34	818.50	6.2095E-09
I-136	0	1313.02	Half-Life too short
08-137	17.	661,65	5.8443E-09
XE-137	() n	45549	Half-Life too short
08-138	Ø.	1435.86	Half-Life too short
XE-138	Ø .	258.31	Half-Life too short
BA-139	۵.	1420.50	Half-Life too short
CE-139	50.	165.85	6.6978E-09
CS-139	Ø.,	1283.23	Half-Life too short
BA-140	26.	537, 32	2.4568E-08
L.A-140	7.	1596.49	1.52278-00
BA-141	Ø.,	190.22	Half-Life too short
CE-141		1.4544	1.2519E-08
LA-141	Ø.,*	1354.52	Half-Life too short
BA-148	0.	255.12	Half-Life too short
LA-142	Ø.,	641.17	Half-Life too short
CE-143	44.	293.26	3.62235-08
CE-144	44.	133.54	5.0236E-08
PR-144	②	1409,15	Half-Life too short
ND-147	42.	91.10	3.5206E-08
PM-148M	Charles Charles	550.27	6.0138E-09
EU-152	39.	344, 27	2.0845E-08
EU-154	1. 1	1004.76	3.3021E-08
EU-155	42.	1.95, 31	3.2841E-08
EU-156	20.	646.29	8.2848E-08
HF-181	30.	482.03	6.9824E-09
TA-182	1.2.	1221.42	2.5663E-00
W-187	18.	685.81	7.5622E-08
RE-188	52.	155.03	2.6409E-07
AU-199	53.	158.38	2.3292E-08
HG-203	36.	279.19	6.6246E-09
BI-207	28.	569.67	5.9970E-09
TL-208	Ø.,	583.14	Half-Life too short
PB-212	81.	238.63	3.7375E-07
BI-214	Ø.,	609.31	Half-Life too short
PB-214	Ø.,	351.92	Half-Life too short
RA224	66.	240.98	2.3902E-07
RA-226	67.	186.21	1.86156-07
AC-228	37.	338.32	4.7195E-08
TH-228	35,	8437	7.8076E-07
PA-234	47.,	131.20	4.1932E-06
TH-234	400 u	63.29	8.2500E-07
U-235	10, 10, 10, 10, 10, 10, 10, 10, 10, 10,	143.76	5.4846E-08
MP239	43.	106.13	5.39676-08
AM-241	36.	59.54	1.2568E-07

# FERMI I NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Log Number <u>EFT-1-110056</u>		•
Task	Performed By	Date
Representative sample collected.		
Date/Time 11-03-11 1(98:37)	( Trother	11.23.11
Container Number Sump #10	Fermi() (signable)	
Storage Location	Employee ID Number	<del>,</del>
2. Sample secured against tampering.		•
2. Campio socaroa agamar tamponing	Family (silfappe)	1/-23-11
	By Ole	
	Employee ID Number	
3. Tritium LLD <= 2 B-6 uCi/ml Actual tritium LLD = 1.18 E-6 uCi/ml No tritium activity detected. (If tritium activity	Chemistry (signature)	<u> 11-24-11</u>
detected do not sign, and explain in Remarks.)	Employee ID Number	
4. Gamma spectroscopy count completed on system suitable for MRP18 evaluations.	RP (signature)	11.30 111
	Employee ID Number	
dentified peaks above critical level due to		
icensed radioactive material. (Note disposition f unidentified peaks on gamma spectroscopy	Radiological Engineering (signature)	12-1-11
licensed material detected, do not sign, and explain in Remarks.)	Employee ID Number	
	• •	

### FERMI I NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Log Number 1=1-1-110056	<del></del>		
Task		Performed By	Date
6. Fluid approved for release.		Radiological Engineering (signature)	<u> 12-1-11</u>
	!	Employee ID Number	*.
Remarks:			

	Sample information			
1 . Sample Location		E	EF1-L-110056	3
2. Date Sampled			11/23/2011	•
3 . Time Sampled			08:27 4	ml
4 . Sample Volume, (ml)			4	[11]
	Instrument Count Data		<del></del>	
1 . Date Sample Counted			11/24/2011	
2. Time Sample Counted			03:37	
3 . Background Inf.:				_
Minutes Counted			10	min.
Background Count Rate (cpm)	IP 11 4 4 4 4		9.5	cpm
4. Efficiency Inf.: (Dally Spike Sou	rce ID # 111)		0550.0	
Gross Spike Count Rate (cpm)	•		2550,6 2541,1	cpm
Net Spike Count Rate (cpm) H3 Spike Activity (dpm on count date)			6359.1	cpm dpm
Counter Efficiency			0.3996	cpm/dpm
5 . Sample Info:			0.3990	сримарии
Sample Gross Count Rate (cpm)	•		8.4	cpm
Sample Count Time (min.)		•	10.0	min.
Net Sample Count Rate (cpm)			0,0	cpm
6 . Critical Level:			5,0	Sp.
Critical Level Count Rate (cpm)			2.2	cpm
				•
Min	imum Detectable Activity		<del></del>	
	·			
	(Bkg cpm) (Bkg cpm)			
Minimum Detectable Activity (uCl/ml) = 3.3 x	(Bkg min.) + (Smpl min.)	<del></del>	1.28E-06	uCi/ml
	Efficiency x 2.22E6 dpm/uCi x Sample Volume			
<u>.</u>	Sample Activity			
Sample Activity (uCi/ml) =	Sample Net cpm	<	MDA	
	Efficiency x 2.22E6 uCl/ml x Sample Volume			
				*
			-	
Technician A To		Data	11-24-11	
recilitician ////		Date	11 = 7 - 11	
	0 1			
Reviewed By: Waks	ulent	Date_	11-24-	-11
				I
Form 76.000.39 Att 1 P1/1	DTC: T	GCHEN	fle:	1319.02

#### RADIATION PROTECTION DEPARTMENT

#### GAMMA SPECIFICACIONY AMALYSIS REPORT

#### HIGH EFFICIENCY DETECTOR

Sample TD Humber: EFI-L-118656 SUMP 818

Sample End Time: 23-NOV-2011 08:27:00:00

REMARKS Adducat

PERFORMED BY:

REVIEWED BY:

f.v2-511 PAVESCIEL 12-1-11

POOR\_\_\_\_of\_\_

District in

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#### Formi 2 Radiation Protestion Gamma Spectroscop: Report

киневинениеминический выструктор Рагопетого изменителение виский и выструкти в при выструкти в при выправлением выструкти в при выправлением выструкти в при выправлением выстроит выправлением выстроительным выправлением выстроительнием вы

Sample ID Humber: EFI-L-110056 SUMP #10

Sample collection start date: 23-MOV-2011 08:27:00.00 Sample collection end date : 23-MOV-2011 06:27:00.00

Type of sample : 1 L Mari. Liquid: Sample quantity : 1.00000E#03 cc

Sample geometry a MELL

Operator: CLP

иникиванивининининининининин Acquisition Parameters, ининикининининининининин

Detector number : DET 4 Acquire date : 30-M09-2011 10:26:02.64

Preset live time : 0 00:45:00.00arphi Elapsed Live time : 0 00:45:50.00

Elapsed real time : 0 00:45:00.60 Percent dead time : 0.03 %

вининивинивинивинивиния Calibration Parameters инивинивинивинивинивины

Detector number : DET 4 Vearly cal date : 14-JUN-2011 14:50:56.41 V

Kev/channel . : 5.00235E-01 Zaro offset: -6.02154E-01

Daily cal date | | 30-NOV-2011 09:13:02.38

мининимининиминиминиминимини Peak Search Parameters иминиминиминиминиминимини

Start channel: 100 End channel: 4096

Height sensitivity : 5.00000 Shape sensitivity : 10.00000

Maximum number of iterations to resolve multiplets a 5

www.www.www.www.ww.ww. Muclide Identification Parameters www.www.www.www.ww.

Energy tolerance : 1.75000 Half-life ratio : 10.00000 Library : dacmaster.nlb

to design and the control of the con

Pk	11:	Energy	Area	Ekgrid	FWHM	Channel	Left	tof4	Cts/Sec	xerr	Fit
1.	()	198.53	- 84	94	1.54	398.08	391	13	2.98E82	27.2	
2	(2)	352.70	40	57	1.29	706.28	703	11	1.48E-62	41.2	
.3	0	511.58	158	57	2.17	1923, 89	1015	18	5.97E-02	13.8	
4	(i)	1461.21	76	Ø	2,12	2922.29	2912	20	2.91E-02	11.5	

Semple of the state of the light that the state of the st Sampara (1940) 2 Erib medication SUMP 818 Computation Time (1960) Eric 10:26:00:24

Post-Alb Peak Search Report

16	Energy	Area	Deglad	FUHR	Channel 1	L.eft	$\rho_{W}$	26 T. P. P.	File	Muchides
( <u>.</u> )	196.53	5i			39868	391		2		6-210-8
0	35E.70	40	57	1.29	706.28	703	1.1	41 2		Pb-214
()	511.58	158	57	2.17	1023.89	1.015	1.0	8.51		Aww. Prok
0	1461.21	78	Ë	2.12	2922.29	2912	20	11.5		K-40 6 12-5-11

Proceed to the metal toy Report inequalition dates, 10 model that a facilities

Musicia Types natural

Uncorrected Decay Corr 1-Sigma uCiZec j %Abo 野民主任 uCi/cc #Error Area Machada Energy 10.67\* 2.353E+00 3.031E-07 3.031E-07 11. 47 76 15.--40 1460.01

Flag: "W" = Keyline

Commercy of the disc Autivity Lagu : Acquasition data : 30 NOV 2011 19:26:02 Washington & D. J. (4.1974) 41. (\$4.00006) 2000 rated number of rinas in spectrum Number of unidentified times Number of lines bentatively identified by ADD - 4 100.00% Phiclide Type : natural Uncorrected Decay Corr Decay Corr i-Sigma uC1/cz 1-Sigma Crror MError Flags Nuclida Hlife Dacay uCi/oc K-40 1.0004057 1.00 3.031E-07 3.031E-07 0.348E-07 11,47 3.031E-07 : 3.031E-07 Total Activity :

Grand Total Activity s. 3.031E-07, 3.031E-07

Flags: "K" = Keyline not found "E" = Manually edited "H" = Harmally accepted

"A" = Huclide specific abo. limit

Huclade f -18	189.138		511,005	193,46	(uCircu) 1.958C+20		Rejected by Decay
SE-75	119. 70D	8, 86	121.12	3.41 16.70	Not Fo Not Fo Not Fo	und	Abun.
·			198.60 264.65 279.53 303.91 400.65	59.80 25.20 1.32	9.147E-07	und und	
	93° 29	Abundances	found =	0.81			•
PB~214	26. 90M	381, 40	87. 39. 241. 98 295. 21 351. 52* 785. 91	7.49 19.20 37.20	Not For Not For 1.000E+35	bru bru 91.18	Decay
	×	Abundances					20%)

Flag: "\*" = Keyling

15	änery.	700°G A	સંસ્કૃતન	COMM	Charmet	Legit t	w Costada	%)	Mar i	% of £1 to
Ü	198.50	6 4 a. 4	ৠ	1,34	390.00	391 1	3 21.901-00	127 . 2	6.348900	SI-TS THE TOO SHORLT
Ø	35E.70	49	.57	1.29	706., 28	-703 - 1	1 1.48E-68	91 a 25	530E+00	7 (b 224)
Ö	511.50	150	57	2.17	10k3.69	1015 1	8 5.87E-02	13.9	4.50E+0b	I Annilal bo

Flages "T" = Tentatively associated

Minimum Detectable hocavaty Report

	,			
		8ckgnd	Energy	PTT://
Muclide		Sem	(keV)	(aCi/ac)
BE-7		(1) (1) ka ka s	477. 59	5.4591E-05
F-18		u.	511.00	Half-Life too short
MA-22		11.	1274, 54	7.17076-09
HA-24	;	Ü.	1268.03	Half-Life too short
MG-27		0.	1014.44	Half-Life too short
CL -3u		Ø.	1642.42	Half-Life too short
AR-41		0.	1293.64	Half-Life too short
SC~465		15.	889.28	7,0982E-09
CR-51		10 A.7 G 107 A. 10 A.7 G	320.08	9.1211E-08
PH-54		26.	234.83	8.2002E-09
00-56		1.6.		
			1238.25	1.3867E-08
MH-56	•	Ø.	1810.69	Half-Life too short
HI-56		AP.	158.38	1.1704E-08
CO-57		36.	122.06	.6.7112E-09
CO-58		19.	810.76	7.22030-00
FE-59		16.	1099.22	1.2198E-08
CO-60	,	13.	1332.49	Z., 9414E09
CU-64		Ø.	1345.90	Half-Life too short
MI-65		Ø.	1481.84	Half-Life too short
ZH~65		16.	1115.52	1.5691E-98
ZN-69H		6).	438,63	Half-Life too short
SE-75		51.	1.36, 60	1.06716-08
AS-76		49.	359. 10	1., 4566E-06
BR-82		9.	776.49	1.8795E-07
ER-93		0.	529,64	Half-Life too short
):11(~~)(4		Ü.	081.50	Half-Life too short
BR85		θ.	802,41	Half-Life too short
KR~85		63.	513,99	2.0105E-06
KR~85M		Ø.	151.18	Half-Life too short
SR-85		63.	513.99	9.4206E-09
RB-86		15.	1076.63	1.1089E-07
KR07		0.	402.58	Half-Life too short
SR-87ff		Ø.	366.40	Half-Life too short
ER-88		Ð.	196.32	Half-Life too short
RB-88		0.	1382.39	Half-Life too short
Y-88		ð.	1836.01	7.9782E-09
KR-09		ø.	220.90	Half-Life too short
RB-89		Ø.	1631.88	Half-Life too short
KR-90		0.	1118.69	Half-Life too short
RB-90		0.	831.69	Half-Life too short
RB -96M		Ö.	924.23	Half-Life too short
Y-90M		ä.	202,51	Half-Life too short
SR-91		ä.	1024.30	Half-Life too short
791		eā.	1204, 90	3.23262-06
Ý-9ÎH		Ö.	55560	Half-Life too short
9R-92		0, 0,	1383.94	Half-Life too short
Y92		0.	934.46	Half-Life too short
		ev at	10 to 14 150	CONTRACTOR MADE SHIELD

	ចែក <b>់ព្</b> រាក់។	fine ey:	Pf06
Hata Laster	Suu	(6.£.Q)	(autha, faire)
•			
SR-93	S.	. 590.28	Half-Life too short
1: 93	Ú.	266.90	Half-Life too short
14394	24.	702.63	6. 5916E-69
HB- 95	Aa.	765.79	2.2681E-09
MB- 95M	49.	235.69	9.1353E-0 <i>e</i>
2R-90	23.	756.72	1.3540E-08
HB-97	0	657.90	Half-Life top short
ZR97	0.	743.36	Half-Life too short
MO99	26.	739,58	3.3450E-07
TC- 994	Ø.	140.50	Half-Life too short
TC-101	(7) <sub>a</sub>	366.81	Half-Life too short
RU-103	20.	497. 68	7.4576E-09
TC-104		357., 99	Half-Life too short
RH-195	48.	318,90	9.0945E07
&U−1 <i>0</i> 5	O.	. 724. 50	Half-Life too short
RU108	29.	621.04	6 8266E198
CD-199	37.,	93.63	2.4900E-07
AG-110M	1.3.	937.48	1.93596-08
SN-113	Com Casson	391.69	8.0989E-09
SN-117H	43.	159.56	8.8779E-09
9B-122	E.7.	563.93	5.4079E-08
SB-124	41.	602.71	C.4129E-09
SP-125	© - 1 a	427.89	1.7534E-08
TE-125H	47 n	109.28	2.7994E-06
TE-127	(i) "	417.90	Half-Life too short
TE-127H	23.	57.60	1.7206E-05
XE-127	62.	202.04	1.0470E-08
TE-129	Ø.	459, 60	Half-Life too short
TE-129M	20.	695.88	2.4757E-07
1XE-129H	67	196.56	2.3614E-07
1-130	() a	536.09	Half-Life too short
DA-131	33.	123.80	2.7811E-08
1-131	30.	364, 40 -	1.21366-09
TE-131	. (i)	149.72	Half-Life too short
1E-131W	13.	773.67	7.4032E-07
XE: 131M	53.	163. 93	4.42346-07
1-132	ø.	667.69	Half-Life too short
TE-132	48.	224.16	2.9491E-08
BA-133	40.	302.84	3.1418E-08
BA-1339	÷1.	27609	6.3041E-07
1-133	ea.	529.87	e. 0393E-06
TE-133M	Ö.	918.58	Half-Life too short
XE-133	39.	81.00	7.9514E-08
XE-133h	46.	233.22	5.1950E-07
CG-134	\$1	604.70	7.0345E-09
T-134	Ø. ·	884.09	Half-Life too short
TE-134	. Ou	210.47	Half-Life too short
EA-135M	46.	268.24	2.1970E-06
I-135	. (i) a	1260.41	Half-Life too short
XE-135	0.	249.79	Half-tife too short
XE-135M	(a).	526.56	Malf-Life too short

responsablem date a DS 4676 mena libraturation

•	Walayad	Emery,	P10:3
Haultado	Stan	(ReW)	(OCIACC)
	*		
C5+136	21	618.50	1.0-490808
1-1255	0.	1313. OP	Half-Life too short
G8-137 ·	21.	661,65	6.9431E-09
XE-137	19.,	455, 49	Half-Lifw too short
68-139	(i) n	1435.86	Half-Life too short
XE-138	Ű.	250.31	Helf-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	70.	165.95	8.3318E-09
08-139	0.	1203.23	Half-Life too short
DA-130	24.	537, 32	3.3420E08
LA-140	1.1.	1596.49	i. Seeel-or
Bib~1 4 3	Ö.	190.22	Half-Life too short
CE-141	57.	145.44	1.4781E-08
L6-141	Ø.	1354.52	Half-Life too short
BA-142	(;) <sub>n</sub>	255.12	Half-Life too short
LA-142	Ø.	641.17	Half-Life too short
CE-143	41.	293,26	47504E-07
CE-166	60.	133.54	6.2231E-08
PR-144	O.	1489.15	Half-Life too short
MD-147	49.	91.10	5.43556-08
PPI-140P	19.	550.27	6.2015E-09
EU-152	37.	344.27	2.1527E-08
EU-154	15.	1004.76	3.9740E-08
EU-155	39.	105.31	3.3582E-08
EU-156	11.	646.29	8. 4985E-08
HF-131	27.	482.03	7. 7706E-09
TA-182	1.2.	1221,42	2.7639E-08
U-197	grea.	685.61	2.9858E-06
RE-188	0.	195.03	Half-Life too short
AU-199	42,	158.38	6.7193E-08
HG-203	36.	279.19	7.4349E-09
BI-207	31.	569.67	6.6913E-09
TL-208	0.	583.14	Half-Life too short
FB-212	(3 n	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	48.	240.98	5.6963E-07
RA-226	65.	186.21	1.90506-07
AC-228	51.	336.32	5.76956-00
7H-228	379a	04.87	8.55326-07
		131.20	Half-Life boo shorb
PA-234 ruopa	0 va	63.29	9.6866E-07
TH-234.	36. sec		5.8305E-08
U-235	56.	143.76	
MP-239 .	39 <sub>1</sub> ,	106.13	2.4464E-07
GPI241	25.	59.54	1.3613E-07

EF-1 Sump #11 2008

# FERMI 1 NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Log Number // //		3
Task	Performed By	· Date
1. Representative sample collected.  Date/Time 4/29/08 / 1045  Container Number 5000 # 1/	Fermi 1 (signature)  B 3308  Employee ID Number	4/29/18
2. Sample secured against tampering.	Fermi 1 (signature)	4/29/08
3. Tritium LLD <= 2 E-6 uCi/ml Actual tritium LLD = 1.7-2-1 uCi/ml  No tritium activity detected. (If tritium activity detected do not sign, and explain in Remarks.)	Employee ID Number  Chemistry (signature)  Sule 1  Employee ID Number	5.7.08
4. Gamma spectroscopy count completed on system suitable for MRP18 evaluations.	RA (Signature)  B 3305  Employee ID Number	4/4/08
5. Gamma spectroscopy report shows no identified peaks above critical level due to licensed radioactive material. (Note disposition of unidentified peaks on gamma spectroscopy report.  If licensed material detected, do not sign, and explain in Remarks.)	Radiological Engineering (signature)  Employee ID Number	6-1008

### FERMI 1 NON-OIL RELEASE CHECKLIST LIOUID SCINTILLATION COUNT

	FIGOID 2CINTIFFY HOW COOM!	
Log Number MA		
Task	Performed By	Date Analy
	N 0 .1/14-	Alla
6. Fluid approved for releas	Radiological Engineering	3010 417 300 00000
:	(signature)	Anna Carlon Carl
	Employee ID Number	The market of grants
Remarks:		wan aga wan ing Magamawa na Santawa Mara I.
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		gampie information			
4 0-4-4-1		1		D	
1 . Sample L				Sump #11	
2 . Date Sam		·		04/29/2008	
3 . Time San				10:45	
4 . Sample V	olume, (ml)	/		4	ml
<b>1</b>	•				
1					
		Instrument Count Data			
1 Date Sam	inle Counted	i i		05/01/2008	
2. Time San				16:18	
3 . Backgroun	•	•	. ,	10.10	
Minutes C				10	min.
	nd Count Rate (cpm)			8.1	cpm
4 . Efficiency		rce ID # 111)		0,1	орт
	ke Count Rate (cpm)	!		3031,8	opm
	Count Rate (cpm)			3023.7	cpm cpm
	Activity (dpm on count date)			7776.1	dpm
Counter E				0,3888	•
5 . Sample In		,		0,0000	cpm/dpm
	ross Count Rate (cpm)			0.4	
	ount Time (min.)	:		8.1	cpm
		į		10.0	min.
	le Count Rate (cpm)			0.0	cpm
6 . Critical Le		1		0.4	
Cilical Le	vel Count Rate (cpm)		-	2.1	cpm
1			•		
;	Mili	nimum Detectable Activity			
1		i			
		(Bkg cpm) (Bkg cpm)			
/linimum Detectabl	le Activity (uCi/ml) = 3.3 x	V · (Bkg min.) + (Smpl min.)	=	1.22E-06	uCi/ml
		Efficiency x 2.22E6 dpm/uCl x Sample Volume			
	•	1			
	•				
		Sample Activity			
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•					
Samr	ole Activity (uCl/ml) =	Sample Net cpm	<	MDA	
Oump	ne relivity (dol/iii) =		`	MDA	
y	•	Efficiency x 2.22E6 uCi/ml x Sample Volume			
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Form 76.000.39 Att 1 P1/1

DTC: TGCHEM

File: 1319.02

#### DETROIT EDISON FERMI-2 POWER PLANT

4-JUN-2008 15:44:27.11

#### RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

#### HIGH EFFICIENCY DETECTOR

Sample ID Number: EF-1 SUMP #11

Sample End Time: 29-AFR-2008 10:45:00.00

REMARKS\_

313833

PERFORMED; BY:

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SIGNATUKE/DATE

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#### Fermi 2 Radiation Protection Gamma Spectroscopy Report

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Sample ID Number: EF-1 SUMP #11

Sample collection start date: 29-APR-2008 10:45:00.00 Sample collection end date : 29-APR-2008 10:45:00.00

Type of sample : 1 L Mari. Liquid Sample quantity : 1.00000E+03.cc

Sample geometry : MELL Operator: JNS

Detector number !!

0 00:30:00.00 Elapsed live time : 0 00:30:00.00 Preset live time :

Elapsed real time : 0 00:30:01.04 Percent dead time # 0.05 %

ार प्राप्त के प्राप्तिक है। यो भारत के बिहु प्राप्तिक के बेबे हुई है। announcementaries and the contraction of the contra Yearly cal date : 20-JUN-2007 12:16:46.16

Detector number :0 DET 4 5.00091E-01 Zero offset: -1.34794E-01 Kev/channel !!

: 4-JUN-2008 06:32:04.62 Daily cal date

ининимининининининининининин Peak Search Parameters инциринининининининининин

End channel: 4096 Start channel: 100

Height sensitivity : 5.00000 Shape sensitivity : 10.00000

Maximum number of iterations to resolve multiplets : 5

members members marked and the state of the companies of

Energy tolerance : 2.00000 Half-life ratio : 10.00000 mass . Abundance Limit : 75,00000 Library : dacmaster.mlb

Efficiency file : EFFD4\_m211 Efficiencies at a Peak lenergy

ptk	It	Energy	Area	Blegnd	FWHM	Channel	Left	βw	Cts/Sec	%Err	Fit
:1.	0	511.12	1.38	54	2.25	1022.31	1012	1.8	7.67E-02	15.1	
22	(2)	558.90	72	28	1.25	1117.85	1111	14	3.985-02	19.6	
3	1.	1460.31	20	4	2.61	2920.27	2910	3.8	1.14E-02	48.9	7.88E-01
4	:].	1461.18	28	4	2.37	2922.00	2910.	1.8	1.56E-02	29.2	
5	<b>(2)</b>	1764.98	16	2	1.08	3529.44	3521	1.3	8.67E-03	34.2	

Sample Title : EF-1 SUMP #11
Decay Time = 36 04:29:23.74

Page : 1 Acquisition Time = 4-JUN-2008 15:17:23.74

#### Post-NID Peak Search Report

T t	Energy	Area	Blegnd	FWHM	Channel	Løft	Pω	%Err	Fit	Nuclides	
Ø	511.12	138	54	2.25	1022.31	1012	1.8	15.1	and pro-	ANN POOR	
Ø	558.90	72	28	5.00	1117.85			19.6		ALOC	
:1.	1460.31	20	4	2.61	2920.27	2910	1.8	42.9	7.888-01	12.40	
1.	1461.18	28	4	2.37	2922.00	2910	1.8	29.2		K40	
0	1764.98	1.6	22	1.08	3529.44	3521	1.3	34.2		RA-223	

Nuclide Line Activity Report Sample ID : EF-1 SUMP #11

Page : Acquisition date : 4-JUN-2008 15:14:23

The Adams of Angle to the State of

Nuclide Type: natural .....

Uncorrected Decay Corr Muclide 🦠 Area. Energy K-40 : 1460.81 28 

Flags "\*" = Keyline

Summary of Nuclide Activity Sample ID : EF-1 SUMP #11

Page a Acquisition date : 4-JUN-2008 15:14:23

Total number of lines in spectrum Number of unidentified lines

ij 1.

80.00%

Number of lines tentatively identified by NID

Nuclide Type : natural

Uncorrected Decay Corr Decay Corr 1-8igma

1-Sigma Error MError Flags

Muclide Hlife Decay uCi/cc uCi/cc K-40 1.00E+05Y 1.00 1.575E-07 1.575E-07 0.461E-07 29.23

> 1.575E-07 1.575E-07 Total Activity :

Grand Total Activity : 1.575E-07. 1.575E-07

"M" = Manually accepted Flags: "K" = Keyline not found

"E" = Manually edited "A" = Nuclide specific abn. limit

### Page : 4 Acquisition date : 4-JUN-2008 15:14:23

	Hat	lf-Life			Ac	e balva	ty in	Sigma	er et kirist er het et 1940 bl. 1 Eksterne en e	
Muclide	Half-life I	Ratio Ey	ergy :	为mud6数					Rejected by	:
F-18	1.09.74M		1.00%	193.46	10	100E+		5.11	Decay	
	™ Abu	ındances fou	and 🎟 :	100.00						
		ì								
AS76	26. BEH		9.10%	4470	4.4	*38E+	·02 1	9.62	Decay, Abun.	
	•		3.23				Found			
		•	1.30	0.14			Found			
		65	703	6.10	**** **** ****	Not	Found	**** **** ****		
	r	66	5.31	0.39	.;":\"	Not	Found	**** **** ****		
		174	0.12	0.12	i m	Not	Found	**** **** ****		
		77	176	0.12	******	Mot	Found			
	•		7.63	0.12		Not	Found			
	*	112	9.87	0.14	**** }*** ****	Not	Found	********		
:		121	2.72	163	****	Not	Found	*********		
		121	6.02	3.84	**** **** ****	Mot	Found	HII ****		
		122	8.52	1.39	*********	Not	Found	*********	*	
		and the second s	9.13	0.33	**** ****	Not	Found			
		1.45	3.60	0.13	****	Not	Found			
		178	7.67	0.33	*** ****	Not	Found	**** ****		
	% Abu	indances Fou	nd ==	73.70						
:										
BI-214	19.90M 8	619.32 60	9.31%	46.30	**********	Not	Found	*******	Decay, Abun.	
•		76	8.36	504	**** }*** ****	Not :	Found	**** * ****		
:		93	4.06	3.21	**** **** ****	Not 1	Found	**********		
		112	D. 29	15.10	H== 1+++ ++++	Not 1	Found	**** **** ****		
		123	3.11	5.94	**** ****	Mot I	Found	**** ** ** ****		
			7.67	4.11	**** **** ****	Not 1	Found	************		
			4.49	15.80	1.0	00E+.	35 34	1.23		
	ж Abu	ndances four	nd ==	16.54				· 48.	48%)	

Flags "w" = Keyline

It	Energy	Area	Blegnd	FWHM	Channel	Left	Pw Cts/Sec	%ETT	METT TE	lags
0	511/12	138	54	2.25			18 7.67E-02		and the second s	Υ.
(2)	558.90?	72	28	1,425	,		14 3.98E-02		4.68E+00	T
<b>:1</b> .	1460.31	20	· 4	2.61	2920.27	2910	10 1.14E-02	42.9	2.50E+00	
<b>Ø</b>	1764.98	16	2	1108	3529.44	3521	13 8.67E-03	34.2	2.26E+00	T

Flags: "T" = Tentatively associated

newsermenser

## Minimum Detectable Activity Report

- A 1

	그 사람이 함께 그리고 그 그 그 그 그 그 그 그 그 그 그 그 그 그 그 그 그 그		* · · · · · · · · · · · · · · · · · · ·
	Belegnet	Energy	MDA
Nuclide		(keV)	(uCi/ee)
1 10,000 10 10 10 10	346 343 44	,	
Willia 1,3	25.	477.59	1.1809E-07
BE-7			
F-18	Ø.	511.00	Half-Life too short
NA22	9	1274.54	9.5818E-09
NA24>	() · · · · · · · · · · · · · · · · · · ·	1368.53	Half-Life too short
140-27	Ø.,	1014.44	Half-Life too short
CL-38	Ø.,	1642.42	Half-Life too short
AR-41	· 0.	1293.64	Half-Life too short
SC-46	11.	889.25	1.12806-08
ČR-51	30.	320.08	1.79216-07
MN-54	21.	834.83	1.12025-08
	9.	1238.25	1.8758E-08
CO-56			
MN-56	Ø.,	1810.69	Half-Life too short
MI-56	54.	158.38	5.1115È-07
CO-57	46.	122.06	1.1391E-08
CO-58	1.6)	810,76	1.0500E-08
FE59	13.	1099.22	3.0774E-08
CO-60	9.	1332.49	9.5443E-09
CU64	· 0"	1345.90	Half-Life too short
NI-65	Ö.	1481.84	Half-Life too short
ZN65	8.	1115.52	1.7770E-08
ZN-69M	. 0.	438.63	Half-Life too short
SE-75	42.	136.00	1.6292E-08
	· ·	559.10	
AS-76	∴ > Ø.,		Half-Life too short
BR-82	, <b>0.</b>	776.49	Half-Life too short
BR-83	Ø.	529.64	Half-Life too short
BR-84	. <u>Ø</u> .,	; 881.50	Half-Life too short
BR-AS	Ø.,	802.41	Half-Life too short
KR85	45.	513.99	2.4418E-06
KR85M	Ø.,	151.18	Half-Life too short
SR-85	45.	513.99	1.5475E-08
RB-86	10.	1076.63	3.8594E-07
KR-87	Ø <sub>n</sub>	402,58	Half-Life too short
SR-87M	ő.	388.40	Half-Life too short
KR-88	Ö.	196.32	Half-Life too short
	Ø.,	1382.39	Half-Life too short
RB-88	65 u 185 a	1836.01	1.1345E-08
Y-88		220.90	
KR-89	() () () () () () () () () () () () () (	1031.88	
F0389	Ø.,	1118.69	
KR-90	(Ö)	1831.69	Half-Life too short
F0990	0.		Half-Life too short
RB-90M	: 0.	624.23	Half-Life too short
Y-90M	Ø.,	202.51	Half-Life too short
SR-91	Ø.	1024.30	Half-Life too short
Y-91 .	1. 1	1204.90	5.0783E-06
Y91H	0.	555.60	Half-Life too short
SR-92	Ø.,	1383.94	Half-Life too short
Y-92	Ø.	934.46	Half-Life too short
	• .	,	•

1 50

Energy MDA Bekgnd (key) (uCi/cc) Muclide Sum 590.28 Half-Life too short SR-93 Ø,, Half-Life too short 0. Y-93 266.90 702.63 21. 8.6699E-09 NB-94 765,79 NB--95 12. 1.5387E-08 235,69 0. Half-Life too short NB--95四 756.72 16. 2.2420E-08 ZR-95 657.90 0. Half-Life too short MB-97 743.36 Half-Life too short 0. ZR-97 739,58 Half-Life too short 0... MO--99 140.50 TC-99M 0... Half-Life too short (i) .. 306.81 Half-Life too short TC--101 497.08 1.5216E-08 RU-103 20. 357.99 Half-Life too short Ø). TC-104 318.90 Half-Life too short RH-105 0. (3), 724.50 Half-Life too short RU-105 16. 621.84 7.7590E-08 RU-106 88.03 3.7138E-07 36. CD-109 937,48 2.3914E-08 AG-110M 8. 391.69 24. 1.3267E-08 SN-113 53. 150.56 6.0294E-08 SN-117M 563.93 Half-Life too short SB-122 0. 602.71 1.2353E-08 88-124 21. 29. 427,89 2.7542E-08 88-125 5.1103E-06 39. 109.28 TE-125M Ø., 417.90 Half-Life too short TE-127 57.60 3.1545E~05 TE-127M 34. 202.84 2.0771E-08 37. XE-127 459.60 Half-Life too short TE-129 Ø. 695.88 5.1543E-07 18. TE-1291 196.56 2.7816E-06 XE-129M 47. Ø., 536.09 I = 130Half-Life too short BA-131 43. 123.80 ·2.4638E-07 364,48 1.9513E-07 1-131 26. 149.72 TE-131 Ø. Laif-Life too short (ž) " 773.67 Half-Life too short TE-131M 38. 163.93 2.9840E-06 XE-131M (I. 667.69 Half-Life too short 1-132 228.16 Half-Life too short TE-132 0. 302.84 5.1076E-08 BA-133 52. 276.09 Half-Life too short BA-133M 0. 529.87 I - 133(I) ... Half-Life too short 912.58 TE-133M 0. Half-Life too short 5.3101E-06 37. 181.00 XE-133 XE-133M 233.22 Half-Life too short (2) a 604.70 9.4319E-09 27. CS-134 Half-Life too short 884.09 Ø., I = 134210.47 TE-134 0.Half-Life too short 268.24 BA-135M Ø., Half-Life too short 1260.41 I - 135(2) <sub>u</sub> Half-Life too short 249.79 Half-Life too short XE-135 Ø., XE-135M Ø., 526,56 Half-Life too short

. 17

Sample ID : EF-1 SUMP #11

Acquisition date : 4-JUN-2008 15:14:23

	Belegnd	Energy	MDA
Muchide	Sum	(k@V)	(uCi/ce)
(*) (*) -1 **) (*)	oleman order	n a n egen	827 A 327 (19 A 327 A 32
CS-136	13.	818.50	5.4592E-08
I-136	<b>0.</b> 9953	1313.02	Half-Life too short
CS-137	16.	661.65	8.668E-09
XE-137	Ø.	455.49	Half-Life too short
CS-138	<b>@.</b>	1435.86	Half-Life too short
XE-138	<u>Ø</u> .,	258.31	Half-Life too short
BA-139	Ø. ·	1420.50	Half-Life too short
CE-139	33.	165.85	9.8848E-09
CS-139	.Ø.,	1283.23	Half-Life too short
BA-140	8.	537.32	1.4471E-07
LA-140	Ø.	1596.49	Half-Life too short
BA-141	(O	190.22	Half-Life too short
CE-141	.52.	1.45, 44	м <sub>еро</sub> м г. н <b>3., 7394Е08</b>
LA-141	<b>0.</b>	1354.52	Half-Life too short
BA-142	On ghileha	255.12	Half-Life too short
LA-142	<b>0.</b> ************************************	g 641.17	Half-Life too short
CE-143	<b>0.</b> 10 10 10 10 10 10 10 10 10 10 10 10 10	293.26	Half-Life too short
CE-144	37. (4.4)	ij 133.54	7.5383E-08
PR-144		J1489.15	Half-Life too short
ND-147	40.	91.10	4.4555E-07
FM-148M	19.	1550.27	1.4155E-08
EU-152	351 ***	344.27	3.0137E-08
EU-154	<b>9.</b> 1 19. 19. 19. 19. 19. 19. 19. 19. 19. 1	1004.76	4.4744E-08
EU-156	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	646.29	5.1344E-07
HF-181	20,	482.03	1.7736E-00
TA-182	7.	1221.42	3.7119E-08
W-187	Ø.	685.81	Half-Life too short
RE-188	Ø <sub>a</sub> - Harris	155.03	Half-Life too short
H0-203	54,	1 279.19	1.9880E-08
BI-207	<b>9.</b>	569.67	5.5840E-09
TL-208	Ø.,	583.14	Half-Life too short
PB-212	Ø.,	e3a.63 (	Half-Life too short
BI-214	< Ø.,	609.31	Half-Life too short
PB-214	Ø.	351.92	Half-Life too short
RA-224	38.	240.98	1.9241E-04
RA-226	45.	1.86.21	2.3146E-07
AC-228	20.	330.32	6.3056E-06
TH-228	34.	84.37	1.1963E-06
PA-234	<b>.</b>	131.20	Half-Life too short
TH-234	40.	63.29	3.3021E-06
U-235	48.	143.76	7. 7324E-08
MP-239	Ø"	106.13	Half-Life too short
AM-241	37"	59.54	1.8986E-07
	Set U U Sept 1	300 00 00 00 0	reach the second of the second backward with the second of

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EF-1 Sump #11 2009

# FERMI I NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Log Number		
Task	Performed By	Date
1. Representative sample collected.  Date/Time 3/18/09 1 14/30  Container Number 5 unp # 1/  Storage Location EF-1	Charthmark Ferni 1 (signature)  B 3308 Employee ID Number	3/19/19
2. Sample secured against tampering.	Femil 1 (signature)  B 330 8  Employee ID Number	3/19/09
3. Tritium LLD <= 2 E-6 uCi/ml Actual tritium LLD = 1.16E-6 uCi/ml No tritium activity detected. (If tritium activity detected do not sign, and explain in Remarks.)	Chemistry (signature)  SOUS  Employee ID Number	3-21-09
4. Gamma spectroscopy count completed on system suitable for MRP18 evaluations.	RP/signature)  B 3 308  Employee ID Number	5/14/09
5. Gamma spectroscopy report shows no identified peaks above critical level due to licensed radioactive material. (Note disposition of unidentified peaks on gamma spectroscopy report.  If licensed material detected, do not sign, and explain in Remarks.)	Radiological Engineering (signature)  SOUTH  Employee ID Number	<u>5 14-09</u>

### FERMI I NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Log Number WH Task	Performed By	Date
6. Fluid approved for release.	Radiological Engineering (signature)  Employee ID Number	en e

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### Tritium Activity Calculation

	Sample Information		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
<ol> <li>Sample Location</li> <li>Date Sampled</li> <li>Time Sampled</li> <li>Sample Volume, (ml)</li> </ol>			Sump #11 03/18/2009 14:30 4	ml
·	Instrument Count Data			
	1			
<ul><li>1 . Date Sample Counted</li><li>2 . Time Sample Counted</li></ul>			03/20/2009 14:00	
3 . Background Inf.:			14.00	
Minutes Counted			10	min.
Background Count Rate (cpm)			7.8	cpm
4 . Efficiency Inf.: (Daily Spike Source	iD # 111)			
Gross Spike Count Rate (cpm)			2972.5	cpm
Net Spike Count Rate (cpm)			2964.7	cpm
H3 Spike Activity (dpm on count date)			7397.6	dpm
Counter Efficiency 5 . Sample Info:	1		0.4008	cpm/dpm
Sample Gross Count Rate (cpm)			7.3	cpm
Sample Count Time (min.)			10.0	min.
Net Sample Count Rate (cpm)			. 0.0	cpm
6 . Critical Level:				
Critical Level Count Rate (cpm)			2.0	cpm
Minim	num Detectable Activity			
	(Bkg cpm) (Bkg cpm)			
Minimum Detectable Activity (uCi/ml) = 3.3 x	(Smpl min.) + (Smpl min.)	==	1.16E-06	uCi/ml
	Efficiency x 2.22E6 dpm/uCl x Sample Volume			
· ·				•
	Sample Activity		··-·	
Sample Activity (uCl/ml) =	Sample Net cpm	_<	MDA	
	Efficiency x 2.22E6 uCl/ml x Sample Volume			
Technician		Date <sub>.</sub>	3.21-09	<u>}</u>
			··	· · · · · · · · · · · · · · · · ·
Form 76.000.39 Att 1 P1/1	DTC: 1	rgchei	M File:	1319.02

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#### \* DETROIT EDISON FERMI-2 POWER PLANT

23-MAR-2009 11:23:47.61

have not to the transfer of th

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: SUMP#11	
Sample End Time: 18-MAR-2009 14:30:00.	88
REMARKS	

SIGNATURE

REVIEWED EX

5-6-09

STONAYUREZDATE,

PAGE\_\_\_\_of\_\_

#### Fermi 2 Radiation Protection Gamma Spectroscopy Report

ининивининининининининининининин Sample Parameters ининивининининининининининин

Sample ID Number: SUMP#11

Sample collection start date: 18-MAR-2009 14:30:00.00 Sample collection end date : 18-MAR-2009 14:30:00.00

Type of sample : 1 L Mari. Liquid Sample quantity : 1.00000E+03 cc

Sample geometry : MELL

Operator: JNS

numerous numerous numerous Acquisition Parameters sussesses numerous numero

Detector number : DET.4 | Acquire date : 23-MAR-2009 10:53:42.88

Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00

Elapsed real time : 0 00:30:01.44 Percent dead time : 0.05 %

nonununununununununununun Calibration Parameters nununununununununununununun

Detector number : DET 4

- Yearly cal date : 20-JUN-2008 12:00:00.00

Kev/channel : 4.99924E-01 Zero offset: 2.36636E-01

Daily cal date : 23-MAR-2009,10:11:24.69

ининимининимининиминиминими Peak Search Parameters инимининимининимининиминини

Start channel : 100

End channel : 4096

Height sensitivity : 5.00000 |

Shape sensitivity : 10.00000

Maximum number of iterations topresolve multiplets : 5

Energy tolerance : 2.00000

Half-life ratio : 10.00000

Abundance limit : 75.00000

Library : dacmaster.nlb

Efficiency file : EFFD4\_m211

Efficiencies at a Peak energy

Pk.	It	Energy	Arrea	Ekgnd	FWHM	Channel	L.eft	Pω	Cts/Sec	%Err	Fit
1.	Ø	296.02	112	68	3.70	591.66	585	14	6.24E-02	18.4	
22	0	352.10	158	54	1.55	703.83	697	1.6	8.80E-02	12.9	
.3	(3)	511.16	141	3/4	2.49	1022.00	1016	1.3	7.85E-02	11.8	
4	(3)	559.56	50	53	2.31	1118.80	1110	21	2.00E-02	37.2	
.5	(3)	609.44	168	1, 13	2.29	1218.58	1212	1.4	9.316-02	9.0	
6	<b>(3</b> )	1120.40	.49	Ġ.	2.39	2240.64	2235	1.22	2.728-02	17.4	
7	Ø	1461.97	35	1.6	2.36	2923.86	2913	1.5	1.946-02	29.7	

Sample Title : SUMP#11 Decay Time = 4 20:23:42.88

Page : 1 Acquisition Time = 23-MAR-2009 10:53:42.

### Post-NID Peak Search Report

It	Energy	Area	Blagnd	FWHM Chammel	Left	Pw MErr	Fit	Nuclides
<b>Ø</b>	296.02	112	68	3.70 591.66	585	14 18.4		Pb-214
<b>(</b> )	352.10	1.58	54	1.550 703.83	697	16 12.9		Pb-214
(2)	511.16	1.41	34	2.49 1022.00	1016	13 11.8		ANNI
0	959.56	50	53	2.31 1118.80	1110	21 37.2		
Ø	609.44	1.68	1.3	2.29 1218.58	1212	14 9.0		B. 214
0	1120.40	49	6	2.39 2240.64	2235	12 17.4		13-214
(2)	1461.197	35	1.6	2.36 2923.86	2913	15 29.7		K-40

Muclide Line Activity Report Sample ID : SUMP#11 Page: 2 Acquisition date: 23-MAR-2009 10:53:42

Nuclide Type: natural

Uncorrected Decay Corr 1-Sigma Nuclide K-40 Energy Arrea %Albin , METT uCi/cc uCi/cc MError 10.67% 1460.81 35 2.500E+00 1.961E-07 1.9618-07 29.73

Flag: "\*" = Keyline

Summary of Nuclide Activity Sample ID : SUMP#11 .

Page : 3 Acquisition date : 23-MAR-2009710:53:42

Total number of lines in spectrum Number of unidentified lines

Ó

Number of lines tentatively identified by NID

7 100.00%

Nuclide Type : natural

á

Uncorrected Decay Corr Decay Corr 1-Sigma Muclide : Hlife Decay uCi/cc uCizco 1-Sigma Error MError Flags K--40 1.00E+05Y 1.00 1.961E-07 1.961E-07 0.583E-07 29.73 \*

Total Activity : 1.961E-07

1.961E-07

Grand Total Activity : 1.961E-07

1.961E-07

Flags: "K" = Keyline not found
"E" = Manually edited

"M" = Manually accepted

"A" = Nuclide specific abn. limit

Nuclide F-18	Halfelife 109.74M %		511.00%	193.46		
SC-46	83.830	<sub>5</sub> 0.06	142.53	99.98		Abun.
; 	%	Abundances	1120.51 Found =	99.99 38.07		•
AS-76	ee. 32H	4.43	559.10% 563.23 571.30 657.03 665.31	1.17 0.14 6.10 0.39	Not Found Not Found Not Found Not Found	Abun.
·			740.12 771.76 867.63 1129.87 1212.72	0.12 0.12 0.14	Not Found Not Found Not Found Not Found Not Found Not Found	
			1216.02> 1228.52 1439.13 1453.60 1787.67	3.84 1.39	Mot Found Not Found Not Found Not Found	
	nd An	Abundances	Found ==	73.70		• .
BR-84	31.801	220.09	604.80 736.50 802.20	1.31	Not Found Not Found Not Found	Decay, Abun.
Ø		·	881.50% 1015.90 1213.30 1463.80 1741.20 1877.50 1897.30 2029.60	42.00 6.20 2.60 2.00 1.60 1.14	Not Found Not Found Not Found 1.000E+35 29.73 Not Found Not Found Not Found Not Found Not Found Not Found	
	%	Abundances	A Committee of the Comm	2.45		
KR-90	32.329	12992.69	121.82 539.49 1118.69%	29.00	Not Found Not Found 1.000E+35 17.44	Decay, Abun.
	%	Abundances		37.76		
Y-92	3.54H %	32.95 Abundances	561.10 844.30 934.46% 1405.40	2.40 1.25 13.90	Not Found 5.596E+03 37.20 Not Found Not Found Not Found	Decay, Abun.
RU-103	39.35D	0.12	A CONTRACTOR OF THE CONTRACTOR		•	Abum.
† ; ;	%	Abundances	610.33 Found =	5.60 5.92	1.083E-06 9.05	

Nuclide Hal XE-135	9.11H		Energy 249.79% 608.19 Found =		Not Found	Rejected by Decay, Abun.
PM-1.48M	41. 36D	0.12	288.11 414.07 432.78 501.26 550.27% 599.74 611.26 629.97 725.70 915.33 1013.81 Found	12.54 5.48 99.00 32.80 17.17	Not Found	Abun.
BT-214	19.90M	351.69	609.31* 768.36 934.06 1120.29 1238.11 1377.67 1764.49 Found =	4630	Not Found	Decay 48%)
PB-214	26.80M	261.15	87.30 241.98 295.21 351.92* 785.91	19.20 37.20	Not Found 1.000E+35 18.35 1.000E+35 12.93 Not Found	Decay
	%	Abundances	Found =	80.96		20%)

Flag: "\*" = Keyline

T t	Energy	Arrea	Blegnd	FWHM	Channel L	oft Pv	. Cts/Sec.	MErr.	eas <b>%Eff</b> eren	Lags
ca.	en en en en	4.4.25	4.37.23	3.170 \	r to salah ni Kabana kak		6.24E-02	13 1 gs	6.086+00	
Ø Ø	296.02 352.10	112 158	***	3.70 · 1.55	,		. 6.80E-02		5.70E+00	
Ø	511.16	141		2]49			7.85E-02		4.88E+00	T
<b>Ø</b>	559.56	50	53	2/31			2.80E-02		4.68E+00	· T
(2)	609.44	168		2 29			9.315-02		4.52E+00	Ţ.
Ø	41120.40	49	. <b>6</b> i	2.39	2240.64 2	235 12	2.72E-02	17.4	2.90E+00	ï

Flage: "T" = Tentatively associated

mag . J

#### Minimum Detectable Activity Report

	Bekynd		, Energy	MDA
Muclide	Sum		(k@V)	(uCi/ee)
BE-7	зė.		477.59	08.5677E-08
F-18	().		511.00	Half-Life too short
NA-55	10.		1274.54	9.5445E-09
	15.		1368.53	2.63226-06
MA-24 MG-27	. Ø.,		1014.44	Half-Life too short
	0.		1642.42	Half-Life too short
CL-38		•	1293.64	Half-Life too short
AR41	Ø.,		+ 889.25	1.0023E-08
SC-46	16.			
CR-51	34		320.08	9.7033E-06
MN-54	8 20.	1	834.83	1.02135-08
CO-56	30.	4 1 1 1	1238.25	2.4005E-00
MM56	0	11,10	1810.69	Half-Life too short
NX-56	59.		158.38	1.5213E-08
CO-57	47		122.06	1.0667E-08
CO-58	13.		810.76	8.7251E-09
FE-59	9.		1099.22	1.60008-08
00-60	7		1332.49	8.4677E-09
CU64	9.	•	1345.90	1.7935E-03
NI-65	0.,		1481.84	Half-Life too short
ZN65	1.00 n		1115.52	4.8233E-08
ZN69M	15.		438.63	2.2499E-06
SE-75	52.		136.00	1.5068E-08
A876	73.		559.10	6.5487E-07
BR-82	11.		776.49	8.5094E-08
BR-83	(?)	•	529.64	Half-Life too short
BR-84	00.		881.50	Half-Life too short
BR-85	Ø.,		802.41	Half-Life too short
KR85	49.		, 513.99	2.5368E-06
KR85M	Ø.,		151.18	Half-Life too short
SR-85	49		513.99	1.15656-08
RB86	6		1076.63	9.7587E-08
KR-87	(?) <sub>н</sub>		402.58	Half-Life too short
SR-87M	Ø.		388.40	Half-Life too short
KR-88	Ø		196.32	Half-Life too short
RB88	Ø.		1382.39	Half-Life too short
Y-88	8.		1836.01	1.1391E-08
KR89	. Ø.	•	- 220.90	Half-Life too short
RB-89	Ø "	p\$.	1031.88	Half-Life too short
KR-90	Ø.,	*. *	1118.69	Half-Life too short
RB-90	Ø.,		831.69	Half-Life too short
RB90M	0.		824.23	Half-Life too short
Y-90M	. 0.1		, 202.51	Half-Life too short
SR-91	Ø		1024.30	Half-Life too short
Y91	· 55 a		1204.90	2.4596E-06
Y91M	( <u>/</u> ) <sub>n</sub>		555.60	Half-Life too short
SR-92	Ø.		1383.94	Half-Life too short
Y92	Ø.		934.46	Half-Life too short

14 (44) 14 (44) 15 (44) 15 (44) 16 (14)

2 8 6 6

Acquisition date : 23-MAR-2009 10:53:42

		1		
	Bekgnd	Energy	, MDA	tana di kacamatan kataban da kacamatan da kataban da kataban da kataban da kataban da kataban da kataban da ka Kataban da kataban da k
Muchide	Sum	(keV)	(uCi/cc)	
SR-9 (	. (0.,	590.28	Half-Life too short	State of the state
Ÿ93'	·	266.90	Half-Life too short	
NB-94	23.	702.63	9.1363E-Ø9	
NB-95	24.	765.79	1.1178E-08	
MB-95M	52,	235.69	8.7089E-08	
ZR-95	16.	756.72	1.5761E-08	•
NB-97	Ø	657.90	Half-Life too short	4.
ZR-97	17.	743.36	1.0339E-06	44
MO99	14.	739.58	2.0630E-07	
TC-99M	0.	140.50	Half-Life too short	·
TC-101	Ø.,	306.81	Half-Life too short	
RU-103	17.	497.08	8.1535E-09	•
TC-104	<b>0.</b>	357.99	Half-Life too short	••
RH-1.05	43.	318.90	4.3079E-07	
RU-1.05	Ø.,	724.50	Half-Life too short	
RU106	1. A.	621.84	6.52255-08	:
CD-109	54.	88.03	4.2685E-07	
AG-110M	17.	937.48	3.0396E-08	
SN-113	24.	391.69	1.1127E-00	4
SN-117M	61.	158.56	1.3008E-08	* * *
88-122	1.9.	563.93	3.6241E-08	4 身有
SB-124	20.	602.71	8.4170E09	
93-125	34.	427.89	2.91195-08	
TE-125M	44.,	109.28	3.73916-06	ž. 4
TE-127	0.	417.90	Half-Life too short	%% <sub>1</sub>
TE-127M	29.	57.60	2.3004E-05	•
XE-127	46.	202.84	1.2574E-00	
TE-129	0.	459.60	Half-Life too short	
TE-129M	12.	695.88	2.2884E-07	and the state of t
XE-129M	57.	196.56	2.6355E-67	
1-130	26.	536.09	5.8483E-06	15 等級
BA-131	48.	123.80	4.0899E-08	· "我们就
1-131	eā.	364.48	1.3707E-08	THE NAME OF THE
TE-131	8 0.	149.72	Malf-Life too short	
TE-131M	1.0.	773.67	2.6717E-07	
XE-131M	53.	163.93	5.5683E-07	
1-132	0.	667.69	Half-Life too short	
TE-132	53.	228.16	2.7599E-08	
BA-133	36.	302.64	4.2876E-98	
BA-133M	40.	276.09	3.4395E-07	15.00
1-133	The second secon	The transfer of the second of	3.7606E-07	18 × 2°
TE-133M		529.87 912.58	Half-Life too short	
XE-133	20 cm = .	81.00	8.1506E-08	<u> </u>
XE-133M	46.	233.22	a transfer of the contract of	10 m 1 m 1 m 1 m 1 m 1 m 1 m 1 m 1 m 1 m
. CS-134	1.6.	. 60470	3.6539E-07 7.2709E-09	
1-134	7. CA.	884.89	Half-Life too short	
TE-134	Ø.	210.47		
BA-135M	43.	268.24	Half-Life too short	
I-135		*	8.3924E-07	
	· Ø "	1260.41	Half-Life too short	
XE-135	Ø.,	: 249.79 : 506 56	Half-Life too short	
XE-135M	Ø.	526.56	Half-Life too short	

Acquisition date : 23-MAR-2009 10:53:42

	•	Bekgnd		Energy	MDA
Muclide		Sum		(keV)	<pre>c OuCi/cc)</pre>
				1	
CS-136		19.	, ,	818.50	ſ.2541E-08
1-136		ø.		1313.02	Half-Life too short
CS-137		20.		66165	9.4588E-69.
• XE-137		Ø.,		455.49	HalffLife too short
.CS-1.38		Ø.		1435.86	Half-Life too short
XE-138	7	ø.	•	258.31	Half-Life too short
BA139	•	Ø.,		1420.50	Half-Life too short
CE-139	•	60.		165.85	1.1034E-08
CS-139		(3 <sub>n</sub>		1283123	Half-Life too short
B的…1.40	!	21.		537.32	3.9441E-08
LA-140		O.		1596.49	7.7217E-00
BA-141	:	Ø.		190.22	Half-Life too short
CE-141	·	49.	,	145.44	1.8685E-08
L.A141		0.		1354.52	Half-Life too short
360~142		Ø.,		255.12	Half-Life too short
LA-142		(i) n		641.17	Half-Life too short
CE-143		65.		293.26	2.7215E-07
CE-144		51		133.54	8.1388E-08
PR-144		Ø.		1489.15	Half-Life too short
ND-147		54.		91.10	7.0945E-08
PM-148M		25.	•	550.27	9.5250E-09
EU-152		34		344.27	2.9282E-08
EU154	•	10.		1004.76	4.7508E-08
EU-155		48.		105.31	5.22375-08
EU156		17.		646.29	1.31968-07
HF-181	•	29.		482.03	1.0026E-08
TA-182		12.		1221.42	3.8638E-08
W-187		9.		685.81	6.12726-07
RE-188		56.		155.03	6.6005E-06
HG-203		40.		279.19	10865E-08
BI-207		21.	1. W	569.67	7.9728E-09
TL208	··. 8	Ø.	-	583.14	Half-Life teo short
PB-212		②		236.63	Half-Life too short
BI-214		O.		609.31	Half-Life too short
PB-214		Ø.,	•	351.92	Half-Life too short
RA224		92.		240.98	7.2160E-07
RA-226	•	54.		186.21	2.52176-07
AC-228		32.		338.32	6.6561E-08
TH-228	1	4)	!	84.37	1.38692E-06
PA-234		0	!	131.20	Half-Lift too short
TH-234	·	- 39.	1.7	63.29	-11, 3232E-06
U-235		60.		143.76	A., 536.06-44
MD-239		44.		106.13	1. 8888E-07
AM-241	1	31.		59.54	1.7459E-07
	•	* **	,		

# FERMI I NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Log Number W/H		
Task	Performed By	Date
1. Representative sample collected.  Date/Time (2/3/09 / 1/25)  Container Number 5411  Storage Location EF-1	Feymi 1 (signature)  B 3308  Employee ID Number	. 12/7/09
2. Sample secured against tampering.	Salar Mused. Fermi 1 (signature)  B 3307  Employee ID Number	13/7/09
3. Tritium LLD < = 2 E-6 uCi/ml Actual tritium LLD = (1(5 E-6 uCi/ml No tritium activity detected. (If tritium activity detected do not sign, and explain in Remarks.)	Chemistry (signature)	12-70-09
4. Gamma spectroscopy count completed on system suitable for MRP18 evaluations.	Employee ID Number  RP (signature)  By 116  Employee ID Number	<u>12-16-09</u>
5. Gamma spectroscopy report shows no identified peaks above critical level due to licensed radioactive material. (Note disposition of unidentified peaks on gamma spectroscopy report.  If licensed material detected, do not sign, and explain in Remarks.)	Radiological Engineering (signature)  Employee ID Number	<u>12:22</u> 09

## FERMI 1 NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Log Number/				
Task	_ ;	Performed By		Date (14)
6. Fluid approved for release.	1			And Andrews
o. Pluid approved for release.		Radiological Engineer (signature)	ing A	
· · · · · · · · · · · · · · · · · · ·	<u> </u>	A TO March		
		Employee ID Number		
Remarks:	:			
A second	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	e e e e e e e e e e e e e e e e e e e		
		·		
	:	Y		
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	•			and S Community of Samuel Samuel And Angles of Samuel br>Samuel Samuel Samu
·				
	; ;			
				·
	· ·			•

	Sample Information			
1 . Sample Location		ļ	EF-1 Sump #11	
2 . Date Sampled			12/03/2009	
3 . Time Sampled			14:25	
4 . Sample Volume, (ml)			4	ml
	1,		•	4
•	Instrument Count Data			
	instrument Count Data			
1 . Date Sample Counted			12/09/2009	
2 . Time Sample Counted			06:03	
3 . Background Inf.:	1			
Minutes Counted	:		10	min.
Background Count Rate (cpm)	ì		7.1	
4 . Efficiency Inf.: (Daily Spike Source	o ID # 111)		7.1	cpm
Gross Spike Count Rate (cpm)	e 10 # 111)		0747 5	
			2747.5	cpm
Net Spike Count Rate (cpm)		•	2740.4	cpm
H3 Spike Activity (dpm on count date)			7101.9	dpm
Counter Efficiency	i		0.3859	cpm/dpm
5 . Sample Info:				
Sample Gross Count Rate (cpm)	*		8.3	cpm
Sample Count Time (min.)	,		10.0	min.
Net Sample Count Rate (cpm)			1.2	cpm
6 Critical Level:	1			
Critical Level Count Rate (cpm)			1.9	cpm
•				•
:				
Minin	num Detectable Activity	· · · · · · · · · · · · · · · · · · ·		
	(Bkg cpm) (Bkg cpm)			
Minimum Detectable Activity (uCi/ml) = 3.3 x	(Bkg mln.) + (Smpl mln.)	_=	1.15E-06	uCi/ml
	Efficiency x 2.22E6 dpm/uCi x Sample Volume			
,			,	•
•				
	Sample Activity			
	1			
Sample Activity (uCl/ml) =	Sample Net cpm	_	MDA	
Sample Activity (dCi/mi) =		_ `	MDA	
3	Efficiency x 2.22E6 uCi/ml x Sample Volume			
•				
f				
Technician Killing		Date	12-10-09	
		,_		- ·

DTC: TGCHEM File: 1319.02

Form 76.000.39 Att 1 P1/1

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DETROIT EDISON FERMI'S POWER PLANT

17-DFT (1000 15:14:39:11

RADIATION PROTECTION DEPARTMENT

DAMMA SPECTROSCOPY AND YOUS REPORT

HEGH EFFICIENCY DETECTOR ( ) ...

Sample ID Number: EFLOUPH: 11

Dample End Time: 3-DEC-P009 14:05:00.00

REMARKS

Charles Rolls

SOLITION

SIONATORE

Sample Title : EF18UFFF 11

· Decay bine - 14 00:19:36.27 // / Acquisition Time - 17-DEC COUR 14:44:36.2

It is Energy as Areas a Blight of OHA Channel short. Posterous fates that I does

Contract to the contract of th

0	E.C. 49	33 +4 4 (1 108,05 108 8 30 0 From <1 6	12-22-07-7
3	510.04	04 45 22,45,1021.35 1014 31 22.2 1.11E+00-	
3	512.31	43 41 0.89 10011.00 (1014 31 00.2	11: 05- AND
			R. All Pills
(2)	558.56	61 17 011 50 1146 91 1111 12 13 7	Mu xc:
. (2)	609.18	35 21 1.67 1218.02 1211 12 31.3	Ri. 7111
(3)	806.777		151 - K14 -11 W C
(B	1460.43		(- 40)

A MARTINE STATE OF THE PROPERTY OF THE STATE 
1-12-22-09

 (1) A Section ( angan manganan kenalah kebagai penggalah angan salah ke kerbekan menganan di beramanan salah salah sebagai pen Berampangan sebagai penggan mengan kebagai penggan sebagai sebagai sebagai sebagai penggan berampan sebagai se Berampan sebagai sebag at the contribution for the state of the contribution of the state of the state of the contribution of the state of the s

All the same where the real methods have been a super-contraction to

in your many that he follows from A the solution of

PAGE\_\_\_\_of\_

Sample ID : DF1SUMPH 11

inequialtion date . 17-DEC inary 14:44:36

Design to the properties of th

Fermi & Radiation Protection Camma Space, Jacopy Deport

никиментический полический в под от 19 м г. и под от 19 м г.

Sample ID Humber: EF1GUMPH 11 Sample collection start date: 3-DEC:2009 14:25:00.00

Sample collection end date . 3 DEC 2003 14:25:00.00

Type of sample : 1 L. Plack . Liquid

Sample quantaby : 1.00000E-602 cc

4

Sample geometry : MELL & Same Common CLP

Detector number : : DELEGATION ACQUITE date : 17-MIC-2009 1...44:36.27

Preset live time : 0.00:30:00.00 Elapsod live time : 0.00:20:00.00

Elapsed real time : 0 00:50:00.92 Porcent dead time : 0.05 %

мести и под при в при в при в при в при в в при в в при в в при 
Detector number: DET 4 Yearly cal date: 3 JUN-2009 17:37:00:00

Kev/channel : 5.00005E-01 - Zero offaet: 1.58710E-01

Daily cal date : 17-DEC-2009 06:22:35.19

живиними констинуваний в при в в при в

Start charinel : 100 End channel : 4076

Height sensitivity : 5.00000 Chape sensitivity : 10.00000

Maximum mainbor of iterations to resulve multiplets : 5%

second consideration of the angle of the ang

Energy tolorance : 1.75000 Half-lite ratio : 19.00000

Abundance limit : 75,00000 Library : dacmanter into

Efficiency file : EFFD4\_m211 Efficiencies at a Peak energy

Pk	rt	Energy	Area	Blug nd	हमाना	Cleanwal	Light Whi	Part	Comittee	Will r	Fat
1	<b>(3</b> )	66.49	, 3,3	41	0.67	132,65	129	Ą	1.836 63	30, 9	
12	.3	·510.64	84	+ 40	2: 15	_1021,235	1014	3.1	4.550-08	121.1.21	4.441.202
.3	.3	512,31	43						24.381.002		
4	(2)	558.58	6.1	17	1.60	1116.81	1111	12	3.422-03	18.7	
(5	(2)	609:18	35	21	1.67	1218.02	1211	1.17	L.94E-0D	31.2	
€,	(2)	806.79	1.1.	3	122	1613.PB	1609	3	5.07E-0.7	44. 1	
. 7	Ø	1460.43	37	115	Ø. eT	COCO. 40	2913 ·	13	::. 97E-08		, v

ñ :182 114.74D

-0.12 [67.75 N1.30 0.9030 08 N0.92 Abd.,

Rejected Report (continued) Page : 11 Sample ID : EFISUMFW.11 (2): 12: 12: 12: 12: 13: 14:44:06: Half-Life Ratio Energy Shbund (uti/m) Efror Ryjected by TM-182 114.74D 0.12 .100.10 14.10 --- Not Found --- Obuy. 1221.427 22.10 --- Not Found ---X.Abundances: Found # 132.03 The first of the state of the s tologo tola. 80 5 coo. 21 m. danso t. coors 7: Cl. 24 Dec., 19 (19) 19 (19) 234, 06; (23, 21) mm, Hot. Found (19) 1238.11 5.94 - Not Found 1377.67 . 4.11 ---- Not Found ---1761.40; 15.86 ---- Not Lound ----- % Abundances Found = 48.46 (Obn. Limit = 48.46)

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Flags "%" - Keyline

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The Indian Continuous Con-

. Page 1 Réjected Report Sample ID : EFISUMPH 11 o Acquisition date of TY-DEC 2000 14844836 - Halfellafe Activity to Olyma Nuclide Half-life Ratio Energy Milbund - KüCi/GCI - Stroom Phylys Lad by 109.749 -184.02 Sil.00#195.46 4., 00003 535 722, 84 Ditton age - % Abundarace Francis 199.00 119.76D 66.05 1, . (0):: 316798 06 38.92 Abun. SE-75 0.12 196, 13 BOLAL --- NOT Pound and 121.12 16.70 · Hot Found ----1136,00% 50,00 -- 1 Not Found ---3.6 6 4 303 **1,96,60**7 1.45 min Not found com 50,80 -- Mot found --~ D64.65 25.20 -- Not Found + 879, 53. 4.32 " Whit Found 🗎 303. 91 400% 85 11.40 - Not found ---M Abundances Found \*\* 0.37Commence of the control of 112.79 559.10% 44.70 3.1176-07 10.59 26.32H Lector, Abuth 503,23 1.17 - Hot Found -0.14 - Not Found ..... 371, 30 6.10 · ··· Not Found 857,00 0.39 - - Not found ---665, 31 740.12 O. 12 --- Not Found ----771,76 0.18 -- Not Found ----867,63 0.12 - · Not Found ---0.14 --- Not Found ----1129.87 tatan. Ye 1.63 ···· Not Louing ···· 3.84 · -- Not Found ----1216.02 1.39 ---- Not Found ----1228,52 1439.13 0.33 --- Not Found de-1453.60 0.113 --- Not found ..... 0.33 --- Not Found ----1787.67 . 3. 70 % Abundances Found = RU-103 39.35D 0.36 497.0600 69.00 --- Note Found ---Alexan s.eo e.éécé-ovo si.ea 640.33 5.92 » Abundances Found 
 « 249.70% 89.70 --- Not Found ---9.11H 36, 95 Device of Morris XE- 135 608,19 5.3146+04 31.84 2.89 % Abundances Found \* 3.11 13.16D 5.794E-07 38.9E 1.97 CS-136 66.91 12,50 film. 86.29 Constitute of Host Course com-155. CE 7.46 · · Mot found 163.80 4.61 - \*\* Not Found \*\* 175.55 13.56 -- " Not Found ---už5.65 1E, 66 · Not found ----

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... Not found .....

· Hot Found

UnidentifiedaEnergy Lines ..... ្រង់ជ្រាក់ ដ Bigned FWHI Channel Left Pw Cta/Sec WErr Energy Area MILTY " ITLAMS. The state of the s B. 67 33 132.65 129 8 1.655-02 58.9 66,49 1.436400 45 2.45 1021.35 1014 31:4.65E-02 22.2 35 510.64 84 4.38E+00 : T 17 1.60 1116.81 1111 12 3.42E-07 18.7 4.09E+00 T **(:)** 558.58 61 . 21 64.67 **(**2) 609,18 35 1815.02 d211/12 1.94E-68 31.E 3. SOLACO (1 - 9 | 1122 | 1618.80 1609 | A 5.07E 03-44.1 806.79 1. 1. (ž) D. 69E 690

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 $\langle \nabla x_{-i} \rangle_{H^{\alpha_i}}]$ 

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Committee of Report 1984

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(a) A supply of the probability of the following supply of the probability of the prob

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### Minimum Detectable Activity Report

		Bekgnd	Signal Energy	MDA
Huclide	•		CHAIN	cuthizec)
•		•		
I3127	•	19.	477, 79	. 7.8603E:00
F-13	•	Ľ.	511.0C	Halfdalfe too short
NA~ 22		9.		o. sener. · 64
HA- 04	٠.	0. , ,	1.000.0.3	Half Later Lan Line
MO27		Θ.	1014.44	Half-Life too short
CL - 38		. B.,	1642, 40	Hatf Line too thort
AR-41		0	1893.64	Half-Life too short
30-46		9	- 580.25	8.63640 09
CR-51		33.	320.08	1.07788 07
1114-54	•	1.4	0.3-1 (5.3	9.08536-67
CO58		16.	1230.25	1.9537E-08
MN~56		Ø.	1310.69	Half Life too short
минью	•	51.	158.38	4. 0268E-08
CO~57		49.	122.0C	1.1097E-08
00~58		1.E	810.76	9.0061E-09
FTC -59		12.	1099.82	2.1448E: 03
00-60		10.	1332149	9. BYSCE · OF
CH-64		Ø.	1345. 90	Hair Lare too mort
NII-65		. 0.	1401.04	Half-Life too shurt
214-65		12.	1115.52	1.9961E O8
ZN-69M	•	Ø.	478.63	Half-Life too wheat
SE-75		36.	1,36, 90	1.34280-08
AS-76	•	Ø.	559, 10	Half-Life too short
DR 68		7.	776149	5.22238.06
ER83		8.	529.64	Half Life, bow chart
BR-84		Ø.,	A31.50	Half Life stoo short
海内一名5000		Ø.	802.41	Half-Life too short
KEH85M	•	(3),,	151.18	Half-Life too short
RE86	•	1.7"	1076.63	37. 1.3.361 · · · · · · · · · · · · · · · · · · ·
KR-87		(3.,	1402, 50	- Malfelife too stort
9R-87H	•	Ø., ·	348,40	Healf dather too short
KK-88		IJ.,	1 Dec. 32	Half Life too short
RU-88		( <u>)</u>	1002.00	Half Life too short
Y88	•	11.	1036101	1.34990-02
KR-09	•	(P.,	220, 20	Hadf-Lafe too thart
SB89		Ø.,	1831,38	Half Life too short
KR-90		. O.	2110.69	Hall f Lilfe bost at the
FE:90		Ü.,	031.60	Half Life but shart
RB-90M		(4.,	Mill 6 a 12 2	Half-Life too stort
ProcY	•	O.	202.51	Hatf Live box short
SR-91		Ø.	1 002 5 2 3:0	that f later two short
N. 04	•	4 for	1 "01 00	1. 175 mil-12. (7.)

** *** **	ATA 4500 AVI 44 A	1 11 44 11 1	*** **** *	
· (7t.,	CECO CE	HalfwLife	ሲውው	short
Q) a	1363.9	Halfwlite	too	short
0.	934.46	Half-Life	ხიი	short
Ľ.,	590.04	Half-Life	too	shoct
(i)	6567074 1267	Half-tife	too	Prode

Pfinimum Detectable Activity Export (continued)
Sample ID : EFISUMPH 1: Page 1 Pequisition date : 17-DEC-1027 14:64.11

•	* 4			
		Balaprid	Aurior gr	MDA
Nuc Läde		Sum	(heV)	(uCL/cu)
61			71750 7 .	A CONTRACTOR OF THE ACTION ASSESSMENT
NB94		19.	TOR. OB	8.4147E 02
NM-95			765.75	
		1.8.		1.4.21.98000
HB95M		41.	235.69	4. 5286C- 97
ZR-98	•	1.00.	756.72	1.4632E-08
HE-97		<b>0.</b> (3.45)	j657490	Half hife too short
IR- 97			743. 36	Malfelife too .horr
MO -99		Car and All I	739.50	· [4] [4] [4874] [16] [7]
TC99H	•	A. The state of th	1.40.50	Had fel. I for Long athort.
10-181	•	U.,	36.81	Halfflate too chart
RU-103		15,	497.05	8.97480-09
TC -104			~ 35T. 99	Half-Life too Lore
EH-105	•	<b>33.</b> 22. 20.	318.90	3,876AC 05
RU-105	in .		72:44 200	AND THE PROPERTY OF THE PROPER
	•			that Life the short
RU- 106			3621.204	7.1668E 08
CD-109		36.	00.63	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1
AG-110M	, ,	11:1	0.37.48	E. 6077L NB
3H113			391.69	TO THE TANK AND THE STATE OF TH
SH-117M		51	\$158.56	1.9147E-08
8B-122		2015年中国共和国共享	(C63. 93	3.9230E Q.
33-124	1	<b>27.</b> 经产品的 1000000000000000000000000000000000000	€602.71	19 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
98-125	1	"自己"。"是是一个,我们就是一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个	Ka7. 69	2 1982. 2384E DO 1
TE125M			<sup>8</sup> 109.26	2.87106-06
TE- 127	1	and the second of the second o	417.90	Halfelife too short
TE-187M			\$ 57.60	21. 19071:05
XE -127	•		200.64	the J. DOYAL WOOD
			~459460	ાં. વહાઉંગા હશે 🖯
TE-129		ti) ii	**************************************	flalfold for too short
TE-189H		23. 2007 whi	695.88	11 Sept. 6656E- 027
XE-129M		41. 31 37.35 36	196.56	11.600 A. 6640E-07
1-130		Ø. 10 The state of	នៃនុច្ច. ២០	Halff Laffe too short
BA-131		40.	183.60	6.4768E-08
1-131			<b>364.</b> 48	<b>5.,97</b> /5E -08
7 E-131			149. Pe	Halt-Life too short
TE-131M	•	U.,	773.67	Half-Life too short
XE-LBIM		28.	1.63, 93	1356F-07
1-102	1	0.	Oh7. (2)	Thatf-Life too short
TE-132		30.	228,16	1.66436-67
BA-133			307.84	3.9363E 00
BA-133M	• •		270.09	THE TOTAL OF THE
1-133		Man and a second	589.87	
				Hadr ddfe too allart
TE-133M			714.08	Halfillfe bon affort
XE-133		20.	31.00	2.2401E-07
XE-133M		P5 (1) II	233. RE	5.91751. 00
CS-134	_	land p	604. 70	9.30418 99
I-134		W.	884.89	Half date too short
TE 1.34	ŧ.	9 6.	210.47	Half-life the short
BO-135H		0.	268.24	Half-Life boo abort
7-137			126.01 -) 7	Half of the force change.

Ø.,	i 64979	Half Life t	troots ook
Ø.	_ 526. TA	Half-Life t	Profit on
10.	 838.50	15422	E-08
· (2)	1315.65	Half-Life t	coo short

مدان العلالية والما	•		Energ.	MDA
Muclide		Sem '	The Court of the C	A Cuthide
09-137		18.	661,65	8.99878-09
XE-137			455, 40	Half-Life too Liort
09-136		Ø.	455, 45 1,435, 86	Half-Lafe boo nhort
XE-138			258.31	Half-Life boo short
BG-139			1420.50	Half-Life too short
CE-139		394	165.65	9.4602E. U)
08-139		Ø	1203.20	Half-Life too short
BA-140		1.42	937. 32	.5°, 0454E -80
L.A-140	1	gi,	1,596., 49	EL MAIN CO
DG-141	*	0	ፈጣጣ, ድር	Hall Told Ta true short
CE 2.4.2		39.	1.45.45	3.05100 06
LA-141		O.	1354.58	Halify Life too short
第6~ 1.4段		Ú.	255, 31	Half-dife too theet
1-13-1-142		Et.	641.17	HART Later too thort
CE-1.43	,			Halfetlife too short
UE-144		33	133.54	6.8373E-66
FT:1.44		(7)	1469.15 91.10 550.27	Halfellie bou shurt
ND-147		思存品	91.10	8. 2660E · 93
四十二十48四		1,3 .	550.27	8.14E4E-09
Eu-lie	•	@4.	344.07	A 2.5250E-03
EU-154		1. 1. m. j.j.	1,004. 76	₩ <sub>₩</sub> ₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩
EU 155		35 m		teg (garges 541.4F 98)
L"U-156		, <b>.1.9.</b> ,	646.29	#:. 0905E6::
111-161		1.4.	A 18 18 18 18 18 18 18 18 18 18 18 18 18	. 9.10640 00
TA182		. 11	1221.42	3.988.E- 68
W-187.		C)	1.14 CAUS. 431.	Hallf Large Loo almort
RE-188		() <sub>11</sub>	155.03	Half-Life too short
MG (203		39	279, 19	1.2360E 00 7.5294E 09
81-207		1.9	569,67	
TL-200		$\Theta_{n \in \mathcal{N}}$	503.11	Half Life too short Half-Life too short
PB-212		Ø.,.,	288.60	Half .L. tfo too short
BI-214		0.	600.31	Half-Life too short
PB-214	· .	ا ما د	35198	Half Lafe too short
RA-224		մենես,,,	240.00 186.81 No. 80	2.6546E • 06
RA-226		43 July 43 C 3	1 Of the Rich	2. PLOBE OF
AC-226 TH-228		, ,	4	G.3791E 08
PA-234	•	30.	84.37	April 1000E -06
144-234 14-234		O week	131.20	Halfelite too short
U-235		j zakada Se o	63.92	1.638(40) 06
NP-239	•	34.	1-1-3	6.57690-04
AM-241		20.	106.13	2.51425-66
t st t toontab		15557 9	ST Zu of s	1.CGG1E-07

Provided Survey Chydria Chila

EF-1 Sump #11 2010

## FERMI 1 NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Log Number	Performed By	Date
1. Representative sample collected.  Date/Time 5/10/10 11525  Container Number 5ump# 11  Storage Location EF-1	Southward Formi 1 (signature)  B 3308 Employee ID Number	5/10/10
2. Sample secured against tampering.	Festini 1 (signature)	5/10/10
3. Tritium LLD <= 2 E-6 uCi/ml Actual tritium LLD = <1.200-1. uCi/ml No tritium activity detected. (If tritium activity detected do not sign, and explain in Remarks.)	Employee ID Number  Chemistry (signature)	5-17-10
4. Gamma spectroscopy count completed on system suitable for MRP18 evaluations.	Employee ID Number  RP (signature)  B 3307  Employee ID Number	6/15/10
5. Gamma spectroscopy report shows no identified peaks above critical level due to licensed radioactive material. (Note disposition of unidentified peaks on gamma spectroscopy report.  If licensed material detected, do not sign, and explain in Remarks.)	Radiological Engineering (signature)  50027  Employee ID Number	<u> (-22-10</u>

### FERMI 1 NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Log Numbe	N/A	LIQUID SCINTILLATION COC	
Task		Performed By	Date
		A / / 4	<b>N//A</b>
6. Fluid app	proved for release.	Radiological Engine (signature)	ering
		Hymlovee ID Numb	

#### **Tritium Activity Calculation**

Sample Information 1 . Sample Location Sump #11 2. Date Sampled 05/10/2010 3. Time Sampled 15:25 4. Sample Volume, (ml) 4 m! **Instrument Count Data** 1. Date Sample Counted 05/17/2010 2. Time Sample Counted 15:28 3. Background Inf .: Minutes Counted 10 mln. Background Count Rate (cpm) 7.9 cpm 4 . Efficiency Inf.: (Daily Spike Source ID # 111) Gross Spike Count Rate (cpm) 2703.1 cpm Net Spike Count Rate (cpm) 2695.2 cpm H3 Spike Activity (dpm on count date) 6929.6 dpm Counter Efficiency 0.3889 cpm/dpm 5 . Sample Info: . Sample Gross Count Rate (cpm) 8,4 cpm Sample Count Time (min.) 10.0 min. Net Sample Count Rate (cpm) 0.5 cpm 6 . Critical Level: Critical Level Count Rate (cpm) 2.0 cpm Minimum Detectable Activity (Bkg cpm) (Bkg cpm) (Bkg mln.) Minimum Detectable Activity (uCl/ml) = 3.3 x (Smpl min.) 1.20E-06 uCi/ml Efficiency x 2.22E6 dpm/uCl x Sample Volume Sample Activity Sample Activity (uCi/ml) MDA Sample Net cpm Efficiency x 2.22E6 uCl/ml x Sample Volume

Form 76.000.39 Att 1 P1/1

DTC: TGCHEM

File: 1319.02

15-JUN-2010 14:10:30.18

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	:1	GAMMA SPECTROSCOPY ANALYSIS REPORT (\$1.25)	
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	v populación	HIGH EFFICIENCY DETECTOR	100 mg
		HIGH EFFICIENCY DETECTOR	
		HIGH EFFICIENCY DETECTOR	
		HIGH EFFICIENCY DETECTOR	
	Sample ID N	HIGH EFFICIENCY DETECTOR  Lumber: EF-1 SUMP#11	
	Sample ID N		
	494 1830		
	494 1830	Lumbærs EF-1 SUMP#11	
	Sample End	Lumbærs EF-1 SUMP#11	が 1000年 100
	494 1830	Lumbærs EF-1 SUMP#11	

Southwall signature

REVIEWED BY: 6-22-16
SIGNATURE/DATE

PAGE of

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#### Fermi 2 Radiation Protection Gamma Spectroscopy Report

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Sample ID Number: EF-1 SUMP#11

Sample collection start date: 10-MAY-2010 15:25:00.00 Sample collection end date : 10-MAY-2010 15:25:00.00

Type of sample : 1 L Mari. Liquid Sample quantity : 1.00000E+03 cc

Sample geometry : MÉLL : Derator: JNS

announcementariancementaria Acquisition Parameters accessionementariancement

Detector number : DET 4 — Acquire date : 15-JUN-2010 13:25:26.36

Preset live time : 0 00:45:00.00 Elapsed live time : 0 00:45:00.00

Elapsed real time : 0 00:45:00.67 Percent dead time : 0.03 %

иничининичинининининининининини Calibration Parameters ининичинининининининининининини

Detector number : DET 4 Yearly cal date : 3-JUN-2009 17:37:00.00

Kev/channel : 4.99767E-01 Zero offset: 3.33491E-01

Daily cal date : 15-JUN-2010 08:23:12.97

www.communer.communer.com Pak Search Parameters were communer.communer.com

Start channel: 100 End channel: 4096

Height sensitivity: 5.88000 Shape sensitivity: 10.00000

Maximum number of iterations to resolve multiplets : 5

memoramenter and memorame Muclide Identification Parameters memoramenter and memoramenter a

Energy tolerance: 1.75000 Half-life ratio: 10.00000 Abundance limit: 75.00000 Library: dacmaster.nlb

PR	Ιt	Energy	Area	Elegnd	FWHM	Charmel	Left	Phy	Cts/Sec	METT	Fit
		510.89 1461.09	160 110						5.92E-02 4.07E-02		

Sample Title : EF-1 SUMP#11 Docky Time = 35 22:00:25.36, Page : 1' -Acquisition Time = 15-JUN-2018 13:25:26.3

### Post-NID Peak Search Report

T to	Energy	Area	Ekgrid	PIHM	Channel	Left Pw %Err	Fit	Muclides
0	510.89	160	52	1.34	1021.62	1014 15 12.7		Avri Peak
(3	1461.09	110	5	1.96	2923.19	2913 20 10.8		. K-40

Nuclida Line Activity Report ... Sample ID : EF-1 SUMPWil

Payer & D Acquisition date : 15-JUN-2010 13:25:26

en la martin degliga e la completa la la completa de la completa de la completa de la completa de la completa d La completa de la co

Nuclide Types natural

Uncorrected Decay Corr 1 1-Sigma uCi/ce uCi/ce Nuclide Energy Arma %Abn 15~40 1460.81 1.1.0 10.67\* 2.501E+00 4.127E-07 4.127E-07 10.75

Flags "W" = Keyline

Summary of Nuclide Activity Sample ID : EF-1 SUMPWil

Page : Acquisition date : 15-JUN-2010 13:25:26

Total number of lines in spectrum.

Number of unidentified lines

2 . Number of lines tentatively identified by MID

Nuclide Type : natural

1.00E+05Y

K~40

Uncorrected Nuclide Hlife Decay

uCi/cc 4.127E-07 1.00

Decay Corr uCi/cc 4.127E-07

Decay Corr 1-Sigma 1-Sigma Error MError Flags 0.444E-07

10.75

. Total Activity :

4.127E-07

4.127E-07

Grand Total Activity : 4.127E-07

4.127E-07

Flags: "K" = Keyline not found

"E" = Manually edited

"M" = Manually accepted

 $\mathbb{Z}^n$ ()

"A" = Nuclide specific abn. limit

Rejected Report Sample ID : EF-1 SURPWII

Page s Acquisition date : 15-JUN-2010 13:25:26

Half-Life

Activity 1-Sigma (uCi/cc) %Error Rejected by Nuclide Half-life Ratio Energy %Abund F-18 109.74M 471.50 511.00\*193.46 1.000E+35 12.65 Decay

% Abundances Found = 100.00

Flag: "%" = Keyline

Unidentified Energy Lines Sample ID : EF-1 SUMP#11

Acquisition date : 15-JUN-2010 13:25:26

It Energy Area Bkgnd FWHT Channel Left Pw. Cts/Sec XErr / XEff Flags

0 510.89 160 52 1.34 1021.62 1014 15 5.92E-02 12.7 4.88E+00 T

Flags: "T" = Tentatively associated

### Minimum Detectable Activity Report

	Bakgrid	Energy	PED (A)
Muclide	Sum	(Vest)	(uCi/ce)
•	•	•	
BE-7	21.	477.59	7.2479E-08
F-18	0.	511.00	Half-Life too short
NA-22	10.	1274.54	6.7719E-09
NA~24		1360.53	Half-Life too short
	Ø.	1014.44	Half-Life too short
MG-27			•
CL-32	Ø.	1642.42	Half-Life too short
AR-41	9.	1293.64	Half-Life too short
SC-46	10.	889.25	7.1366E-09
CR-51	. 36.	320.08	1.2898E-07
MN-54	14.	834.83	6.31865-09
00~56	16.	1238.25	1.6089E-08
MM-56	Ø.,	1810.69	Half-Life too short
NI-56	44,	158.38	3.0243E-07
CO-57	437	122.06	7.3952E-09
CO-58	20.	810.76	9.3744E-09
FE-59	9		1.7614E-08
•	B <sub>n</sub>	1332,49	6.1561E-09
00-60			
CU64	Ø.	1345.90	Half-Life too short
MI-65	9.	1481.84	Half-Life too short
ZN-65	14		1.5106E-08
ZM-69M	0	438.63	Half-Life too short
SE-75	61	136.00	1.2884E-08
AS-76	Ø.,	559, 10	Half-Life too short
BR92	Ø.,	776.49	Half-Life too short
BR-83	(2) n	529.64	Half-Life too short
BR-84	. 0.,	881.50	Half-Life too short
BR-85	Ø.	802.41	Half-Life too short
KR-85	51.	513.99	1.7273E-06
KR-85M	Ø.	151,18	Half-Life too short
SR-85	51	513.99	1.0916E-08
	11.	1076.63	2.6544E-07
RE-86		402.50	Half-Life too short
KR-87	O.	The state of the s	
sr-a7M	9	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1302.39	Half-Life too short
Y-88	S. P.	1836.01	7.7863E-09
KR-89	O.,	<u>,220.98</u>	Half-Life too short
RB-89		1031.88	Half-Life too short
KR-90	Ø.	1118,69	Half-Life too short
RB-90	0	831.69	Half-Life too short
RB-90M	Ø.,	024.23	Half-Life too short
Y-90m	Ø.	202.51	Half-Life too short
9R-91	Ø.	1624.30	Half-Life too short
Y-91	11.	1204.90	3.2723E-06
		555.62	Half-Life too short
Y-91M	1		
SR-92	Ø.,	1383,94	Haif-Life too short
A95	0.	994.46	Half-Life too short

22 Sample ID : EF-1 SUMPH11 Acquisition date : 15-JUN-2010 13:25:26

44	Bokgnd	Energy	ACM
Muclide	Sum	(k@V)	(uCi/cc)
SR-93	0.	590.28	Half-Life too short
Y-93	Ø.,	266.90	Half-Life too short
MB-94	. 24.	702.63	6.2053E-09
MB95	1.4.	765,79	1.07125-08
NB-95M	54.	235.69	2.32516-05
ZR95	17.	756.72	1.5380E-08
NB-97	<b>O.</b>		Half-Life too short
ZR-97	Ø.	743.36	Half-Life too short
MO-99	Ø.,		Half-Life too short
TC-99M	£) "		Half-Life too short
TC-101	Ø.		Half-Life too short
RU-103	21. 244		1.0309E-08
TC-104	Ø.		Half-Life too short
RH1.05	Ø.,	318.90	Half-Life too short
RU-105	O. I.		- Half-Life too short
RU-106	26.	621.84	6.4798E-08
CD-109	39.	88.03	2.55716-07
AG-110M		937,46	2.2962E-08
SN-113	32.	391.69	1.0117E-08
SN-117M	44. 34. 34.	158.56	3.6251E-08
SB-122	Ø., S	563.93	Half-Life too short
88-124	32.	602.71	9.9057E-09
SB-125	25.	427.89	1.7084E-08
TE-125M	47.	109.28	3.7146E-06
TE-127	· · · · · · · · · · · · · · · · · · ·	417.90	Half-Life too short
TE-127M	2. Sept.	57.60	1.9166E-05
XE-127 TE-129	65.	202.84 459.60	1.7842E-08
TE-129M		695.88	Half-Life toolshort 3.8324E-07
XE-129M	Control of the contro	196,56	1.9612E-06
1-130		536.09	Half-Life too short
BA-131	45.	123.80	1.6465E-07
1-131	30.	364.48	1.3700E-07
TE-131	<b>Ø.</b>	and the second s	Half-Life too short
TE-131M	<b>0.</b> 8.8		Half-Life too short
XE-131M	47.		2.1590E-06
1-132	Ø.	•	Half-Life too short
TE-132	Ø	228.16	Half-Life too short
BA-133	36	302.84	2.8605E-00.
BA-133M	Ø a		Half-Life too short
I-133 ,	Ø.,		Half-Life too short
TE-133M	0.		Half-Life too short
XE-133	20.		2.9744E-06
XE-133M ·	Ø n	233.22	Half-Life too short
C8-134	31.	604.70	6.6465E-09
I-134	Ø.,	0.84.09	Half-Life too short
TE-134 BA-135M	Ø.,	210.47	Half-Life too short
I-135	♡. ♡.	. 268.24 .1260.41	Half-Life too short Half-Life too short
XE-135	⊗. Ø.,	249.79	Half-Life too short
XE-135M	Ø.,	526.56	Half-Life too short
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cinued) Page : 3 Acquisition date : 15-JUN-2010 13:25:26

	Ba	okgrad	Evergy	MDA
Nuclide		Sum	Greatly	(uCi/cc)
.08-136		15.	818.50	3.9348E-08
1-136		Ø "	1313.02	Half-Life too short
C9-137		21.	661.65	6.5094E-09
XE-137		(?) <u>"</u>	455,49	Half-Life too short
09-138		24。	1435.86	Half-Life too short
XE-138 :	•	Ø.	258.31	Half-Life too short
BA-139		Ø.	1420.50	Half-Life too short
CE-139	i.	56.	165.85	8.3549E-09
CS-139	*4	0.	1203.23	Half-Life too short
BA-140		21.	537.32	1.4054E-07
LA-140		Ø.	1596.49	Half-Life too short
BA-141		0.	190.22	Half-Life too short
CE-141	•	43.	145.44	•
				2.2750E-08
LA-141		Ø.,	1354.52	Half-Life too short
BA-142		0.	255.12	Half-Life too short
LA142		Ø	641,17	Half-Life too short
DE-143	•	On .	293.26	Half-Life too short
CE-144		Sa.	133.54	6.1799E-08
,护院一生存在		0.	1489.15	Half-Life too short
ND-147		37.	91.10	2.8131E-07
PM-148M		21.	550.27	9.7261E-09
EU-152	•	34.	344.27	1.96235-08
EU-154		18.	1004.76	4.1016E-08
EU-155		41.	105.31	3.2963E-08
EU-156	1.	21.	646.29	3.9716E-07
HF-181		34.	482.03	1.2926E-08
TA-192	1	<u> </u>	1221,42	2.6804E-08
W-187		Ø.	685.81	Half-Life too short
RE-188	,	Ø.	155.03	Half-Life too short
HG-203		48.	279.19	1.2441E-08
BI-207	•	20.	569.67	6.04848-09
TL-200	•	(i)	583.14	Half-Life too short
FB-212		Ø.	2381.63	Half-Life too short
BI-214		0.		
PB-214			609.31	Half-Life too short
	•	Ø	351.92	Half-Life too short
RA-224		54.	240.98	1.4352E-04
RA-226	•	65.	186.21	1.8394E-07
AC-228	i	30.	339.32	4.4776E-08
TH-228		37.	84.37	8.3373E-07
PA-234		0.	131.20	Malf-Life too short
TH-234		43.	63.29	2.2474E-06
U-235	•	52.	143.76	5.3185E-08
MD-539		0.	106.13	Half-Life too short
AM-241		34	59.54	1.2246E-07
			•	

# FERMI 1 NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Log Number		
Task	Performed By	Date
1. Representative sample collected.  Date/Time 12/7/10 / 0925  Container Number 5ump # 11  Storage Location	Fermi 1 (signature)	12/7/D
2. Sample secured against tampering.	Sainthur S Formi 1 (signature)	12/7/10
3. Tritium LLD < = 2 E-6 uCi/ml  Actual tritium LLD = <u>~/.40E_~</u> uCi/ml  No tritium activity detected. (If tritium activity detected do not sign, and explain in Remarks.)	Employee ID Number  Chemistry (signature)	12/11/10
4. Gamma spectroscopy count completed on system suitable for MRP18 evaluations.	Employee ID Number  (hules profest RP (signature)  Employee ID Number	<u>/-/4-/1</u>
5. Gamma spectroscopy report shows no identified peaks above critical level due to licensed radioactive material. (Note disposition of unidentified peaks on gamma spectroscopy report.  If licensed material detected, do not sign, and explain in Remarks.)	Radiological Engineering (signature)  Employee ID Number	<u> 1~18~11</u>

# FERMI 1 NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Log Number	<del></del>	
Task	Performed By	Date
6. Fluid approved for release.	Radiological Engineering	1-18-11
	(signature)  Employee ID Number	

Remarks:

## Tritium Activity Calculation

1	Sample Information			
1 Sample Location			EF1 SUMP 11	
1 . Sample Location			12/07/2010	
2 . Date Sampled			09:25	
3 . Time Sampled			4	ml
4 . Sample Volume, (ml)			4	ml
•				
	Instrument Count Data			
1 . Date Sample Counted	•		12/10/2010	
2 . Time Sample Counted			19:30	
3 . Background Inf.:			•	
Minutes Counted			10	min.
Background Count Rate (cpm)	•		9.3	cpm
4 . Efficiency Inf.: (Daily Spike Sourc	e ID # 111)	•		-
Gross Spike Count Rate (cpm)			2435.0	cpm
Net Spike Count Rate (cpm)			2425.7	cpm
H3 Spike Activity (dpm on count date)			6711.4	dpm
Counter Efficiency			0,3614	cpm/dpm
5 . Sample Info:				
Sample Gross Count Rate (cpm)	•		6.6	cpm
Sample Count Time (min.)			10.0	min.
Net Sample Count Rate (cpm)			0.0	cpm
6 . Critical Level:			0.0	ории
Critical Level Count Rate (cpm)			2.2	cpm
Official Lotor Countricate (Spring				ории
Minin	num Detectable Activity			v
				<del></del>
i .	(Bkg cpm) (Bkg cpm)			
Minimum Detectable Activity (uCi/ml) = 3.3 x	(Bkg mln.) + (Smpl mln.)	=	1.40E-06	uCi/ml
minimited in personable interior (activity (activity)	Efficiency x 2.22E6 dpm/uCl x Sample Volume		1,102.00	40,,,,,
	Chiconicy X 2.2220 division X dample volume			
•				
	Sample Activity			
				•
Sample Activity (uCl/ml) =	Sample Net cpm	<	MDA	•
	Efficiency x 2.22E6 uCl/ml x Sample Volume			
·				
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		:		•
Technician (9)	11	Date	12/11/	10
	1		· .	-
	1		141	
Reviewed By:		Date	12/13/18	
			14	01/4/11
	,			

DTC: TGCHEM

File: 1319.02

Form 76.000.39 Att 1 P1/1

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Obayt chamel : 158 End phasewl : 4000

Height sensitivity : 5.00023 Shape sensitivity : 10.03880

Maximum number of iterations to resulve multiplets : 5

www.weamenegeamenegeam Nuclide Identification Fagameters www.pasemanesembranes

Energy tolerance : 1.75000 Half-life ratic : 18.00000 Abuvāknos limit 1 75.68888 -Library : dacmartwn-mlb

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"A" = Utclide specific about limit

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EF-1 Sump #11 2011

# FERMI I NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Task  Performed By  Date  1. Representative sample collected.  Date/Time 5/13/11 / 15:40  Container Number 5/13/11 / Fermi I (signature)  Storage Location From By  Date  Performed By  Date  Fermi I (signature)  By  Fermi I (signature)  By  Fermi I (signature)  By  Fermi I (signature)  By  Date  Fermi I (signature)  By  Fermi I (signature)  By  Fermi I (signature)  By  Date  Fermi I (signature)  By  Date  Fermi I (signature)  By  Date  Fermi I (signature)  By  Fermi I (signature)	5-13.11
Date/Time 5/13/11 15:40 Chaffet 5  Container Number 547741 Fermi V (signature)  Byoth	<u>5-13-1</u> 1
139016	
·	·
2. Sample secured against tampering.  Fermi 1 (signature)  Employee ID Number	<u>5-13</u> -11
3. Tritium LLD <= 2 E-6 uCi/ml Actual tritium LLD = 1.182-6 uCi/ml No tritium activity detected. (If tritium activity detected do not sign, and explain in Remarks.)  Chemistry (signature)  Employee ID Number	<u> </u>
4. Gamma spectroscopy count completed on system suitable for MRP18 evaluations.  RP (signature)	15.11
Employee ID Number	
5. Gamma spectroscopy report shows no identified peaks above critical level due to licensed radioactive material. (Note disposition of unidentified peaks on gamma spectroscopy report.  If licensed material detected, do not sign, and explain in Remarks.)  Radiological Engineering (signature)  7 - 1/5/ Employee ID Number	<u>20-</u> 4

## FERMI I NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Log Number EP1-6-116	028		.•		
Task		Performed By		Date	.51
. 6. Fluid approved for release.		Radiological Enginee (signature)  Employee ID Number		SZO	erang M M Marana Marana Marana
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or the arelation but in the temperature.

### 1 Tritlum Activity Calculation

	Sample information			
<ol> <li>Sample Location</li> <li>Date Sampled</li> <li>Time Sampled</li> <li>Sample Volume, (ml)</li> </ol>			EF1-L-110028 05/13/2011 15:40 4	ml
	Instrument Count Data			and an array of Special and a second second
<ol> <li>Date Sample Counted</li> <li>Time Sample Counted</li> <li>Background Inf.:         Minutes Counted         Background Count Rate (cpm)</li> <li>Efficiency Inf.: (Daily Spike Source</li> </ol>	ce ID # 111)		05/15/2011 18:55 10 6.7	min. cpm
Gross Spike Count Rate (cpm)  Net Spike Count Rate (cpm)  H3 Spike Activity (dpm on count date)  Counter Efficiency  5 . Sample Info:			2397.9 2391.2 6551.6 0.3650	cpm cpm dpm cpm/dpm
Sample Gross Count Rate (cpm) Sample Count Time (min.) Net Sample Count Rate (cpm) 6. Critical Level: Critical Level Count Rate (cpm)			8.2 10.0 1.5	cpm min. cpm
	mum Detectable Activity		1.0	cpm
Minimum Detectable Activity (uCi/ml) = 3.3 x	(Bkg cpm) (Bkg cpm) (Bkg min.) + (Smpl min.)  Efficiency x 2.22E6 dpm/uCl x Sample Volume	=	1.18E-06	uCi/ml
	Sample Activity			
Sample Activity (uCl/ml) =	Sample Net cpm Efficiency x 2.22E6 uCl/ml x Sample Volume	<	MDA	
Technician		Date <sub>_</sub>	5-15-11	
Reviewed By: WScourse	e	Date <sub>.</sub>	5-16-4	-

Form 76.000,39 Att 1 P1/1

DTC: TGCHEM

File: 1319.02

Sample ID Number: EF1-L-110028 SUMP #11  Sample End Time: 13-MAY-2011 15:40:00.00  REMARKS Actual  PERFORMED BY:  May May May May Signature  REVIEW REVIEW FOR SIGNATURE  SIGNATURE SIGNATURE			
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#### Fermi 2 Radiation Protection Gamma Spectroscopy Report

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Sample ID Number: EFi-L-110028 SUMP W11

Sample collection start date: 13-MAY-2011 15:40:00.00 Sample collection end date : 13-MAY-2011 15:40:00.00

Type of sample : 1 L Mari. Liquid Sample quantity : 1.00000E+03 cc

Sample geometry: M2LL Operator: CLP

Detector number : DET 4 Acquire date : 20-MAY-2011 12:03:30.17

Preset live time : 0 00:45:00.00 Elapsed live time : 0 00:45:00.00

Elapsed real time : 0 00:45:00.59 Percent dead time : 0.03 %

necessary consequences and instinction farameters server execution enteresting

Detector number: DET 4 Yearly cal date: 23-JUN-2010 12:28:00.00

Key/channel : 4.99766E-01 Zero offset: 1.89593E-01

Daily cal date : 20-MAY-2011 10:42:08.12

жение ображение объектение объектение Риди. Swarch Parameters - объектение о

Start channel : 100 End channel : 4096

Height sensitivity: 5.00000 Shape sensitivity: 10.00000

Maximum number of iterations to resolve multiplets : 5

Energy tolerance : 1.75000 Half-life ratio : 10.00000 Abundance limit : 75.00000 Library : dacmaster.nlb

The sact are the s

File	It	Energy	Arrea	Elegrod	FWHM	Channel	Left	βq <sub>W</sub>	Cts/Sec	xerr	Fit
1.	0	139.36	4.8	92	0.95	278.48	274	1.1.	1.796-02	40.9	
22	0	352.15	79	56	1.93	704.25	697	151	2.91E-02	23.7	
3	(2)	511.18	1.75	46	1.72	1022.48	1.631.4	1.7	6.508-02	11.7	•
4	Ø	558.67	29	22	0.96	1117.50	1114	1.0	1.068-02	35.0	
5	(2)	609.98	67	40					2.47E-02		
6	0	1461.76	70	15	1.47	2924.62	2916	21	2.608-02	18.4	

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 $\mathbb{E}\left( \mathbb{E}(X_{t}, X_{t}) \cdot \operatorname{deg}_{X_{t}} \left( (X_{t}, X_{t}) \cdot \operatorname{deg}_{X_{t}} \right) \cdot \operatorname{deg}_{X_{t}} \left( (X_{t}, X_{t}) \cdot \operatorname{deg}_{X_{t}} \left( (X_{t}, X_{t}) \cdot \operatorname{deg}_{X_{t}} \right) \right) \right) = \mathbb{E}\left( \mathbb{E}\left( X_{t} \cdot X_{t} \cdot \operatorname{deg}_{X_{t}} \left( (X_{t}, X_{t}) \cdot \operatorname{deg}_{X_{t}} \right) \right) \right) \right)$ 

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11.08-5- f						. •				
Ø7×I		7 "8T	tz	9168	29"7262	ፈ <i>ት</i> "ፕ	GT ·	02.	92 " 1951	Ø
1718-18		8"78	ST	STET	91 "0331	800	Øb	29	96.1609	(2)
3m1207 (l-V)-P)		0"98	01	****	29 "ZTTT	96."0	28	68	29 "899	<b>(2)</b>
7/2011 DECETE		2."11	2.1	710T	07 "3301	82."1	9b	SZI	91"119	(2)
710-97		2 "88	GT	269	92 "Y0Z	26 ° T	96	62	ar "gge	(i)
22 (T-N) (Lamel		6 "Ø7	ŢŢ.	728	87 .878 ·	S6 "0	86	Øb	98 "681	0
sepitony	4,1,1	JJEW	Med	ajen	Channel	ынм. <u>.</u>	puling	worth '	Kaneug	9.I
	. % -	•	***			,	guodey	Horse8	Head CIN-a	sog

Muclide Line Activity Report Sample ID : EF1-L-118028 SUM Page : 28 Acquisition date : 28-MAY-2011 12:03:30

Muclide Types natural

Uncorrected Decay Corr 1-Sigma %Abn %Eff uCi/cc MucLide Ererny Area uCi/cc WError K-40 2.500E+00 2.637E-07 1460.81 70 10.67% 2.637E-07 .18.42

Flag: "\*" = Keyline

Summary of Nuclide Activity Sample ID : EFI-L-116028 SUM

. Acquisition date : 20-MAY-2011 12:03:20

Total number of lines in spectrum

6

Number of unidentified lines !

0

Number of lines tentatively identified by NID 

1...00

100.00%

Nuclide Type s natural

Hlife Decay

Uncorrected Decay Corr

Nuclide

uCi/cc

uCi/cc

1-Sigma Error MError Flags

K--40

1.00E+05Y

2.6375-07

2.637E-07

0.486E-07

Decay Corr

Total Activity :

2.637E-07

2.6375-07

18,42

1-81 ama

Grand Total Activity : 2.637E-07

2.637E-07

Flags: "K" = Keyline not found

"E" = Manually edited

"M" = Manually accepted

"A" = Muclide specific abn. limit

Activity 1-Sigma Half-Life (uCi/cc) MError Rejected by Nuclide Half-life Ratio Energy %Abund 109.74M 90.09 511.00%193.46 2.436E+19 11.68 Decay F-18 % Abundances Found = 100.00 559.10% 44.70 1.0525-06 35.01 Abum. 6,26 AS-76 26.32H 563.23 1.17 --- Not Found ----0.14 --- Not Found ---571.30 657.03 6.10 --- Not Found ---665.31 0.39 --- Not Found ---0.12 --- Not Found ---740.12 0.12 --- Not Found ---771.76 0.12 --- Not Found ---867.63 0.14 --- Mot Found ----1129.87 1.63 --- Not Found ----1212.72 3.84 --- Not Found ---1216.02 1.39 --- Not Found ---1228.52 1439.13 0.33 --- Not Found ---0.13 --- Not Found ---1453.60 1787.67 0.33 --- Not Found ---73.70 % Abundances Found = 3.80 1.123E-06 40.92 2.50 140.51 Abun. MO--99 66.02H 6.20 --- Not Found ---181.06 1.37 --- Not Found ---366.43 739.58% 12.80 --- Not Found ---778.00 4.50 --- Not Found ---% Abundances Found = 13.25 27.37 1140.50% 89.87 1.4725+00 40.92 Decay TC-99M 6.02H % Abundances Found = 100.00 497.08\* 89.00 --- Not Found ---Abum. 39.350 0.17 RU-103 610.33 5..60 2.980E-07 24.25 5.92 % Abundances Found = CS-138 32.20M 307.02 138.10 1.49 1.000E+35 40.92 Decay, Abun. 227.76 1.51 --- Not Found ---408.98 4.66 --- Not Found ---462.79 30.70 --- Not Found ---546,94 10.80 --- Not Found ----5.11 --- Not Found ---871.80 29.80 --- Not Found ----1009.78 1.24 --- Not Found ----1147,22 1343.59 1.14 --- Not Found ---1435.86\* 76.30 --- Not Found ---0.92 % Abundances Found == 12.56 --- Not Found ----0.17 288.11 Abuna PM-148M 41.300 18.66 --- Not Found ----414,07 5.35 --- Not Found ----432.78 5.75 --- Not Found ---501.26 550.27% 94.90 --- Not Found ---

599.74

12.54 --- Not Found ---

		Half-Life		Activity 1-Sigma
Muclide	Half-life	Ratio	Energy	%Abund (uCi/gc) %Error Rejected by
Prima 148M	41.300	0.17		5.48 3.827E-07 24.25 Abun.
			629.97	89.00 Not Found
			725.70	32.80 Not Found
			915.33	17.17 Not Found
			1013.81	20.30 Not Found
	93 20	Abundances	Found =	1,74
BI-214	19.90m	49678	609.31*	46.30 1.000E+35 24.25 Decay
				5.04 Not Found
				3.21 Not Found
			1120.29	15.10 Not Found
			1238.11	5.94 Not Found
		•	1377.67	4.11 Not Found
			1764.49	15.80 Not Found
	1/4	Abundances	Found ==	48.48 (Abr. Limit = 48.48%)
PB-214	26.801	368.88	87.30	4.67 Not Found Decay
•		1		7.49 Not Found
			295.21	19.28 Not Found
				37.20 1.000E+35 23.67
;		• • • •		1.10 Not Found
3	%	Abundances		53.40 (Abn. Limit = 37.20%)
				the first of the second control of the secon

Flag: "%" = Keyline

It	Energy	Area	Bagnd	FigHr	Channel	Left	pu	Ots/Sec	%Err	wett	Flags
(3)	139.36	48	92	0.95	278,48	274	1 i.	1.796-02	40.9	6.38E÷00	T
<b>(</b> )	352.15	79	S.C.	1.93	704.25	697	15	2.91E-02	23.7	5.70E+00	Υ
(2)	511.18	1.775	46	1.78	1022,48	1014	17	6.506-02	11.7	4.885+00	Τ
(2)	558.67	29	22	0.96	1117.50	1114	10	1.068-02	35.0	4.69E+00	Ţ
0	609.98	67	40	2.01	1220.16	1215	1.5	2.47E-02	24.2	4.52E+00	T

Flags: "T'' = Tentatively associated

www.numenceremen

#### Minimum Detectable Activity Report

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	Bekgnd	Energy	MDA
Nuclide	Sum	(keV)	(uCi/cc)
BE-7	31.	477.59	5.9453E-08
F1.8	(3)	511.00	Half-Life too short
NA-22	1.1.	1274.54	6.6316E-09
NA24	Ø,	1368.53	Half-Life too short
MG27	Ø,	1014.44	Half-Life too short
CL-38	ø.	1642.42	Half-Life too short
AR-41	Ø.,	1293.64	Half-Life too short
SC-46	1.22.	869.25	6.0661E-09
CR-51	3(I) a	320.08	5.7913E-08
MN~54	42.	834.83	9.5405E-09
00-56	1.35	1238.25	1.12215-08
MM-56	(i) <sub>n</sub>	1810.69	Half-Life too short
NI-56	50.	158.38	1.1750E-08
CO-57	522	122.06	7.4871E-09
CO-58	20.	910.76	7.1171E-09
FE-59	15.	1099.22	1.3909E-08
00-60	1.7.	1332.49	8.2733E-09
CU64	(2) n	1345.90	Half-Life too short
	9.7 и От	1481.84	Half-Life too short
MI-65	19.	1115.52	1.5995E-08
ZN~65		,	Half-Life too short
ZN-69M	Ø.,	438.63	
SE-75	44.	136.00	9.3412E-09
AS-76	47.	559.10	1.2636E-06
BR-82	22.	776.49	1.9967E-07
BR-83	Ø.,	.529.64	Half-Life too short
BR-84	Ø <b>.</b>	881.50	Half-Life too short
BR85	Ø.,	802.41	Half-Life too short
KR-85	53.	513.99	1.7548E-06
KR85M	Ø.	151.18	Half-Life too short
SR-85	53.	513.99	8.1699E-09
RB-86	12.	1076.63	9.2126E-08
KR-87	Ø.,	402.58	Half-Life too short
SR87H	ø.	388.40	Half-Life too short
KR-88	Ø.,	196.32	Half-Life too short
RB88	· G.	1382.39	Half-Life too short
Y88	<i>8</i>	1836.91	7.5639E-09
KR89	The state of the s	.220.90	Half-Life too short
RB-89	· Ø.,	1031.88	Half-Life too short
KR-90	. Ø.,	1118.69	Half-Life too short
RB90	Ø.,	831.69	Half-Life too short
R3-9@4	Ø	824.23	Half-Life too short
Y-90M	₩.	202.51	Half-Life too short
98-91	Ø.	1024.30	Half-Life too short
7-91	1.4.	1204.90	2.5696E-06
y-Sim	(b)	955.60	Half-Life too short
SR-92	Ø.	1383.94	Half-Life too short
Y-92	Ø.,	934.46	Half-Life too short

	Religne	Energy	, MDA
Nucliae	Silm	(keV)	(uOi/cc)
SR-93	(2) u	590.28	Half-Life too short
Y93	(E)	266.90	Half-Life too short
NB94	19.	702.63	5.6164E-09
NB-95	4.8	765 79	.6.8385E-09
NB-95M	49.	235.69	8.3248E-08
ZR-95	1.0	75672	14.1404E-08
NE-97	Ø.	657.90	Half-Life too short
ZR-97	1.6.	743.36	4.7882E-06
rio99	in an halis a	739.58	2.7534E-07
TC-99M	Ø.,	140.50	Half-Life too short
TC-101	Ø.,	305.81	Half-Life too short
kU-103	34.	497.08	7.6650E-09
TC-104	(ž) "	357.99	Half-Life too short
RH-105	37.	318.90	6.9119E-07
RU-105		784.50	Half-Life too short
	31.	621.84	6.58326-00
RU-106		88.03	2.8719E-07
CD-109	nging Mark		
AG-110M	14.	937.48	1.8933E-08
SN-113	35.	391.69	8.8486E-29
SM-117M	50.	158.56	8.7428E-09
88-182	23.	563.93	4.4271E-08
98-124	33.	602.71	7.1427E-09
SB-125	120 gr	427.89	1.7842E-08
TE-125M	24.	109.28	1.9207E-06
TE-127	Ø <sub>a</sub>	417.90	Half-Life too short
TE-127M	27.	57.60	1.5712E-05
XE-127	49.	202.84	9.9731E-09
TE-129	Ø.,	459.60	Half-Life too short
TE-129M	23.	695.88	2.1184E-07
XE-129M	46.	196.56	1.8636E-07
1-130	Ø,	536.09	Half-Life too short
BA-131	43.	123.80	2.9198E-08
1-131	34.	364,48	1.1866E-08
TE-131	)2) <sub>u</sub>	149.72	Half-Life too short
TE-131M	22.	773.67	7.7876E-07
XE-131M	54.	163.93	4.1972E-07
1-132	Ø) "	667.69	Half-Life too short
TE-132	50.	220.16	2.7420E-08
BA-133	37.	302.84	2.9041E-08
	43.	276.09	5.5397E-07
BA-133M	27.	529.87	1.57636-06
1-133		912.58	
TE-133M	(2) <sub>11</sub> · ·		Half-Life too short 6.5108E-08
XE-133	29.	81.00	
XE-133M	52.	233.22	4.8509E-07
CS-134	63.7 n	604.70	6.0983E-09
I-134	Ø.,	884.09	Half-Life too short
TE-134	_ O .	210.47	Half-Life too short
BA-1.35%	36.	268.24	1.65116-06
T-135	Ø.,	1260.41	Half-Life too short
XE-135	₩.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

4.1

Sample ID : EF1-L-110228 SUM Acquisition date : 20-MAY-2811 12:03:30

	Bekgnd		Energy	MDA
Nuclida			(keV)	(uCi/ee)
			•.	
08-136	1.7.	A. 3	818.52	8.7894E-09
1-136	0		1313.02	Half-Life too short
CS-137	16.		661.65	5.7749E-09
XE-137	€5 n		455.49	Half-Life too short
09-138	. Ø.		1435.86	Half-Life too short
XE-138	Ø.		258.31	Half-Life too short
BA-139	Ø.		1420.50	Half-Life too short
CE-139	€s€r		165.85	7.79796-09
CS-139	0.		1283.23	Half-Life too short
BA-140	19.		537.32	2,0284E-08
LA-140	10.		1596.49	1.3195E-07
BA-141	Ø "		190.22	Half-Life too short
CE-141	53 55 a		145.44	1.3701E-08
L.A-141	Ø.		1354.52	Half-Life too short
BA-142	0.	and the second	255, 12	Half-Life too short
LA-142	Ø.,			Half-Life too short
CE-143	44.	4 4 4 4	293,26	4.1870E-07
CE-144	Ba.		133.54	5. 5039E-08
PR-144	Ø.		1489.15	Half-Life too short
ND-147	27.		91.10	3.9426E-08
PM-148M	19,		550.27	5.7490E-09
EU-152	40.		344.27	2.1175E-08
EU-154	10.		1004.76	3.2095E-08
EU-155	33.	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	105.31	2.9409E-08
EU-156	11.	Harris	6.46 600	
HF-181	28.	, # × 1		
TA-182	17.		482.03	•
W-187	16.	* *** :	685.81	0 kg 3.0687E-08 2.1062E-06
RE-188	43.		195.03	2.7843E-85
AU-199	50°			6.5880E-08
	41.	1 .	150.38 279.19	
HG-203				7.5647E-09
BI-207	25.	100	569.67	5 7754E-09
TL-208	Ø.		583,14	Half-Life too short
PB212	. Ø.,		238.63	Half-Life too short
BI-214	Ø.		609.31	Half-Life too short
PB-214			351.92	Half-Life too short
RA-224		in display	240.98	5.6651E-07
RA-226	59.		186.21	1.7540E-07
AC-228	40.		338.32	4.9771E-08
889-HT	Se.	•	84.37	9.4112E-07
PA-234	0.		131.20	Half-Life too short
TH-234	32.	•	63.29	8.5849E-07
U-235	51.	\$ 14 L	143.76	5.2659E-08
NP-239	34.		106.13	2.0321E-07
AH-241	34.		. 59.54	1.2164E-07

## FERMI I NON-OIL RELEASE CHECKLIST LIQUID SCINTILLATION COUNT

Log Number <u>Eff-17/2</u>	<u> </u>		
Task	,	Performed By	Date
1. Representative sample container Number Scan Storage Location	1081S	Fermi 1 (signature)  A 4016  Employee ID Number	<u> </u>
2. Sample secured against ta	mpering.	Fermin (signature)  P () / G  Employee ID Number	<u> </u>
3. Tritium LLD < = 2 E-6 uCi Actual tritium LLD = 1.28 E  No tritium activity detected. (I detected do not sign, and expla	uCi/ml	Chemistry (signature)  50 50  Employee ID Number	<u> </u>
4. Gamma spectroscopy count system suitable for MRP18 eva		RP (signature)  B 40 14  Employee ID Number	<u>/1~30~1</u> (
5. Gamma spectroscopy report identified peaks above critical le licensed radioactive material. (Nof unidentified peaks on gamma report.  If licensed material detected, do and explain in Remarks.)	vel due to Vote disposition spectroscopy	Radiological Engineering (signature)  L 57553 Employee ID Number	12-1-11

	Sample Information	·		
Sample Location     Date Sampled			1-L-110053 1/23/2011	
3 . Time Sampled		•	08:15	
4 . Sample Volume, (ml)			4	ml
	·			
	Instrument Count Data		***************************************	
1 . Date Sample Counted		1	1/24/2011	
2 . Time Sample Counted		·	03:37	
3 . Background Inf.:				
Minutes Counted	•		10	min.
Background Count Rate (cpm)			9.5	cpm
4 . Efficiency Inf.: (Daily Spike Source	20 ID #L111)		0.0	орт
Gross Spike Count Rate (cpm)	ייים ואים ואים ואים ואים ואים ואים ואים		2550,6	cpm
Net Spike Count Rate (cpm)			2541.1	cpm
H3 Spike Activity (dpm on count date)			6359.1	dpm
Counter Efficiency		,	0.3996	-
			บ.อยยน	cpm/dpm
5 . Sample Info:			10.7	anm
Sample Gross Count Rate (cpm)	•		10.7	cpm
Sample Count Time (min.)			10.0	min.
Net Sample Count Rate (cpm)			1.2	cpm
6 . Critical Level:			0.0	
Critical Level Count Rate (cpm)			2.2	cpm
.1				
Mini	mum Detectable Activity			
IVIIIIII	muni Detectable Activity		<del></del>	
	(Bkg cpm) (Bkg cpm)			
Minimum Detectable Activity (uCi/ml) = 3.3 x	(Bkg min.) + (Smpl min.)	<b>=</b> 1	.28E-06	uCi/ml
Willihiditi Detectable Motivity (downin) - 5.5 X	Efficiency x 2.22E6 dpm/uCi x Sample Volume	_ '	,2012-00	(IO#III
	Efficiency x 2.22E0 aprivaci x Sample volume			
·				
. :	Sample Activity \ \ \			
• • • • • • • • • • • • • • • • • • • •				
Sample Activity (uCi/ml) =	Sample Net cpm	_<	MDA	
;	Efficiency x 2.22E6 uCl/ml x Sample Volume			
	•			
		· · ·		
Tanhaisian XX		D.4. 71	211	
Technician $xr(y)$		Date_//	. 24-11	
	$\bigcirc$ $\bigcirc$			
Reviewed By: // Cabu	( )	Data	11,74-	77
Reviewed by. 1/100 to reco		Date	1-21	<u>.</u> /
	•			

DTC: TGCHEM

File: 1319.02

Form 76.000.39 All 1 P1/1

RADINTION PROTECTION DEPARTMENT

GARRA SPECINOSCOPY AHALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Momber: EFI-L-118053 SUMP Hii

Sample End Time: 23-MOV-2011-08:15:00.00

PERFORMED BY:

REVIEWED BY:

PAGE\_\_\_of\_\_

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#### Terms I Radiagion Protection Gamma Spectroscope Report

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Sample 10 Housers Effet-110053 SUDF 811

Sample collection start dare: 23-MDV-2011 08:15:00.00

Sample collection and data : 23-MOV-2011 08:15:70.00 Type of sample : 1 L Mari. Liquid Sample quantity: 1.00000E+03 cc. P

. Operator: CLP Sample meametry : MELL -

Detector number : DET 4 V Acquire date : 30-MOV-2011 15:40:12.59

Preset live time : 0 00:45:80.80 u Elapsed live time : 0 00:45:00.00

Elapsed real time : 0 00:45:00.63 Percent dead time : 0.03 %

мини выничение и постичение вы Calipration: Paramotors и ининичение ининичение и ининичение и ининичение и ини

Detector number s DET 4

Yearly cal date : 14-JUN-2011 14:50:56.41 u

: 5.002356-01 Zero offsets -6.02154E-61 Kav/charmel -

Daily cal date : 30-H00-2011 09:13:02.38

End channel : 4096 Start channel: 100

Height sensitivity : 5.00000 Shape sensitivity : 10.00000

Maximum number of iterations to resolve multiplets : 5

merconnective entrees Auclide Identification Parameters entrementations in

Energy tolerance : 1.75000 V Half-life vatio : 10.00000 Abundance limit : 75.86006 Library a dacmaster. nlb

Efficiency file : EFFD4 m2ll Efficiencies at : Peak energy

grange programment of the contraction of the contra

βψ	14;	Energy	Area	Blegnd	: म्यानाम् इ.स.च्या	Channel	Left	PN	Cts/Sec	XETT.	Filt
1,	(3)	66, 54.	33	98	1.02	134.23	129	10	1.235-02	58.2	
£,	()	295.78	56	70	11.67	592.48	585	1.4	2.07E-02	34.4	
4	(3)	352, 14	. 67	51	488	705.15	700	•9	2.46E-02		
4	Ü	511,40	160	40	2, 45	1023.52	1612	21	5.94E-02	13.3	
155	$\mathfrak{G}$	610.13	120	25	2.11	1220.90	1211	21	4.46E-02	14.6	
$\epsilon$	<b>(?)</b>	767.62	24	31	7, 73	1535, 73			8.98E-03		
7	Ø	1461.29	02						3.036-02		

Post Hib Peak Stanch Report

ït	Casegy	Arma	Estgod	Fülle	Charmel	Left	Ь'n	#Err	fit Nection
0	66.51	3.3	99	1.62	134,23	129	10	55.2	6-EN- 8
$\Theta$	295.78	556	70	1.67	592.48	5/3/5	j. 4	34.4	Pb-214
()	352.14	67	53.1	1.88	795.15	700	9	23.,0	Pb-3.14
Ü	511.40	160	86	2.85	1023.52	1012	21	13.3	14ww Peak
0	610.13	123	25	2.11	1220.90	1211	21	14.6	Bi-214
(3	767.62	24 1	31	7.73	1535.73	1524	21	61.2	Bi-24
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Decay Corr 1-Sigma 1-Sigma Error WError Flags

0.422E-07 12.92

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3.267E-07

3,2676-07

Grand Yotal Activity # 3.267E-07

3.267E-97

Flags: "K" = Keyline not found

"E" " Manually edited

"M" = Manually accepted

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: "A" = Huclide apecific abo. limit

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			96.73	3.41	Not Found	
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	•		136.997	59, 20	Hot Found	
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	ı		205.47		Hot Found	
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			677.34	9.50	Hot Found	
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		,	847.03		Hot Found	
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		•	884.09%		Mot Found	
			94786	4.04	Hot Found	
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		•	113616	9.70	Not Found	
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TE-134	41.80M	cost in	79.45		Not Found	Decay, Abum.
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			210.474		Not Found	
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			565.99		Not Found	,
			742.59		Not Found	
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CS-136	13.160	0.56	66.91	12.50	8.860E-07 50.24	Abun.
and have also have have	in the Health	CAR WALL	86.29		Hot Found	
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					Mot				
			1048.07		Kot				
•			123534		Not				
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			611.26	5.48	5.857E				
			6.29. 97	99 " (JB		Four	:1	•	
			725.70	32.80	Not	Found	)		
			915, 33	17.17	Hot	Four	d		
			1013.81	29. 39	Hot	Found			
	¥.	Abundances	Found =	1.74					
Ta-102	114.740	0.06	67.75	4830	6. OOSE-	-0s (	5824	Ábura.	
			100.10	14.10	Not	Found	j		
			1189.05		Not				
			1221,424		Hot:				
			1230.97		i- Hot				
	45.1	Abundances		38.01	140.2 0	1 (73,111)			
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BI-214	19,900	530.04	609.31%	46,30	1.000E4	135 3	13.97	Decay	
			768.36	5.94	1.000E4	F35 (	51.21		
			934 96	3.21	TOUR	Counc			•
		•	1120.29	15, 10	Note	Found	}		
			1238.11		Hat				
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		Abundances						6.8964	
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PB-214	26.804	393.57	87.30	4.67	Nat	Found	Ì	Decay	
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			295.21	19.20	1.600E+	-35 3	34.40		
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Ú)	610.13 767.62	120 24	•								TB1 244 214

Flages "T" - Tentablyely associated

The contract of the contract

Himimum Debectable Activity Report

	•		1.
	Bakgnd	Energy	MXA
Muclida	Sun	(Aug V)	(uti/cc)
ME-7	ill of a		6.99626-08
F-13	(j) n	511.00	Half-Life too short
PA-22	10.	1274.54	6.8938E-09
NA-24	0.	1360.53	Half-Life too short
MG-27	(7) .	1014.44	Half-Life too short
CL - 38	Ø.,	1642,42	Half-Life too short
(1R-41	0.	1293,64	Half-Life too short
SC-46	26.	989.25	e. 6835E-89
LR-51	80 80 h.c. a	320.08	7.8859E-08
1414-54	41.	834.83	9.97096-69
00-56	27 mg 27 mg	1238.25	1.5338E-08
MH-56	Ø.	1010.69	Half-Life too short
NI-56	55.	158.38	1.33206-08
CO-57	54.	122.06	0.1027E-09
CO-58	(15.00) (45.00) (46.00)	810.78	2.5150E-09
FE-59	3.C.,	1099.22	1.51956-00
00-60	10.	1332,49	7.1040E-09
00-64	ā.	1345.90	Half-Life too short
MI-65	Ö.	1481.84	Half-Life too short
ZM-65	1.7"	1115.52	1.61626-06
ZN-69M		438.63	Half-Life too short
BE-75	65.	136.00	1.1979E-08
AS-76	41 a	559.10	1.69626-96
ER-82	77 J. n 73 77 18, 73 p	776.49	2.6957E-07
ER-83		529.64	Half-Life too short
PR-84	0. 0.		Half-Life too short
		881.59	
887-85	Ø.	802.41	Half-Life too short
KR-85	59.	513.99	1.9579E-06
KR-85H	<b>0.</b>	151.18	Half-Life too short
SR-25	- 69. 	513, 99	9.15986-09
RE-06	12.	107663	1.0123E-07
KR-27	0	402,50	Half-Life too short
SR-974	<u>@.</u>	309.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
R00-88	0.	1302,39	Half-Life too short
Y-68	<i>a.</i>	1836.01	6.1271E-09
KR-05	Ø.,	220.90	Half-Life too short
RB-89	Ø.	1031.58	Half-Life too short
KR-90	Ű.	1118.69	Half-Life too short
RD-90	·	931.69	Half-Life too short
RB-90M	Ű.	Q24.23	Half-Life too short
Y-90M	Ø,	202.51	Half-Life too short
SR-91	Θ.,	1024.30	Half-Life too short
Y91	16.	1264.90	2.9746E-06
Y-91M	(i) .	555.60	Half-Life too short
8R-98	Ø.	1383.94	Half-Life too short
Y -92	Ð.,	934.46	Half-Life too short

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•	Sciegnd	Snergy	MOG
Huclido	Stein	4ke∀)	(uCi/ac)
9R-93	Ø.,	590.20	Half-Life boo short
Y-93	. Wa Wa	266.90	Half-Life too short
NB-94	21.	702.63	
- ND-95	65 d. a 399 a	765.75	8.2434E-09 9.1E92E-09
HB-95M		205.69	
rus our Manage			1.08346-07
MB-97	λΩ., ra	796.72	1.0047E-08
ZR-97	Ø.,	657.90	Half-Life too short
20-99 140-99	Ö.,	743.36	Half-Life too short
70-99M	£1	739.58	3. 2100E-07
10-101	₿.,	140.50	Half-Life too short
	<b></b>	306.81	Half-Life too short
20-103	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	497.08	7.5896E-09
TC-194	Ü.	357.99	Half-Life boo short
RH-105	53 m	318.90	1.06176-06
RU-105	·	724.50	Half-Life too short
RU-106	25.	621.84	6.3473E-00
CD-109	40.	98.03	2.5813E-07
A6-110M	15.	937.48	2.0546E-08
SN-113	34.4	391.69	9.5769E-09
SH-11TM	il. di il. di	159.56	9.7152E-09
SB-122	2000	563.93	5.5474E-68
SB-124	35.	692. 21	7.89865-09
SB-125	100 A 100	427.89	1.65026-08
TE-125M	61.	1,09.,28	3.1601E-06
TE-127		417.90	Haif-Life too short
TE-127M	(1) (1) <sub>H</sub>	5760	1.77866-65
XE-127	\$4.	202.84	1.0864E-08
TE-129	0.	45960	Half-Life too short
TE-129H	28.	69588	2.4520E-07
XE-129M	EE, .	196.58	2.2236E-07
I-130	Ø.	536.09	Half-Life too short
BA-131	5.54	123.50	3.5931E-00
I-131	440 m	364.48	1.46.35E-03
TE-131	Ø.	149.72	Half-Life too short
7E-131M		778.67	1.0992E-06
XE-131M	61.	163.93	4.7738E-07
1-132	Ø.	667.69	Half-Life too short
TE-132	27 A.T. W	228.16	2.9858E-08
B9-133	41.	302.84	3.1726E-08
BA-133M	49.,	276.09	7.5691E+07
I-133		529.87	2.2084E-06
TE-133h	Ü,	912.58	Half-Life too short
XE-133	27.	81.00	8.0401E-08
XE-133h	$A_{i}^{*}\mathcal{J}_{i}$	28.88	5.5254E-07
CS-134	26.	604.70	64010E-09
I-134	0	88 <b>4.</b> 09	Half-Life too short
TE-134	<i>1</i> 3	210.47	Half-Life too short
9A-135M	15 15 a	266.24	2.6670E~06
1-135	Ð.	1260.41	Half-Life too short
ME-135	0.	24979	Half-Life too short
XE-135M	Ũ.	526.56	Half-Life too short

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<b>:</b>	. Belegne	Energy	rij).A
Marc Lileby	- Gun	Mea.Ma	CaCi./Cc)
1 2600 as di 63%	1,11,11	5145a V 7	V SONAN ACC. SOLVE
09-136	$\int_{\mathbb{R}^{2}} \frac{f_{k}^{2}}{h} dx$	014.50	9.73696-09
I-136	Ü.	1313.02	Half-Life too short
CS-137	1.5	661.65	S. 3276E-09
XE-137	Ű.	455, 49	Half-Life too short
08-138	<b>5.</b>	1435.86	Half-Life too short
MEL-138	0.	253.31	Half-Life too short
BA-139	vä.	1420.50	Half-Life too short
CE-133	61.	165.85	7.8730E-09
09-139	0.	1203.23	Half-Life too short
BA-140	202	67.37 GB9 1	3.76696-08
LA-140	10.	1596.49	1.87886-07
144-141	O.	190.22	Half-Life too short
CE-141	46	1.45, 44	1.3404E-08
LA-141	ä.	1354.52	Half-Life too short
EA-142	Ö,	255.12	Half-Life too short
1.6v - 1.422	() <sub>u</sub>	641.17	Half-Life too short
CE-143	48	293,26	57441E-07
CE: 144	19 (3 u (2 yr) 17 (11 u	133.54	5. 2253E-08
		1489.15	
PR-144	<b></b>		Half-Life too short
MD-147	an en Maria Maria	91.10	5.6910E-08
Pri-148n	965 a	550.27	7.8198E-09
EU-152	36.	344.27	2.1405E-08
EU-154	E2.	1004.76	4.6764E-08
ED-155	A A u	105.31	3.5548E-08
EU-156	Programmes Berne (1) - sk Marie - sk	646.29	1.2935E-07
HF-181	30.	402.00	8.1770E-09
TA-162	11.	1221.42	2.6590E-08
W-187	10.	6.05.61	3.1970E-06
RE-189	Ø.	155.63	Half-Life too short
AU-199	533.	150.30	7.8354E-08
H0-203	23.	279.19	9.70898-09
BI-207	27.42 22.23 a	569.67	6.1330E-09
TL-200	() "	583.14	Half-Life too short
P2-212	Ø <b>.</b>	230.63	Half-Life too short
BI-214	Ø "	609.31	Half-Life too short
PB-214	(2)	351.92	Half-Life too short
RA-224	71.	240.98	7.1219E-07
RA-226	56.	18621	1.7794E-07
AC-228	4.57.4	338.32	5.4372E-08
TH-220	35.	84.37	8.2260E-07
PA-234	<b>∅</b>	131.20	Half-Life too short
TH-234	34.	63.29	9.4198E-07
U-235	51.	143.76	5. 6055E-08
MP-230	43.	166.13	2.7125E-07
APF-241	23.	59.54	1.0357E-07

### Fermi 1 NRC Docket No. 50-16 NRC License No. DPR-9

Attachment 4 to NRC-12-0012

"Updated Fermi 1 Groundwater Monitoring Data"

**Offsite Laboratory Analytical Results** 



#### a member of The GEL Group INC



PO Box 30712 Charleston, SC 29417 2040 Savage Road Charleston, SC 29407

P 843.556.8171 F 843.766.1178

www.gel.com

February 19, 2010

Mr. Tom Mow Detroit Edison - Fermi 1 PO Box 44440 Detroit, Michigan 48244

Re: Fermi 1 - PO# 4700246055

Work Order: 245517

Dear Mr. Mow:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on January 25, 2010. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4297.

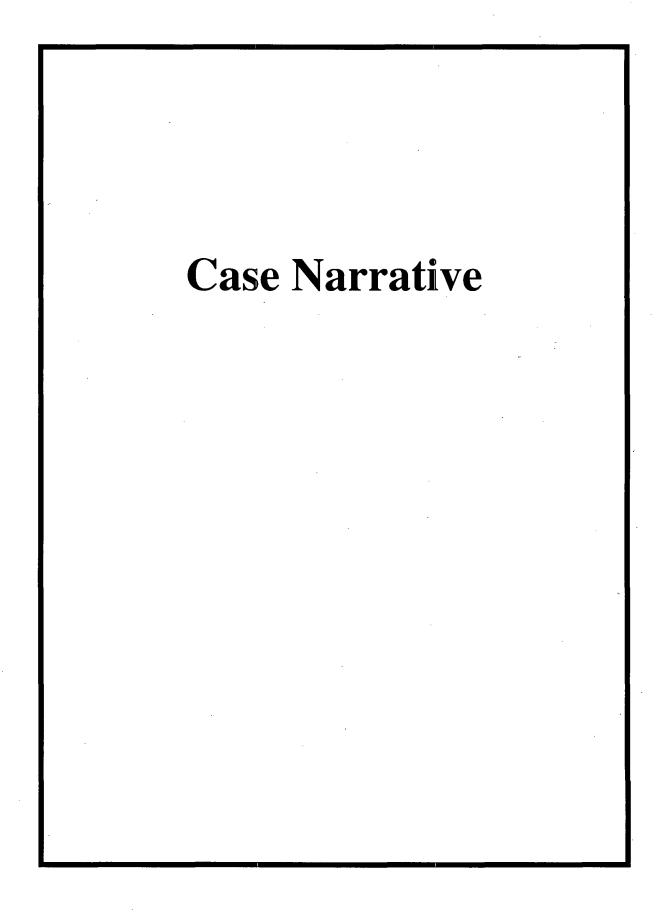
Sincerely,

Amanda Rasco Project Manager

Purchase Order: 4700246055 Enclosures

## Table of Contents

Case Narrative	1
Chain of Custody	4
Radiological Analysis	10
Sample Data Summary	
Quality Control Data	52



#### Case Narrative for Detroit Edison Company SDG: 245517

February 19, 2010

#### **Laboratory Identification:**

GEL Laboratories LLC 2040 Savage Road Charleston, South Carolina 29407 (843) 556-8171

#### **Summary**

**Sample Receipt** The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on January 25, 2010 for analysis. The sample containers recieved did not have collection dates and times that matched the chain of custody. Per client instruction, the time and dates on the chain of custody were used. All sample containers arrived without any visible signs of tampering or breakage. Sample EF1-4/S was not recieved. Some samples were not at the correct pH upon receipt. Preservative was added to these samples per client request. 245517001, 245517005, 245517008, 245517013, 245517017, 245517020.

Sample Identification The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
245517001	GW01
245517002	GW02
245517003	GW04
245517004	EF1-1/D
245517005	EF1-1/S
245517006	EF1-1/I
245517007	EF1-2/D
245517009	EF1-4/D
245517010	EF1-5/D
245517011	EF1-5/S
245517012	EF1-6/D
245517013	EF1-6/S
245517014	EF1-7/S
245517015	EF1-8/S
245517016	EF1-9/S
245517017	EF1-10/S
245517018	MW393 S
245517019	MW393 D
245517020	MW388 S
245517021	MW381 D
245517022	EF1-4S-D

#### Case Narrative

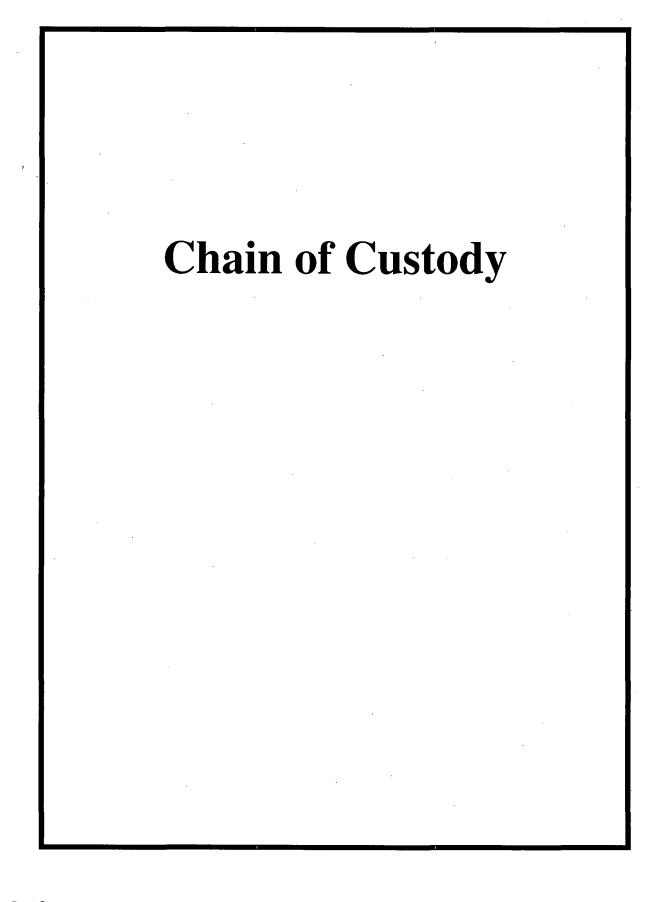
Sample analyses were conducted using methodology as outlined in GEL Laboratories, LLC (GEL) Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

#### Data Package

The enclosed data package contains the following sections: General Narrative, Chain of Custody and Supporting Documentation, and data from the following fractions: Radiochemistry.

Amanda Rasco

Project Manager



D										<u>.</u> .			:		295	51)
PROJECT	SAMPLE PREP					AMBUBAYABBB B B		NE STATES		and the		ASIC INC.	Marie III	PHYNY		
Fermi-1	THEIMAS 1									AL 1313	TO BE PE	TI YHM		e vizio		
LABORATORY ID	SAMPLE PREP	(signature)														
	The			1119	FOU	NIPAYAYILLER KALONTELER					233/234 238	89/30				
		Escapado de la composición	4756					8/×	·		33/23	20	39		1	
	plije wasie we					TATION LOCATION OR CONTAINER NUMBER	HS:	8	26	Od		£	l ns l		CONTAINER	HEMĀRKS 5 A
	TYPE			S	9	TATION LOCATION OF	E Z	2	N	22	75 /236 335 /236	Strautiu	18,			
-SAMPLE NUMBER		JAPA E		S	8	CONTAINER NUMBER		1085	1		2 %	ð	33			
	(BEE CODE ABOYE)			ଥ			₽ē	3	8	RA	Uranium 235/231	<i>*</i>	00			
		CHARLES AND AND ADDRESS OF THE PARTY OF THE	-300 FEET \$5500 FE			AND THE REAL PROPERTY OF THE P					,	~	1		a reconstruction	NO SEPTEMBER OF SE
GW01		1/14/2010	12.15	-		GW01		X	X	X	X				<del> </del>	3500 ML
GWUZ		1/14/2010	09:50	1-1	_	GWOZ	/	×	×	×	×				ļ	3500 ML
5w04		1/13/2010	11:50	1	4	BW04	1	×	×	×	×					3500 ML
EF1- 4/0	/	1/5/2010	08.50	$\vdash$		EF1-2/D	4	<u>X</u>	X_		X				<u> </u>	3506 mL
EF1-1/5	/	1/5/2010	10:15	1-1		EF1-1/5	1.2	×	Κ		_ X		<b> </b>			3500 ML
EF1-1/1	/	1/14/2010	15:30	_	_	EF1-1/2	2	_ X			*	<u>×</u> _	K	ļ		SSOOML (2)
EF1-210		1/4/2010	11:30	1-1	_	CF1-210	2	X						<b></b> _		500mc
EF1-415	1.	12/24/2009		1-1		EF1-4/5	1	X	<u> </u>				<u> </u>		1	500ral
EF1-41D		<del></del>	10:20		$\dashv$	EF1-4/0		X	ļ		ļ			ļ		SOUML
EF1 - 5/D		12/24/2009	11:25	4-4	-	EF1-5/0	2	X	X	X		×	*			5560.nL
EF1-515		12124/2009	12:25	11	$\vdash$	FF1-515	2	X	×	X	×	×	_×	<u> </u>	<del> </del>	5500.nc
EF1-610		12129/2009	15:50	1-1		EF1-6/D	1	X	ļ	<b></b>	×	ļ	<b> </b>	ļ	ļ	1500mg
EF1-615		12/24/2007		-		EF1-615	1	X		<b></b>			<u> </u>	<u> </u>		500.11L
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245517

## FERMI 1 NUCLEAR POWER PLANT CHAIN-OF-CUSTODY

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MW 343 D	1	1/13/2010	13:25			MW343 D	1	*	×	×	X					3500ML
MW388 5	1	1/13/2010	10:20			MW3885	/	×	×	×	<					3500 ML
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FERMI 1 NUCLEAR POWER PLANT 6400 N. DIXIE HWY NEWPORT, MI 48166



Clien	it: ROIT			s	SDG/ARCOC/Work Order: 2 45517				
Rece	ived By: H. Taller				Date Received: 25Jan 10				
Susp	ected Hazard Information	Yes	No		ounts > x2 area background on samples not marked "radioactive", contact diation Safety Group of further investigation.				
COC	/Samples marked as radioactive?		/	Maxin	num Counts Observed*: 200M				
Class	ified Radioactive II or III by RSO?				1				
	/Samples marked containing PCBs?								
Shipp	ed as a DOT Hazardous?		/	Hazaro	d Class Shipped: UN#:				
Samp	les identified as Foreign Soil?								
	Sample Receipt Criteria	Yes	NA	<sup>o</sup> Z	Comments/Qualifiers (Required for Non-Conforming Items)				
1	Shipping containers received intact and sealed?				Circle Applicable: seals broken damaged container leaking container other (describe)				
2	Samples requiring cold preservation within $0 \le 6$ deg. C?		/		ice bags blue ice dry ice none other (describe)				
3	Chain of custody documents included with shipment?								
4	Sample containers intact and sealed?				Circle Applicable: seals broken damaged container leaking container other (describe)				
5	Samples requiring chemical preservation at proper pH?			If	Preservation added, Lot#: #20053				
6	VOA vials free of headspace (defined as < 6mm bubble)?		/		ample ID's and containers affected:				
7	Are Encore containers present?			1	f yes, immediately deliver to Volatiles laboratory)				
8	Samples received within holding time?	/			's and tests affected:				
9	Sample ID's on COC match ID's on bottles?			,	ample ID's and containers affected:				
10	Date & time on COC match date & time on bottles?			1	ample ID's affected:				
11	Number of containers received match number indicated on COC?	-			ample ID's affected:  did not receive EF1-4/5				
12	COC form is properly signed in relinquished/received sections?	/							
Com	Courier								
					1.3				
	mas ( Das A) regions. Init				AFT Date 1/26/10				



# SAMPLE RECEIPT & REVIEW FORM CONTINUATION FORM

Client: ROT Date Received: 1/25/10	Page _ l of _ l	! ·
		司
date and time on containers		
GWOI ph3		$\exists$
GW02 1030		コ
GN04 1200		
EF1-1/D 0945		
ETI-1/5 1045 not grescruted		
EFI-1/I container / 1325 Container 2 1330		╗
EF1-210 1200		$\exists$
EF1-41D 1030		٦
did not receive EFI-415		
EFI-51D container 1 1100 container 2 1140		
EF1-5/5 container 1 1240 container 2 1250		
EF1-610 1600		
EFI- 415 1515 not preserved	<b>.</b>	
#F1-7/5 1020 date 12/30/09 not preserve	3	
EF1-8/5 1035		_
EF1 915 1500 ph 4	·	_
EFI 1015 0940 '		_
EFIH		
NW 3935 1315	· ————————————————————————————————————	_
mw 393D 1415		_
mw 3885 1020 ph 3	· ·	_
mw 381 D 1645		_
EFI-45-D no date or time	<u> </u>	_
		4
		4
Client was contacted and instructed GEL to use	the_	4
collection date/times listed on the COC and	to	4
preserve samples that have pH >2. ATC 11	26/10	_
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		$\dashv$
		$\dashv$

List of current GEL Certifications as of 19 February 2010

State	Certification
Arizona	AZ0668
Arkansas	88-0651
CLIA	42D0904046
California – NELAP	01151CA
Colorado	GEL
Connecticut	PH-0169
Dept. of Navy	NFESC 413
EPA Region 5	WG-15J
Florida – NELAP	E87156
Georgia	E87156 (FL/NELAP)
Georgia DW	967
. Hawaii	N/A
ISO 17025	2567.01
Idaho	SC00012
Illinois – NELAP	200029
Indiana	C-SC-01
Kansas – NELAP	E-10332
Kentucky	90129
Louisiana – NELAP	03046
Maryland	270
Massachusetts	M-SC012
Nevada	SC00012
New Jersey - NELAP	SC002
New Mexico	FL NELAP E87156
New York - NELAP	11501
North Carolina	233
North Carolina DW	45709
Oklahoma	9904
Pennsylvania – NELÁP	68-00485
South Carolina	10120001/10120002
Tennessee	TN 02934
Texas – NELAP	T104704235-07B-TX
U.S. Dept. of Agriculture	S-52597
Utah - NELAP	GEL
Vermont	VT87156
Virginia	00151
Washington	C1641
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#### Radiochemistry Case Narrative Detroit Edison Company (ROIT) SDG 245517

#### **Method/Analysis Information**

Product: Alphaspec Pu, Liquid

Analytical Method: DOE EML HASL-300, Pu-11-RC Modified

Analytical Batch Number: 949025

Sample ID	Client ID
245517006	EF1-1/I
245517010	EF1-5/D
245517011	EF1-5/S
1202033220	Method Blank (MB)
1202033221	245517006(EF1-1/I) Sample Duplicate (DUP)
1202033222	245517006(EF1-1/I) Matrix Spike (MS)
1202033223	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-011 REV# 18.

#### **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met.

#### **Standards Information**

Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

#### **Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

#### **Quality Control (QC) Information:**

#### **Blank Information**

The blank volume is representative of the sample volumes in this batch.

#### **Designated QC**

The following sample was used for QC: 245517006 (EF1-1/I).

#### **QC** Information

All of the QC samples met the required acceptance limits.

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

Samples 1202033220 (MB), 1202033221 (EF1-1/I), 245517006 (EF1-1/I), 245517010 (EF1-5/D) and 245517011 (EF1-5/S) were recounted due to a suspected false positive.

#### **Miscellaneous Information:**

#### **Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Manual Integration**

No manual integrations were performed on data in this batch.

#### **Additional Comments**

Additional comments were not required for this sample set.

#### **Qualifier information**

Manual qualifiers were not required.

#### **Method/Analysis Information**

Product: Alphaspec U, Liquid

Analytical Method: DOE EML HASL-300, U-02-RC Modified

Analytical Batch Number: 947744

Sample ID	Client ID
245517001	GW01
245517002	GW02
245517003	GW04
245517004	EF1-1/D
245517005	EF1-1/S
245517006	EF1-1/I
245517010	EF1-5/D
245517011	EF1-5/S
245517012	EF1-6/D
245517016	EF1-9/S
245517017	EF1-10/S
245517018	MW393 S
245517019	MW393 D
245517020	MW388 S
1202030212	Method Blank (MB)
1202030213	245517001(GW01) Sample Duplicate (DUP)
1202030214	245517001(GW01) Matrix Spike (MS)
1202030215	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-011 REV# 18.

#### **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met.

#### **Standards Information**

Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

#### **Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

#### **Quality Control (QC) Information:**

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### **Designated QC**

The following sample was used for QC: 245517001 (GW01).

#### **OC** Information

All of the QC samples met the required acceptance limits.

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

Sample 245517017 (EF1-10/S) was recounted due to a peak shift.

#### **Miscellaneous Information:**

#### **Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Manual Integration**

No manual integrations were performed on data in this batch.

#### **Additional Comments**

Additional comments were not required for this sample set.

#### **Qualifier information**

Manual qualifiers were not required.

#### **Method/Analysis Information**

Product:	Alphaspec U, Liquid
rrouuct.	Alphaspec O, Liquiu

Analytical Method: DOE EML HASL-300, U-02-RC Modified

Analytical Batch Number: 949027

Sample ID	Client ID
245517021	MW381 D
1202033228	Method Blank (MB)
1202033229	245517021(MW381 D) Sample Duplicate (DUP)
1202033230	245517021(MW381 D) Matrix Spike (MS)
1202033231	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-011 REV# 18.

#### **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met.

#### **Standards Information**

Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

#### **Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

#### **Quality Control (QC) Information:**

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### **Designated QC**

The following sample was used for QC: 245517021 (MW381 D).

#### **QC** Information

All of the QC samples met the required acceptance limits.

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

#### **Miscellaneous Information:**

#### **Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Manual Integration**

No manual integrations were performed on data in this batch.

#### **Additional Comments**

Additional comments were not required for this sample set.

#### **Qualifier information**

Manual qualifiers were not required.

#### Method/Analysis Information

Product: GFPC, Gross A/B, liquid

Analytical Method: EPA 900.0

Analytical Batch Number: 945896

Sample ID	Client ID
245517001	GW01
245517002	GW02
245517003	GW04
245517004	EF1-1/D
245517005	EF1-1/S
245517006	EF1-1/I
245517009	EF1-4/D
245517010	EF1-5/D
245517011	EF1-5/S
245517012	EF1-6/D
245517013	EF1-6/S
245517014	EF1-7/S
245517015	EF1-8/S
245517016	EF1-9/S
245517017	EF1-10/S
245517018	MW393 S
245517019	MW393 D
245517020	MW388 S
245517021	MW381 D
245517022	EF1-4S-D
1202026034	Method Blank (MB)
1202026035	245517003(GW04) Sample Duplicate (DUP)
1202026036	245517003(GW04) Matrix Spike (MS)
1202026037	245517003(GW04) Matrix Spike Duplicate (MSD)
1202026038	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-001 REV# 12.

#### **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met. The discrimination settings are calibrated in beta discriminating mode to reduce beta to alpha crosstalk.

#### **Standards Information**

Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

#### Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

#### **Quality Control (QC) Information:**

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### **Designated QC**

The following sample was used for QC: 245517003 (GW04).

#### **OC** Information

All of the QC samples met the required acceptance limits.

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

#### **Chemical Recoveries**

All chemical recoveries meet the required acceptance limits for this sample set.

#### **Gross Alpha/Beta Preparation Information**

High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating.

#### **Miscellaneous Information:**

## **Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Additional Comments**

Sample, 245517005 (EF1-1/S), did not meet the alpha and beta required detection limit due to low sample volume. No more volume could be used due to not exceeding the maximum net weight limit of the calibration curve. The sample counted for 500 minutes.

#### **Qualifier information**

Manual qualifiers were not required.

#### **Method/Analysis Information**

Product: GFPC, Gross A/B, liquid

Analytical Method: EPA 900.0

Analytical Batch Number: 945898

 Sample ID
 Client ID

 245517007
 EF1-2/D

 1202026044
 Method Blank (MB)

 1202026045
 245518001(A024-00000011) Sample Duplicate (DUP)

 1202026046
 245518001(A024-00000011) Matrix Spike (MS)

 1202026047
 245518001(A024-00000011) Matrix Spike Duplicate (MSD)

 1202026048
 Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-001 REV# 12.

#### Calibration Information:

#### **Calibration Information**

All initial and continuing calibration requirements have been met. The discrimination settings are calibrated in beta discriminating mode to reduce beta to alpha crosstalk.

#### **Standards Information**

Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

#### Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

#### **Quality Control (QC) Information:**

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### **Designated QC**

The following sample was used for QC: 245518001 (A024-00000011).

#### **QC** Information

All of the QC samples met the required acceptance limits.

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

Sample 1202026044 (MB) was recounted due to a negative result greater than three times the error. Second count being reported.

#### **Chemical Recoveries**

All chemical recoveries meet the required acceptance limits for this sample set.

#### **Gross Alpha/Beta Preparation Information**

High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating.

#### **Miscellaneous Information:**

#### **Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Additional Comments**

Additional comments were not required for this sample set.

### **Qualifier information**

Manual qualifiers were not required.

#### **Method/Analysis Information**

Product: GFPC, Ra228, Liquid

Analytical Method: EPA 904.0/SW846 9320 Modified

Analytical Batch Number: 945895

Sample ID	Client ID
245517001	GW01
245517002	GW02
245517003	GW04
245517004	EF1-1/D
245517005	EF1-1/S
245517006	EF1-1/I
245517010	EF1-5/D
245517011	EF1-5/S
245517018	MW393 S
245517019	MW393 D
245517020	MW388 S
245517021	MW381 D
1202026030	Method Blank (MB)
1202026031	245517001(GW01) Sample Duplicate (DUP)
1202026032	245517001(GW01) Matrix Spike (MS)
1202026033	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-009 REV# 15.

#### **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met.

#### **Standards Information**

Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

#### **Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

## **Quality Control (QC) Information:**

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### **Designated QC**

The following sample was used for QC: 245517001 (GW01).

#### **QC** Information

All of the QC samples met the required acceptance limits.

## **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

#### **Chemical Recoveries**

All chemical recoveries meet the required acceptance limits for this sample set.

## **Miscellaneous Information:**

#### **Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Additional Comments**

Additional comments were not required for this sample set:

#### **Qualifier information**

Manual qualifiers were not required.

## **Method/Analysis Information**

Product:	GFPC, Sr89&Sr90, Liq	uid
Product:	GFPC, Sroy&Sryu, Liq	u

Analytical Method: EPA 905.0 Modified

Analytical Batch Number: 946221

Sample ID	Client ID
245517006	EF1-1/I
245517010	EF1-5/D
245517011	EF1-5/S
1202026702	Method Blank (MB)
1202026703	245517006(EF1-1/I) Sample Duplicate (DUP)
1202026704	245517006(EF1-1/I) Matrix Spike (MS)
1202026705	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in

accordance with GL-RAD-A-004 REV# 13.

#### Calibration Information:

#### **Calibration Information**

All initial and continuing calibration requirements have been met.

#### **Standards Information**

Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

#### **Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

#### **Quality Control (QC) Information:**

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### **Designated QC**

The following sample was used for QC: 245517006 (EF1-1/I).

#### **QC** Information

All of the QC samples met the required acceptance limits.

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

Sample 245517006 (EF1-1/I) was recounted to verify sample result. Second count being reported.

#### **Chemical Recoveries**

All chemical recoveries meet the required acceptance limits for this sample set.

#### **Miscellaneous Information:**

#### Data Exception (DER) Documentation

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. The following DER was generated for this SDG: DER 789326 was generated due to Sample improperly preserved. 1. Sample 245517006 was received without the correct preservation. The sample container was preserved prior to analysis. The sample was preserved with 5mL of nitric acid (Reagent Id 1249842.23) to a pH of 2. 1.Reporting results.

#### **Additional Comments**

Additional comments were not required for this sample set.

#### **Qualifier information**

Manual qualifiers were not required.

## **Method/Analysis Information**

Product: Lucas Cell, Ra226, liquid

Analytical Method: EPA 903.1 Modified

Analytical Batch Number: 948312

Sample ID	Client ID
245517001	GW01
245517002	GW02
245517003	GW04
245517004	EF1-1/D
245517005	EF1-1/S
245517006	EF1-1/I
245517010	EF1-5/D
245517011	EF1-5/S
245517018	MW393 S
245517019	MW393 D
245517020	MW388 S
245517021	MW381 D
1202031478	Method Blank (MB)
1202031479	245517001(GW01) Sample Duplicate (DUP)
1202031480	245517001(GW01) Matrix Spike (MS)
1202031481	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-008 REV# 13.

#### **Calibration Information:**

## **Calibration Information**

All initial and continuing calibration requirements have been met.

#### **Standards Information**

Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

## **Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

#### **Quality Control (QC) Information:**

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### **Designated QC**

The following sample was used for QC: 245517001 (GW01).

#### **OC** Information

All of the QC samples met the required acceptance limits.

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

## **Miscellaneous Information:**

#### **Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Additional Comments**

Additional comments were not required for this sample set.

#### **Qualifier** information

Manual qualifiers were not required.

#### **Certification Statement**

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

## **Review Validation:**

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

The following data validator verified the information presented in this case narrative:

Reviewer/Date:	land willh	2/1/18	

DER Report No.: 789326

Revision No.: 2

DATA EXCEPTION REPORT									
	ivision: adiochemistry	Quality Criteria: Specifications	Type: Process						
	est / <b>Method:</b> PA 905.0 Modified	Matrix Type: Liquid	Client Code: ROIT						
	ample Numbers: ee Below								
Potentially affected work order(s)(SDG	:):245517								
Application Issues:									
Sample improperly preserved	•								
Specification and Requirements Exception Description:		DER Disposition:							
Sample 245517006 was received with sample container was preserved prior to preserved with 5mL of nitric acid (Reaged)	analysis. The sample was	1.Reporting results.							

Data Validator/Group Leader:

10-FEB-10

Nat Long

Originator's Name:

10-FEB-10

Van Culpepper



2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

# Certificate of Analysis Report for

ROIT001 Detroit Edison Company Client SDG: 245517 GEL Work Order: 245517

## The Qualifiers in this report are defined as follows:

- \* A quality control analyte recovery is outside of specified acceptance criteria
- \*\* Analyte is a surrogate compound
- U Analyte was analyzed for, but not detected above the RL or LOQ

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the RL or LOQ.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Amanda Rasco.

Reviewed By:/	(eviele	Willen	
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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Report Date: February 17, 2010

ROIT00116 ROIT001

Project: Client ID:

# **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: Sample ID: Matrix:

GW01 245517001

Collect Date:

**Ground Water** 14-JAN-10 12:15 25-JAN-10

Receive Date: Collector:

Client -

			Chefit					
Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF AnalystDate Time Batch	Method
Rad Alpha Spec Analys	is							
Alphaspec U, Liquid "As	Received"							
Pct Uranium-235	U	-3.8				percent	MXE1 02/09/10 1349 947744	´1
Uranium-233/234	U	-0.0389	+/-0.154	0.366	1.00	pCi/L		
Uranium-235/236	U	-0.0453	+/-0.196	0.523	1.00	pCi/L		
Uranium-238	U	0.193	+/-0.264	0.423	1.00	pCi/L		
<b>Rad Gas Flow Proportio</b>	onal Counting					•		
GFPC, Gross A/B, liquid	"As Received"							
Alpha	U	2.75	+/-2.78	4.32	5.00	pCi/L	DXF3 02/11/10 1931 945896	2
Beta	U	1.95	+/-1.99	3.28	5.00	pCi/L		
GFPC, Ra228, Liquid "A.	s Received"		3			•		
Radium-228	U	0.845	+/-0.845	1.38	3.00	pCi/L	JXC5 02/01/10 0723 945895	3
Rad Radium-226						•		
Lucas Cell, Ra226, liquid	"As Received"							
Radium-226		0.832	+/-0.317	0.266	1.00	pCi/L	KSD1 02/10/10 1410 948312	4

Method	Description	Analyst Comments	
1	DOE EML HASL-300, U-02-RC Modified		
2	EPA 900.0		
3	EPA 904.0/SW846 9320 Modified		
4	EPA 903.1 Modified		

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Liquid "As Received"			101	(15%-125%)
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			` 85.6	(15%-125%)

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# **Certificate of Analysis**

Report Date: February 17, 2010

ROIT00116

ROIT001

Project:

Client ID:

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

GW02 245517002

Client Sample ID: Sample ID: Matrix: Collect Date:

**Ground Water** 14-JAN-10 09:50

Receive Date: Collector:

25-JAN-10

Client

			Chent								
Parameter	Qualifier	Result	Uncertainty	DL	RL .	Units	DF	AnalystDate	Time	Batch	Method
Rad Alpha Spec Analys	sis										
Alphaspec U, Liquid "As	Received"	,									
Pct Uranium-235	U	0.00				percent		MXE1 02/09/10	1349 9	47744	l
Uranium-233/234		2.42	+/-0.823	0.347	1.00	pCi/L		•			
Uranium-235/236	U	0.00	+/-0.175	0.268	1.00	pCi/L					
Uranium-238		1.72	+/-0.695	0.347	1.00	pCi/L					
Rad Gas Flow Proporti	onal Counting					•					
GFPC, Gross A/B, liquid	l "As Received"							•			
Alpha	U	1.39	+/-2.49	4.42	5.00	pCi/L		DXF3 02/11/10	1931 9	45896	2
Beta		5.74	+/-2.36	3.22	5.00	pCi/L					
GFPC, Ra228, Liquid "A	s Received"					•					
Radium-228	U	1.71	+/-1.22	1.85	3.00	pCi/L		JXC5 02/01/10	0723 9	45895	3
Rad Radium-226						•					
Lucas Cell, Ra226, liquid	d "As Received"										
Radium-226		0.460	+/-0.300	0.411	1.00	pCi/L		KSD1 02/10/10	1410 9	48312	4

Method	Description	Analyst Comments	'\
1	DOE EML HASL-300, U-02-RC Modified		
2 .	EPA 900.0		
3	EPA 904.0/SW846 9320 Modified		

EPA 903.1 Modified

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Liquid "As Received"			106	(15%-125%)
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			62.2	(15%-125%)

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# **Certificate of Analysis**

Report Date: February 17, 2010

ROIT00116

ROIT001

Project:

Client ID:

Company: Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

GW04 245517003

Client Sample ID: Sample ID: Matrix: Collect Date:

Ground Water 13-JAN-10 11:50

Receive Date: Collector:

25-JAN-10

Client

	concetor.		Chent								
Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Alpha Spec Analys	sis										
Alphaspec U, Liquid "As	s Received"										
Pct Uranium-235	· U	2.35				percent		MXE1 02/09/10	1349 9	47744	1
Uranium-233/234		0.283	+/-0.287	0.228	1.00	pCi/L					
Uranium-235/236	U	0.0938	+/-0.184	0.282	1.00	pCi/L					
Uranium-238		0.607	+/-0.421	0.228	1.00	pCi/L					
Rad Gas Flow Proporti	ional Counting					•					
GFPC, Gross A/B, liquid	d "As Received"	•									
Alpha	U	1.19	+/-2.12	3.91	5.00	pCi/L		DXF3 02/11/10	1935 9	45896	2
Beta		4.58	+/-2.09	2.84	5.00	pCi/L					
GFPC, Ra228, Liquid "A	As Received"					•					
Radium-228	U	-0.757	+/-0.669	1.58	3.00	pCi/L		JXC5 02/01/10	0723 9	45895	3
Rad Radium-226						•					
Lucas Cell, Ra226, liqui	d "As Received"										
Radium-226		1.22	+/-0.331	0.268	1.00	pCi/L		KSD1 02/10/10	1410 9	48312	4

Method	Description	Analyst Comments	
1	DOE EML HASL-300, U-02-RC Modified		
2	EPA 900.0		
3	EPA 904.0/SW846 9320 Modified		
4	EPA 903.1 Modified		

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Liquid "As Received"	•		97.6	(15%-125%)
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			79.3	(15%-125%)

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# **Certificate of Analysis**

Report Date: February 17, 2010

ROIT00116 ROIT001

Project: Client ID:

Company: Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: Sample ID:

EF1-1/D 245517004

Matrix: Collect Date:

Ground Water 05-JAN-10 08:50 25-JAN-10

Receive Date: Collector:

	Collector:		Client								
Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Alpha Spec Anal	ysis										
Alphaspec U, Liquid "A	As Received"										
Pct Uranium-235	· U	3.47				percent		MXE1 02/09/10	1349 9	47744	1
Uranium-233/234		2.04	+/-0.727	0.321	1.00	pCi/L					
Uranium-235/236	.U	0.228	+/-0.283	0.396	1.00	pCi/L					
Uranium-238		0.987	+/-0.508	0.321	1.00	pCi/L					
Rad Gas Flow Propor	rtional Counting				,						
GFPC, Gross A/B, liqu	uid "As Received"	•						•			
Alpha	U	2.51	+/-2.52	3.95	5.00	pCi/L		DXF3 02/11/10	1932 9	45896	2
Beta	U	2.44	+/-1.87	2.95	5.00	pCi/L					
GFPC, Ra228, Liquid	"As Received"					-					
Radium-228	U	1.58	+/-1.14	1.76	3.00	pCi/L		JXC5 02/01/10	0723 9	45895	3
Rad Radium-226						٠,					
Lucas Cell, Ra226, liqu	uid "As Received"										
Radium-226		0.568	+/-0.244	0.259	1.00	pCi/L	,	KSD1 02/10/10	1410 9	48312	4

Method	Description	Analyst Comments	
1	DOE EML HASL-300, U-02-RC Modified		
2	EPA 900.0		
3	EPA 904.0/SW846 9320 Modified		
4	EPA 903.1 Modified		

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Liquid "As Received"			108	(15%-125%)
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			79.5	(15%-125%)

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## **Certificate of Analysis**

Report Date: February 17, 2010

ROIT00116

ROIT001

Project: Client ID:

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

EF1-1/S

Client Sample ID: Sample ID:

245517005

Matrix: Collect Date:

Ground Water 05-JAN-10 10:15 25-JAN-10

Receive Date: Collector:

Client

**Parameter** Qualifier Result Uncertainty DLRLUnits DF Time Batch Method AnalystDate Rad Alpha Spec Analysis Alphaspec U, Liquid "As Received" Pct Uranium-235 U 3.79 percent MXE1 02/09/10 1349 947744 Uranium-233/234 +/-0.685 0.424 1.55 1.00 pCi/L Uranium-235/236 0.189 +/-0.262 0.284 00.1 pCi/L Uranium-238 0.747 +/-0.475 0.367 1.00 pCi/L **Rad Gas Flow Proportional Counting** GFPC, Gross A/B, liquid "As Received" Alpha 0.892 +/-3.17 5.94 5.00 pCi/L DXF3 02/11/10 1932 945896 2 Beta U 0.787 +/-2.95 5.15 5.00 pCi/L GFPC, Ra228, Liquid "As Received" Radium-228 0.223 +/-0.993 1.83 3.00 pCi/L JXC5 02/01/10 0723 945895 Rad Radium-226 Lucas Cell, Ra226, liquid "As Received" Radium-226 0.948 +/-0.348 0.383 1.00 pCi/L KSD1 02/10/10 1440 948312 4

Method	Description	Analyst Comments	
1	DOE EML HASL-300, U-02-RC Modified		
2	EPA 900.0		
3	EPA 904.0/SW846 9320 Modified		
4	EPA 903.1 Modified		•

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Liquid "As Received"			99.5	(15%-125%)
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			76.4	(15%-125%)

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# **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: Sample ID:

EF1-1/I 245517006

Matrix: Collect Date:

Ground Water 14-JAN-10 15:30

Receive Date: Collector:

25-JAN-10 Client

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Alpha Spec Analys	is			-				······································			
Alphaspec Pu, Liquid "As	s Received"										
Plutonium-238	U	0.00	+/-0.141	0.216	1.00	pCi/L		JXD2 02/09/10	0923 94	19025	1
Plutonium-239/240	U	-0.0518	+/-0.153	0.440	1.00	pCi/L					
Plutonium-244	U	0.00	+/-0.141	0.216	1.00	pCi/L					
Alphaspec U, Liquid "As	Received"					•					
Pct Uranium-235	U	0.377				percent		MXE1 02/09/10	1349 94	17744	2
Uranium-233/234		3.20	+/-0.964	0.361	1.00	pCi/L					
Uranium-235/236	U	0.093	+/-0.182	0.279	1.00	pCi/L					
Uranium-238		3.82	+/-1.05	0.361	1.00	pCi/L					
Rad Gas Flow Proportion	onal Counting					•					
GFPC, Gross A/B, liquid	"As Received"										
Alpha		5.77	+/-3.52	4.32	5.00	pCi/L		DXF3 02/11/10	1932 94	45896	3
Beta	U	1.31	+/-2.16	3.67	5.00	pCi/L					
GFPC, Ra228, Liquid "A	s Received"					•					
Radium-228		1.72	+/-0.844	1.12	3.00	pCi/L		JXC5 02/01/10	0723 94	15895	4
GFPC, Sr89&Sr90, Liqui	id "As Received"	•	,			•					
Strontium-89	U	0.272	+/-0.959	1.81	2.00	pCi/L		JXR1 02/03/10	1033 94	46221	5
Strontium-90	U	-0.341	+/-0.603	1.96	2.00	pCi/L					
Rad Radium-226				-		,					
Lucas Cell, Ra226, liquid	l "As Received"										
Radium-226	U	0.128	+/-0.133	0.205	1.00	pCi/L		KSD1 02/10/10	1440 94	48312	6
						-					

Method	Description	Pescription Ana				
1	DOE EML HASL-300, Pu-11-RC Modified		,,,,,,,,			
!	DOE EML HASL-300, U-02-RC Modified					
3	EPA 900.0					
	EPA 904.0/SW846 9320 Modified					
	EPA 905.0 Modified					
5	EPA 903.1 Modified					
_	_					
urrogate/Tracer	recovery Test	Result	Nominal Recover	y% Acceptable Limits		

Plutonium-242 Tracer

Alphaspec Pu, Liquid "As Received"

Recovery % 77.6

Report Date: February 17, 2010

ROIT00116 ROIT001

Project: Client ID:

(15%-125%)

Report Date: February 17, 2010

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

# **Certificate of Analysis**

Company: Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

	Client Sample ID: Sample ID:	EF1-1/I 245517006			Proj Clie	ect: nt ID:	ROIT00116 ROIT001	
Parameter	Qualifier Res	ult Uncertainty	DL	RL	Units	DF	AnalystDate	Time Batch Method
Uranium-232 Tracer	Alphaspec U, Liquid "As Received"						99.7	(15%-125%)
Barium-133 Tracer	GFPC, Ra228, Li	quid "As Received"					91.6	(15%-125%)
Yttrium Carrier	GFPC, Sr89&Sr90, Liquid "As Received"					103	(25%-125%)	
Strontium Carrier	GFPC, Sr89&Sr9	0, Liquid "As Receiv	ved"				96.4	(25%-125%)

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Report Date: February 17, 2010

ROIT00116 ROIT001

Project: Client ID:

# **Certificate of Analysis**

Company: Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

EF1-2/D 245517007

Client Sample ID: Sample ID: Matrix: Collect Date:

Ground Water 04-JAN-10 11:30 25-JAN-10

Receive Date: Collector:

Client

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF AnalystDate Time Batch Method
Rad Gas Flow Propo	ortional Counting						
GFPC, Gross A/B, lie	quid "As Received"						
Alpha	U	3.08	+/-3.04	4.45	5.00	pCi/L	DXB5 02/05/10 1436 945898 1
Beta		5.53	+/-2.52	3.27	5.00	pCi/L	

Method	Description	Analyst Comments
1	EDA 000 0	

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID:

Sample ID:

Matrix:

Collect Date:

Receive Date: Collector:

25-JAN-10 Client Result Uncertainty

EF1-4/D

245517009

Ground Water

29-DEC-09 10:20

Parameter	Qualifier
Rad Gas Flow Prop	ortional Counting

GFPC, Gross A/B, liquid "As Received"

Alpha Beta

1

2.28 5.07

+/-2.49 +/-2.03

3.92 2.71

DL

pCi/L pCi/L

Units

RL

5.00

5.00

Project:

Client ID:

DF

DXF3 02/11/10 1932 945896

Time Batch Method

Report Date: February 17, 2010

ROIT00116

AnalystDate

ROIT001

The following Analytical Methods were performed

Method Description

EPA 900.0

**Analyst Comments** 

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

# **Certificate of Analysis**

Report Date: February 17, 2010

JXR1 02/03/10 1029 946221

KSD1 02/10/10 1440 948312 6

ROIT00116

ROIT001

Project:

Client ID:

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID:

0.297

2.26

-0.0921

+/-1.07

+/-0.671

+/-0.467

Sample ID:

EF1-5/D 245517010

Matrix: Collect Date: Ground Water 29-DEC-09 11:25 25-JAN-10

Receive Date: Collector:

Client

**Parameter** Qualifier Result Uncertainty DL RL Units DF AnalystDate Time Batch Method Rad Alpha Spec Analysis Alphaspec Pu, Liquid "As Received" Plutonium-238 0.00279 U +/-0.151 0.459 1.00 pCi/L JXD2 02/10/10 1301 949025 Plutonium-239/240 +/-0.148 -0.0501 0.425 U 1.00 pCi/L Plutonium-244 0.523 +/-0.389 0.386 1.00 pCi/L Alphaspec U, Liquid "As Received" Pct Uranium-235 U -402 MXE102/09/10 1349 947744 2 percent Uranium-233/234 U 0.0391 +/-0.158 0.376 1.00 pCi/L Uranium-235/236 0.0969 +/-0.190 0.291 U 1.00 pCi/L Uranium-238 -0.0188 +/-0.158 0.376 1.00 pCi/L **Rad Gas Flow Proportional Counting** GFPC, Gross A/B, liquid "As Received" Alpha 3.68 5.00 2.17 +/-2.37 pCi/L DXF3 02/11/10 1942 945896 Beta 6.77 +/-2.29 2.65 5.00 pCi/L GFPC, Ra228, Liquid "As Received" -0.0664 Radium-228 +/-0.659 1.34 3.00 pCi/L JXC5 02/01/10 0723 945895

1.99

1.96

0.306

2.00

2.00

1.00

pCi/L

pCi/L

pCi/L

The following Analytical Methods were performed

GFPC, Sr89&Sr90, Liquid "As Received"

Lucas Cell, Ra226, liquid "As Received"

Strontium-89

Strontium-90

Radium-226

Rad Radium-226

Method	Description	Analyst Comments					
l	DOE EML HASL-300, Pu-11-RC Modified	,					
2	DOE EML HASL-300, U-02-RC Modified						
3	EPA 900.0						
ļ	EPA 904.0/SW846 9320 Modified						
i	EPA 905.0 Modified						
5	EPA 903.1 Modified	•					

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Plutonium-242 Tracer	Alphaspec Pu, Liquid "As Received"			70.0	(15%-125%)

Report Date: February 17, 2010

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# **Certificate of Analysis**

Company: Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

	Client Sample ID: Sample ID:	EF1-5/D 245517010				ect: nt ID:	ROIT00116 ROIT001	
Parameter	Qualifier	Result Uncertainty	DL	RL	Units	DF	AnalystDate	Time Batch Method
Uranium-232 Tracer	Alphaspec U,	Alphaspec U, Liquid "As Received"						(15%-125%)
Barium-133 Tracer	GFPC, Ra228	B, Liquid "As Received"					78.9	(15%-125%)
Yttrium Carrier	GFPC, Sr89&	GFPC, Sr89&Sr90, Liquid "As Received"					104	(25%-125%)
Strontium Carrier	GFPC, Sr89&	GFPC, Sr89&Sr90, Liquid "As Received" GFPC, Sr89&Sr90, Liquid "As Received"					102	(25%-125%)

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## **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID:

Sample ID:

EF1-5/S 245517011

Matrix: Collect Date: Receive Date:

Collector:

Ground Water 29-DEC-09 12:25 25-JAN-10

Client

**Parameter** Qualifier Result Uncertainty DL RL Units AnalystDate Time Batch Method Rad Alpha Spec Analysis Alphaspec Pu, Liquid "As Received" Plutonium-238 0.0361 +/-0.144 0.385 U 1.00 pCi/L JXD2 02/09/10 0923 949025 Plutonium-239/240 -0.0167 +/-0.140 0.333 U 1.00 pCi/L Plutonium-244 U 0.139 +/-0.192 0.208 1.00 pCi/L Alphaspec U, Liquid "As Received" Pct Uranium-235 1.67 percent MXE102/09/10 1349 947744 2 Uranium-233/234 0.502 1.00 +/-1.08 3.62 pCi/L Uranium-235/236 0.305 +/-0.345 0.305 1.00 pCi/L Uranium-238 2.80 +/-0.940 0.247 1.00 pCi/L **Rad Gas Flow Proportional Counting** GFPC, Gross A/B, liquid "As Received" Alpha 3.58 +/-2.90 4.13 5.00 pCi/L DXF3 02/11/10 1942 945896 Beta 3.53 +/-2.05 2.97 5.00 pCi/L GFPC, Ra228, Liquid "As Received" Radium-228 1.51 +/-0.847 1.19 3.00 pCi/L JXC5 02/01/10 0723 945895 GFPC, Sr89&Sr90, Liquid "As Received" Strontium-89 -1.99 +/-0.507 1.98 U 2.00 pCi/L JXR1 02/03/10 1029 946221 Strontium-90 U 1.77 +/-0.872 1.96 2.00 pCi/L Rad Radium-226 Lucas Cell, Ra226, liquid "As Received" Radium-226 0.470 +/-0.277 0.380 1.00 KSD1 02/10/10 1440 948312 6

The following Analytical Methods were nonformed

Method	Description	Anal	yst Comments		
1	DOE EML HASL-300, Pu-11-RC Modified				<u> </u>
2	DOE EML HASL-300, U-02-RC Modified				
3	EPA 900.0				
4	EPA 904.0/SW846 9320 Modified				
5	EPA 905.0 Modified				
6	EPA 903.1 Modified				
Surrogate/Tracei	recovery Test	Result	Nominal	Recovery %	Acceptable Limits

Plutonium-242 Tracer

Alphaspec Pu, Liquid "As Received"

80.4

Report Date: February 17, 2010

ROIT00116

ROIT001

Project:

pCi/L

Client ID:

(15% - 125%)

Report Date: February 17, 2010

**GEL LABORATORIES LLC** 2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

# **Certificate of Analysis**

Company: Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

	Client Sample ID Sample ID:		EF1-5/S 245517011				iect: ent ID:	ROIT00116 ROIT001	
Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time Batch Method
Uranium-232 Tracer	Alphaspec U	Alphaspec U, Liquid "As Received"						93.9	(15%-125%)
Barium-133 Tracer	GFPC, Ra22	8, Liquid	d "As Received"					91.7	(15%-125%)
Yttrium Carrier	GFPC, Sr898	&Sr90, L	iquid "As Receiv	ved"			_	104	(25%-125%)
Strontium Carrier	GFPC, Sr898	&Sr90, L	iquid "As Receiv	ved"				91.9	(25%-125%)

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# **Certificate of Analysis**

Report Date: February 17, 2010

ROIT00116

ROIT001

Project:

Client ID:

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID:

Sample ID:

EF1-6/D 245517012

Matrix: Collect Date: Ground Water 29-DEC-09 15:50 25-JAN-10

Receive Date: Collector:

Client

**Parameter** Qualifier Result Uncertainty DL RLUnits DF Time Batch Method AnalystDate Rad Alpha Spec Analysis Alphaspec U, Liquid "As Received" Pct Uranium-235 U -1.17MXE1 02/09/10 1349 947744 percent +/-0.195 Uranium-233/234 0.227 U 0.131 1.00 pCi/L Uranium-235/236 -0.0225 +/-0.189 0.449 1.00 U pCi/L Uranium-238 0.303 +/-0.297 0.2271.00 pCi/L **Rad Gas Flow Proportional Counting** GFPC, Gross A/B, liquid "As Received" Alpha 1.00 +/-2.18 4.02 5.00 pCi/L DXF3 02/11/10 1942 945896 2 Beta 3.61 +/-1.98 2.83 5.00 pCi/L

The following Analytical Methods were performed

**Analyst Comments** Method Description

DOE EML HASL-300, U-02-RC Modified 2

EPA 900.0

**Acceptable Limits** Surrogate/Tracer recovery Test Result Nominal Recovery % Uranium-232 Tracer Alphaspec U, Liquid "As Received" 96.6 (15% - 125%)

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# **Certificate of Analysis**

Report Date: February 17, 2010

ROIT00116 ROIT001

Project:

Client ID:

Company: Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: Sample ID:

EF1-6/S 245517013

Matrix: Collect Date: Ground Water 29-DEC-09 15:10 25-JAN-10

Receive Date: Collector:

Client

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time Batch	Method
Rad Gas Flow Propor	rtional Counting									
GFPC, Gross A/B, liqu	uid "As Received"									
Alpha		6.22	+/-3.33	3.92	5.00	pCi/L	-	DXF3 02/11/10	1932 945896	1
Beta	U	2.98	+/-2.13	3.33	5.00	pCi/L				

The following Analytical Methods were performed

Method Description **Analyst Comments** EPA 900.0

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# **Certificate of Analysis**

Report Date: February 17, 2010

ROIT00116 ROIT001

Project: Client ID:

Company: Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: Sample ID:

Matrix:

Collect Date: Receive Date: EF1-7/S 245517014

Ground Water 04-JAN-10 10:00

25-JAN-10

Collector:

Client

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time I	Batch	Method
Rad Gas Flow Propo	ortional Counting					***************************************					
GFPC, Gross A/B, liq	guid "As Received"										
Alpha	U	2.87	+/-2.93	4.60	5.00	pCi/L		DXF3 02/11/10	1932 945	5896	1
Beta	U	1.84	+/-2.43	4.10	5.00	pCi/L					

Method	Description	Analyst Comments	
1	EPA 900 0	And the state of t	

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# **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID:

Sample ID:

Matrix:

Collect Date:

Receive Date: Collector:

EF1-8/S 245517015

Ground Water 04-JAN-10 10:30

25-JAN-10

Uncertainty

Client

**Parameter** 

Qualifier Rad Gas Flow Proportional Counting

GFPC, Gross A/B, liquid "As Received"

Alpha Beta

1.55 +/-2.53

Result

+/-3.27 15.5

4.38 3.45

DL

5.00 pCi/L 5.00 pCi/L

Units

**Analyst Comments** 

RL

Project:

Client ID:

DF

Time Batch Method

DXF3 02/11/10 1932 945896

Report Date: February 17, 2010

ROIT00116

AnalystDate

ROIT001

The following Analytical Methods were performed

Method Description 1

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# **Certificate of Analysis**

Report Date: February 17, 2010

ROIT00116 ROIT001

Project: Client ID:

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: Sample ID: Matrix:

EF1-9/S 245517016 Ground Water

Collect Date: Receive Date: 04-JAN-10 14:45 25-JAN-10

Collector:

Client

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Alpha Spec Analysis											
Alphaspec U, Liquid "As Re	ceived"										
Pct Uranium-235	U	0.985				percent		MXE1 02/09/10	1349 94	47744	1
Uranium-233/234		11.2	+/-1.80	0.361	1.00	pCi/L					
Uranium-235/236	U	0.443	+/-0.410	0.446	1.00	pCi/L					
Uranium-238		6.93	+/-1.42	0.226	1.00	pCi/L					
<b>Rad Gas Flow Proportion</b> :	al Counting					-					
GFPC, Gross A/B, liquid "A	As Received"										
Alpha		12.0	+/-4.16	4.76	5.00	pCi/L		DXF3 02/11/10	1933 94	45896	2
Beta		10.2	+/-3.09	4.43	5.00	pCi/L					_

The following Analytical Methods were performed

The following A	nalytical Methods were performed		·				
Method	Description	Analyst Comments					
1	DOE EML HASL-300, U-02-RC Modified						
•	FD 1 000 0						

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Liquid "As Received"			101	(15%-125%)

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Report Date: February 17, 2010

ROIT00116 ROIT001

Project: Client ID:

# **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

EF1-10/S

Client Sample ID: Sample ID: Matrix: Collect Date:

245517017 Ground Water 30-DEC-09 09:15

Receive Date: Collector:

25-JAN-10

Client

	Concetor.		Chem								
Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Alpha Spec Analys	is										
Alphaspec U, Liquid "As	Received"										
Pct Uranium-235	U	1,11				percent		MXE1 02/15/10	1156 94	17744	1
Uranium-233/234		1.26	+/-0.622	0.240	1.00	pCi/L					
Uranium-235/236	U	0.0751	+/-0.199	0.474	1.00	pCi/L					
Uranium-238		1.04	+/-0.565	0.240	1.00	pCi/L					
Rad Gas Flow Proportion	onal Counting						,				
GFPC, Gross A/B, liquid	"As Received"				* .						
Alpha	U	3.62	+/-2.89	4.17	5.00	pCi/L		DXF3 02/11/10	1933 94	15896	2
Beta		5.59	+/-2.48	3.47	5.00	pCi/L					

The following Analytical Methods were performed

Method	Description Description	Analyst Comments	
1	DOE EML HASL-300, U-02-RC Modified		

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Liquid "As Received"			94.9	(15%-125%)

Report Date: February 17, 2010

ROIT00116 ROIT001

Project: Client ID:

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

# **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

MW393 S

245517018

Client Sample ID: Sample ID: Matrix: Collect Date:

Ground Water

13-JAN-10 12:15 25-JAN-10

Receive Date: Collector:

Client

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Alpha Spec Analysis	· · · · · · · · · · · · · · · · · · ·	-									
Alphaspec U, Liquid "As Re	eceived"										
Pct Uranium-235		1.24				percent		MXE1 02/09/10	1349 9	47744	1
Uranium-233/234		15.5	+/-2.18	0.240	1.00	pCi/L					
Uranium-235/236		0.989	+/-0.613	0.297	1.00	pCi/L					
Uranium-238		12.2	+/-1.94	0.384	1.00	pCi/L					
Rad Gas Flow Proportion	al Counting								,		
GFPC, Gross A/B, liquid "A	As Received"										
Alpha		17.4	+/-4.94	4.79	5.00	pCi/L		DXF3 02/11/10	1933 9	45896	2
Beta		7.90	+/-2.94	4.30	5.00	pCi/L		•			
GFPC, Ra228, Liquid "As I	Received"					•					
Radium-228	U	0.948	+/-0.827	1.31	3.00	pCi/L		JXC5 02/01/10	0723 9	45895	3
Rad Radium-226				,		1					
Lucas Cell, Ra226, liquid "	'As Received"								•		
Radium-226	U	0.125	+/-0.163	0.276	1.00	pCi/L		KSD1 02/10/10	1440 9	48312	4

Method	Description	Analyst Comments	
1	DOE EML HASL-300, U-02-RC Modified		
2	EPA 900.0		
3	EPA 904.0/SW846 9320 Modified		
4	EPA 903.1 Modified		

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Liquid "As Received"			95.4	(15%-125%)
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			82.0	(15%-125%)

Report Date: February 17, 2010

ROIT00116 ROIT001

Project: Client ID:

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# **Certificate of Analysis**

Company: Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact: -

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: Sample ID: Matrix:

MW393 D 245517019

Collect Date: Receive Date: Ground Water 13-JAN-10 13:25 25-JAN-10

Collector:

	Conector.		Chent					
Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF AnalystDate Time I	Batch Method
Rad Alpha Spec Analy	sis							
Alphaspec U, Liquid "A.	s Received"							
Pct Uranium-235	U	0.734				percent	MXE1 02/09/10 0923 94	7744 1
Uranium-233/234		0.673	+/-0.387	0.173	1.00	pCi/L		
Uranium-235/236	U	0.020	+/-0.152	0.437	1.00	pCi/L		
Uranium-238		0.421	+/-0.324	0.353	1.00	pCi/L		
<b>Rad Gas Flow Proport</b>	ional Counting					•		•
GFPC, Gross A/B, liqui	d "As Received"							
Alpha	U	1.45	+/-2.34	4.18	5.00	pCi/L	DXF3 02/11/10 1933 94	5896 2
Beta		8.47	+/-2.44	2.99	5.00	pCi/L		
GFPC, Ra228, Liquid "A	As Received"					•		
Radium-228	U	1.80	+/-1.23	1.87	3.00	pCi/L	JXC5 02/01/10 0723 94:	5895 3
Rad Radium-226						r - ·		
Lucas Cell, Ra226, liqui	id "As Received"							
Radium-226		0.689	+/-0.267	0.265	1.00	pCi/L	KSD1 02/10/10 1440 94	8312 4

Method	Description	Analyst Comments					
1	DOE EML HASL-300, U-02-RC Modified						
2	EPA 900.0		•				
3	EPA 904.0/SW846 9320 Modified						
4	EPA 903.1 Modified						

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Liquid "As Received"			110	(15%-125%)
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			63.0	(15%-125%)

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Report Date: February 17, 2010

ROIT00116 ROIT001

Project: Client ID:

# **Certificate of Analysis**

Company: Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: Sample ID:

MW388 S 245517020

Matrix: Collect Date:

Ground Water 13-JAN-10 10:20 25-JAN-10

Receive Date: Collector:

Client

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Alpha Spec Analysis		******						***************************************			
Alphaspec U, Liquid "As Rec	eived"					•					
Pct Uranium-235	U	0.00				percent		MXE1 02/09/10	0923 9	47744	1
Uranium-233/234		1.62	+/-0.605	0.319	1.00	pCi/L					
Uranium-235/236	U	0.00	+/-0.140	0.214	1.00	pCi/L					
Uranium-238		0.908	+/-0.452	0.276	1.00	pCi/L					
Rad Gas Flow Proportional	Counting										
GFPC, Gross A/B, liquid "As	Received"		*.								
Alpha		15.2	+/-4.91	4.25	5.00	pCi/L		DXF3 02/11/10	1934 9	45896	2
Beta		35.8	+/-4.45	3.34	5.00	pCi/L					
GFPC, Ra228, Liquid "As Re	ceived"										
Radium-228		1.69	+/-1.02	1.50	3.00	pCi/L		JXC5 02/01/10	0724 9	45895	3
Rad Radium-226						F				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	-
Lucas Cell, Ra226, liquid "A.	s Received"										
Radium-226		0.908	+/-0.327	0.347	1.00	pCi/L		KSD1 02/10/10	1440 9	48312	4

Method	Description	Analyst Comments	, , , , , , , , , , , , , , , , , , , ,
1	DOE EML HASL-300, U-02-RC Modified		
2	EPA 900.0		
3	EPA 904.0/SW846 9320 Modified		

EPA 903.1 Modified

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Liquid "As Received"			103	(15%-125%)
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			80.5	(15%-125%)

Report Date: February 17, 2010

ROIT00116 ROIT001

Project: Client ID:

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# **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: Sample ID: Matrix:

MW381 D 245517021

Collect Date:

Ground Water

Receive Date: Collector:

13-JAN-10 16:00 25-JAN-10

Client

			Chent								
Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Alpha Spec Analy	/sis								····		
Alphaspec U, Liquid "A	s Received"										
Pct Uranium-235	U	4.58				percent		JXD2 02/07/10	1001 94	9027	1
Uranium-233/234		0.733	+/-0.450	0.336	1.00	pCi/L					
Uranium-235/236	U	0.173	+/-0.240	0.260	1.00	pCi/L					
Uranium-238		0.560	+/-0.388	0.210	1.00	pCi/L					
Rad Gas Flow Proport	tional Counting					_					
GFPC, Gross A/B, liqui	id "As Received"										
Alpha		4.11	+/-2.93	3.97	5.00	pCi/L		DXF3 02/11/10	1934 94	5896	2
Beta	Ū	0.825	+/-1.58	2.76	5.00	pCi/L					
GFPC, Ra228, Liquid "	'As Received"					-					
Radium-228	U	0.785	+/-0.984	1.67	3.00	pCi/L		JXC5 02/01/10	0724 94	5895	3
Rad Radium-226											
Lucas Cell, Ra226, liqu	id "As Received"										
Radium-226	,	1.51	+/-0.407	0.371	1.00	pCi/L		KSD1 02/10/10	1545 94	8312	4

Method	Description Description	Analyst Comments	
1	DOE EML HASL-300, U-02-RC Modified		
2	EPA 900.0		
3	EPA 904.0/SW846 9320 Modified		
4	EPA 903.1 Modified		

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Liquid "As Received"	•		108	(15%-125%)
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			77.0	(15%-125%)

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## **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID:

U

Sample ID:

Matrix: Collect Date:

Receive Date:

Collector:

EF1-4S-D 245517022

Ground Water

29-DEC-09 08:45 25-JAN-10

Uncertainty

Client

**Parameter** Qualifier Result **Rad Gas Flow Proportional Counting** 

GFPC, Gross A/B, liquid "As Received"

Beta

0.592 2.48

+/-2.04 3.96 +/-1.81 2.79

DL

5.00 5.00

RL

DXF3 02/11/10 1934 945896

Time Batch Method

Report Date: February 17, 2010

ROIT00116

AnalystDate

ROIT001

Project:

Units

pCi/L

pCi/L

**Analyst Comments** 

Client ID:

DF

The following Analytical Methods were performed

Method Description

1



2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

**QC Summary** 

Report Date: February 17, 2010

Page 1 of 6

Detroit Edison - Fermi 1 PO Box 44440 Detroit, Michigan

Contact:

Mr. Tom Mow

Workorder:

245517

Parmname			NOM		Sample	Qual	QC	Units	RPD%	REC%	Range Anlst	Date Time
Rad Alpha Spec												
Batch 94	7744											
QC1202030213	245517001	DUP	•		- 0						(77.4	
Pct Uranium-235				U	-3.8	U	-2.69	percent			MXE1	02/09/10 09:23
Uranium-233/234				U	-0.0389	U	0.0111	pCi/L	0.00		N/A	
					+/-0.154		+/-0.126					
Uranium-235/236				U	-0.0453	U	-0.018	pCi/L	0.00		N/A	
					+/-0.196		+/-0.152	<i>a: n</i>			27/1	
Uranium-238				U	0.193	U	0.107	pCi/L	. 0.00		N/A	
QC1202030215	LCS				+/-0.264		+/-0.171	•				
Pct Uranium-235	LCS						0.702	percent				02/09/10 09:23
Uranium-233/234						,	24.4	pCi/L				
Orania 233/23 (							+/-2.40	POLL				
Uranium-235/236							1.13	pCi/L				
<b>01</b>			1 4.				+/-0.574	F				
Uranium-238	•		25.9				25.0	pCi/L		96.5	(75%-125%)	
<b></b>							+/-2.42	<b>.</b>			(,	
QC1202030212	MB		•									
Pct Uranium-235						U	8.77	percent				02/09/10 09:23
Uranium-233/234						U	0.0104	pCi/L				
							+/-0.123					
Uranium-235/236						U	-0.0176	pCi/L				
							+/-0.148					
Uranium-238						U	-0.0286	pCi/L				
							+/-0.123					
QC1202030214	245517001	MS		* *	2.0		0.047					02/00/10 00:22
Pct Uranium-235	•			U	-3.8		0.847	percent				02/09/10 09:23
Uranium-233/234				U	-0.0389 +/-0.154		26.5	pCi/L				
II 225/226				U			+/-2.71	-C:/I				
Uranium-235/236				U	-0.0453		1.56	pCi/L			•	
Harrison 229			25.9	U	+/-0.196 0.193		+/-0.744 28.4	-C:/I		110	(75%-125%)	
Uranium-238			23.9	U	+/-0.264		+/-2.82	pCi/L		110	(7370-12370)	
Batch 94	9025				T/-U.2U4		T/-2.02					
		DIID										
QC1202033221 Plutonium-238	245517006	DUP		υ	0.00	U	-0.0303	pCi/L	0.00		N/A IXD2	02/09/10 09:23
Flutoillulli-236				U	+/-0.141	U	+/-0.156	pent	0.00		NA JADZ	02/09/10 09:23
Plutonium-239/24	ın			· U	-0.0518	U	-0.066	pCi/L	0.00		N/A	
1 Iutomani-257/29				Ü	+/-0.153	J	+/-0.149	PCIIL	0.00		*****	
Plutonium-244				U	0.00	U	0.0357	pCi/L	0.00		N/A	
ratomani 244				Č	+/-0.141	Ü	+/-0.142	PC#L	0.00		1.41.1	
QC1202033223	LCS				5.1.11							,
Plutonium-238						U	-0.168	pCi/L			(75%-125%)	02/07/10 09:43

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## **QC Summary**

		7.	$c_{o}$	illilliai y	<u>′</u> _					
Workorder: 245517  Parmname  Rad Alpha Spec  Parch 949025								Page 2		,
Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Alpha Spec Batch 949025										
				+/-0.227						
Plutonium-239/240	22.7			22.0 +/-2.36	pCi/L		96.8	(75%-125%)	JXD2	02/07/10 09:43
Plutonium-244			U	0.182 +/-0.225	pCi/L			(75%-125%)	)	
QC1202033220 MB				17-0.225				•		
Plutonium-238			U	0.119 +/-0.189	pCi/L					02/09/10 09:23
Plutonium-239/240			U	-0.0162 +/-0.136	pCi/L					
Plutonium-244			U	0.0674	pCi/L					
QC1202033222 245517006 MS				17-0.132						
Plutonium-238	U	0.00 +/-0.141		0.176 +/-0.199	pCi/L			(75%-125%)	)	02/07/10 10:03
Plutonium-239/240	22.7 U			20.8 +/-2.17	pCi/L		91.8	(75%-125%)	)	
Plutonium-244	U		U	0.117	pCi/L			(75%-125%)	)	
Batch 949027		T/-U.141		T/-0.103						
QC1202033229 245517021 DUP										
Pct Uranium-235	U	4.58	U	4.86	percent				JXD2	02/07/10 10:01
Uranium-233/234		0.733 +/-0.450	U	0.316 +/-0.303	pCi/L	73.4		(0% - 100%)	)	
Uranium-235/236	U		U	0.0875 +/-0.171	pCi/L	0.00		N/A	A	
Uranium-238		0.560 +/-0.388	U	0.266	pCi/L	49.1		(0% - 100%)	)	
QC1202033231 LCS Pct Uranium-235		47-0.500		0.654	percent					02/07/10 10:01
Uranium-233/234				24.8	pCi/L					02/07/10 10:01
Oranian 200720				+/-2.78	PCLL					
Uranium-235/236				1.10	pCi/L	·				
Uranium-238	25.9			+/-0.653	pCi/L		101	(75%-125%)	)	
QC1202033228 MB				+/-2.85						
Pct Uranium-235			U	99.9	percent					02/07/10 10:01
Uranium-233/234			U	0.185	pCi/L					
Uranium-235/236			U	+/-0.271 0.101	pCi/L					
Uranium-238			U	+/-0.198 0.00	pCi/L					•
QC1202033230 245517021 MS				+/-0.160						

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## **QC Summary**

Workorder: 245517								Page 3	of 6	
Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anist	Date Time
Rad Alpha Spec										
Batch 949027										
Pct Uranium-235	Ţ	U 4.58		0.936	percent					02/07/10 10:01
Uranium-233/234		0.733		23.4	pCi/L				JXD2	
•		+/-0.450		+/-2.56						
Uranium-235/236	ŧ	U 0.173		1.53	pCi/L					
		+/-0.240		+/-0.726					_	
Uranium-238	25.9	0.560		25.2	pCi/L		94.8	(75%-125%	)	
Rad Gas Flow		+/-0.388		+/-2.65			•		•	
Batch 945895										
QC1202026031 245517001 DUP.										
Radium-228	τ	U 0.845	· U	1.04	pCi/L	0.00		N/	A JXC5	02/01/10 07:24
		+/-0.845		+/-1.04	•					
QC1202026033 LCS										
Radium-228	25.6			29.7	pCi/L		116	(75%-125%	) `	02/01/10 07:24
QC1202026030 MB				+/-2.86						
Radium-228			U	0.808	pCi/L					02/01/10 07:24
				+/-1.06	•					
QC1202026032 245517001 MS										
Radium-228	77.0	U 0.845		80.1	pCi/L		104	(75%-125%	)	02/01/10 07:24
Batch 945896		+/-0.845		+/-7.69						
QC1202026035 245517003 DUP Alpha	1	U 1.19	U	2.05	pCi/L	0.00		N/	A DXF3	02/11/10 19:31
·	•	+/-2.12	O	+/-2.48	реид	0.00		14		02/11/10 19.51
Beta		4.58	U	1.59	pCi/L	97.0		(0% - 100%	)	
		+/-2.09		+/-1.73						
QC1202026038 LCS	106			150	C): //		110	/55% 105%		00/11/10 10 21
Alpha	126			150	pCi/L		119	(75%-125%	)	02/11/10 19:31
Beta	385			+/-13.6 414	pCi/L		107	(75%-125%	,	
Beta	303			+/-16.0	pcuL		107	(1370-12370	,	
QC1202026034 MB				17 10.0						
Alpha			U	-0.46	pCi/L					02/11/10 19:31
·				+/-1.63						
Beta			U	0.620	pCi/L					•
QC1202026036 245517003 MS				+/-2.08						
Alpha	252	U 1.19		290	pCi/L		115	(75%-125%	)	02/11/10 19:35
		+/-2.12		+/-32.5	r			(	<b>'</b> ,	
Beta	770	4.58		854	pCi/L		110	(75%-125%	) .	
		+/-2.09		+/-34.0						
QC1202026037 245517003 MSD	252 1	U 1.10		204	~C:#	2.00	112	(001 200	`	00/11/10 10:21
Alpha	252	U 1.19 +/-2.12		284 +/-34.6	pCi/L	2.00	113	(0%-20%	,	02/11/10 19:31
Beta	770	4.58		873	pCi/L	2.20	113	(0%-20%	)	
Deta .	770	7.50		075	PCHL	4.40	113	(0.70-20.70	,	

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## **QC Summary**

		<u> </u>	c s t	iiiiiiiai <u>y</u>					
Workorder: 245517								Page 4 of 6	
Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range Anlst	Date Time
Rad Gas Flow Batch 945896	•								
		+/-2.09		+/-34.7					
Batch 945898									
QC1202026045 245518001 DUP	,	0.500			O. 7	0.00			
Alpha	U		U	1.37	pCi/L	0.00		N/A DXBS	02/05/10 14:41
Beta	U	+/-1.03 1.84	U	+/-1.38 1.66	pCi/L	0.00		N/A	
Deta .		+/-1.45	U	+/-1.63	pcirc	0.00		IVA	
QC1202026048 LCS	·	47-1.43		47-1.03			•		
Alpha	84.0			102	pCi/L		121	(75%-125%)	02/05/10 14:41
	•			+/-9.34				•	
Beta	257	1		260	pCi/L		101	(75%-125%)	
				+/-10.5					
QC1202026044 MB			U	0.174	ъC:Л				02/05/10 19:26
Alpha			U	+/-0.955	pCi/L				02/03/10 19.20
Beta			U	-0.914	pCi/L				.*
2000		-	•	+/-0.771	P				
QC1202026046 245518001 MS									
Alpha	252 U			290	pCi/L		115	(75%-125%)	02/05/10 14:40
		+/-1.03		+/-27.1					
Beta	770 U			837	pCi/L	*	109	(75%-125%)	
QC1202026047 245518001 MSD		+/-1.45		+/-32.1					
Alpha	252 U	0.509		291	pCi/L	0.277	115	(0%-20%)	02/05/10 14:40
•		+/-1.03		+/-27.1	•				
Beta	770 U	1.84		829	pCi/L	0.964	108	(0%-20%)	
		+/-1.45		+/-32.1					
Batch 946221									
QC1202026703 245517006 'DUP									
Strontium-89	Ŭ		U	0.218	pCi/L	0.00		N/A JXRI	02/03/10 10:34
	**	+/-0.959		+/-0.930	0:11	0.00		27/4	
Strontium-90	U	-0.341 +/-0.603	U	0.339 +/-0.710	pCi/L	0.00		N/A	
QC1202026705 LCS		+/-0.003		+/-0./10					
Strontium-89	7160			7620	pCi/L	•	106	(75%-125%)	02/03/10 10:34
				+/-53.7	-			•	
Strontium-90	482			526	pCi/L		109	(75%-125%)	l
				+/-12.0					ı
QC1202026702 MB			11	171	ъС:Л				02/02/10 10:24
Strontium-89			U	-1.71 +/-0.412	pCi/L				02/03/10 10:34
Strontium-90			U	-0.959	pCi/L				
Saomun 70			J	+/-0.599	PUIL				
QC1202026704 245517006 MS									
Strontium-89	18200 U			16300	pCi/L		89.9	(75%-125%)	02/03/10 10:34
		+/-0.959		+/-117					

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## **QC Summary**

Workorder: 245517 Page 5 of 6 Parmname NOM Sample Qual QC Units RPD% REC% Range Anlst Date Time Rad Gas Flow Batch 946221 Strontium-90 964 U -0.341 857 pCi/L 88.8 (75% - 125%)+/-0.603 +/-19.7 Rad Ra-226 Batch 948312 QC1202031479 245517001 DUP Radium-226 0.832 1.07 pCi/L 24.6 (0% - 100%) KSD1 02/10/10 15:45 +/-0.317 +/-0.316 QC1202031481 LCS Radium-226 24.2 21.3 pCi/L 88.1 02/10/10 15:45 (75%-125%) +/-1.51 QC1202031478 MB Radium-226 Ú 0.287 pCi/L 02/10/10 15:45 +/-0.220 OC1202031480 245517001 MS Radium-226 121 0.832 114 pCi/L 93.5 (75% - 125%)02/10/10 15:45 +/-0.317 +/-6.94

#### Notes:

The Qualifiers in this report are defined as follows:

- \*\* Analyte is a surrogate compound
- < Result is less than value reported
- > Result is greater than value reported
- A The TIC is a suspected aldol-condensation product
- B For General Chemistry and Organic analysis the target analyte was detected in the associated blank.
- BD Results are either below the MDC or tracer recovery is low
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of the sample
- F Estimated Value
- H Analytical holding time was exceeded
- J Value is estimated
- M M if above MDC and less than LLD
- M Matrix Related Failure
- N/A RPD or %Recovery limits do not apply.
- ND Analyte concentration is not detected above the detection limit
- NJ Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- R Sample results are rejected
- U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.
- UI Gamma Spectroscopy--Uncertain identification
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

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## **QC Summary**

Workorder: 245517

Parmname NOM Sample Qual QC Units RPD% REC% Range Anlst Date Time

- Y QC Samples were not spiked with this compound
- ^ RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.
- h Preparation or preservation holding time was exceeded

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

\* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.







PO Box 30712 Charleston, SC 29417 2040 Savage Road Charleston, SC 29407

P 843,556.8171 F 843,766,1178

www.gel.com

May 03, 2010

Mr. Tom Mow Detroit Edison - Fermi 1 PO Box 44440 Detroit, Michigan 48244

Re: Fermi 1 - PO# 4700246055

Work Order: 250814

Dear Mr. Mow:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on April 09, 2010. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4297.

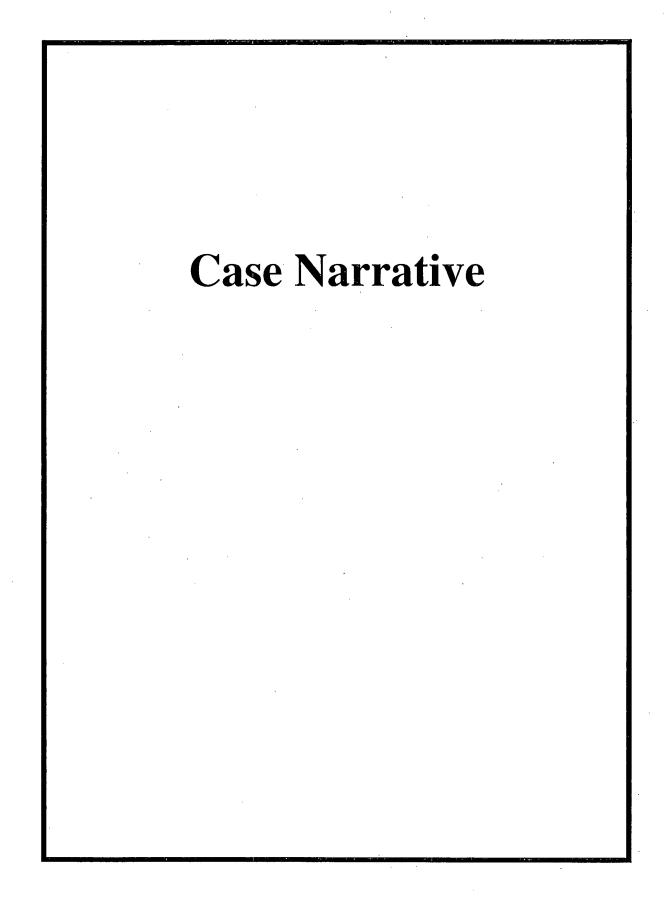
Sincerely,

Amanda Rasco Project Manager

Purchase Order: 4700246055 Enclosures

## Table of Contents

Case Narrative	1
Chain of Custody	3
Radiological Analysis	10
Sample Data Summary	
Quality Control Data	25



#### Case Narrative for Detroit Edison Company SDG: 250814

#### May 03, 2010

#### **Laboratory Identification:**

GEL Laboratories LLC 2040 Savage Road Charleston, South Carolina 29407 (843) 556-8171

#### **Summary**

Sample Receipt The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on April 09, 2010 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Sample Identification The laboratory received the following samples:

<u>Laboratory ID</u>	Client ID
250814001	MW393 (S) Duplicate
250814002	MW393 (D)
250814003	MW381 (S)
250814004	MW388 (S)
250814005	MW393 (S)
250814006	GW-4

#### Case Narrative

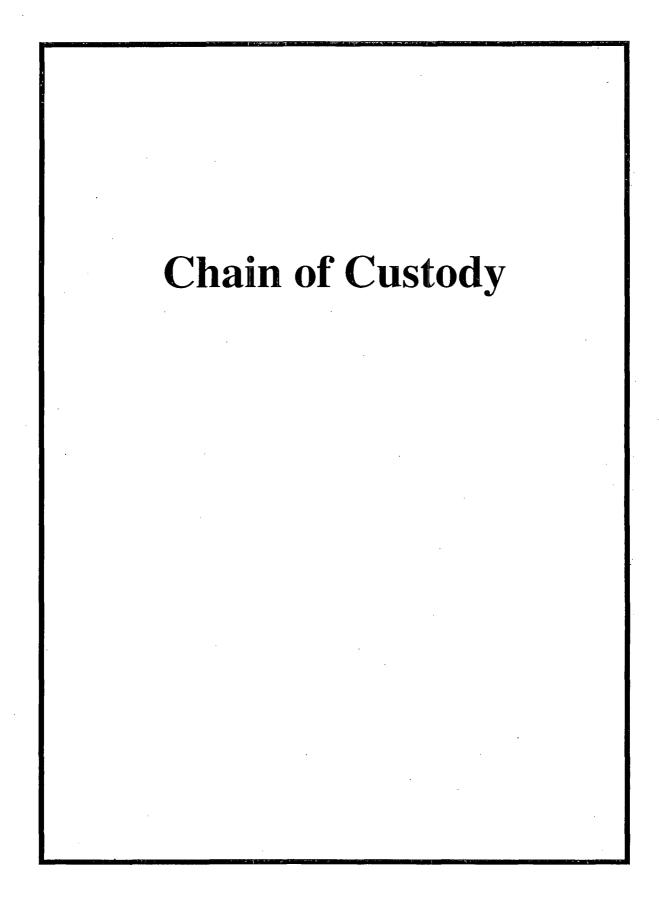
Sample analyses were conducted using methodology as outlined in GEL Laboratories, LLC (GEL) Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

#### Data Package

The enclosed data package contains the following sections: General Narrative, Chain of Custody and Supporting Documentation, and data from the following fractions: Radiochemistry.

Amanda Rasco

Project Manager



Page: of	GEL W	GEL Ch		Cus	stody		d A1		•	cal	R	equ	est		1	2040 Charl Phon	Savag leston, e: (84:	ge Roa , SC 2	9407 5-8171	
Client Name: DTE ENER9	y		Phone #: 7	734 -5	586-5	<i>334</i>			Sam	ple A	naly	sis Re	quest	ed <sup>(5)</sup>	(Fill i	in the	e num	ber o	f conta	iners for each test)
Project/Site Name: Ferni -			Fax #:				Should	this	iners	NI	NI	NI								< Preservative Type (6
Address: 6400 North D	ixie Hw	Y, Newpo	ort, M	ich	48,	166	conside	red:	fconta	m	. 0									Comments
Collected by: THOMAS MOW	Send Resi	ults To: Mow t	O DIE	ENE	rgy	.com		FSCA Regulated	ber o	311	226	20			-					Note: extra sample is
*Pate Collected Collected Collected Collected (Milliary) (hhmm)  *For composites - Indicate start and stop date/time  *Date Collected (Milliary) (hlmm)  *Time Collected (Milliary) (nlmin)  QC Code Field (Matrix 4)									Total number of containers	Vraniu	RAZ	RAZ		_						required for sample specific QC
*MW393(5) Duplic	Ate	4-1-10	15:50	FD	Y	GW	Radiosctive		1	X	X	×								
MW393(D)		4-1-10	10:40	N	Y	6W			1	×	X	X								
						-						-		•						
						-													<del>                                     </del>	
<u> </u>		<del> </del>																		·
TAT Requested: Normal: Rush:	Specify:	(Subject to Surcha	rge) Fax Re	sults:	Yes	/	No		Cir	cle De	elivera	ıble: C	of A	/ 00	C Sum	mary	/ L	evel 1	/ Le	evel 2 / Level 3 / Level 4
Remarks: Are there any known hazard	ds applicable i	o these samples	? If so, ple	ase list	the haz	ards												Sam Eas Cer		lection Time Zone Pacific Other
		ody Signatures			F.'								Sam	ple Sh	ippin	ng an	d De	livery	Detai	ils
Relinquished By (Signed) Date  1-8-10	Time /6.'00	Received by (si	gnea)	)ate 11   9	Time	08	AX	GEL I								D-4-	Shipp	- 1.		
7-8-10	, , , , ,	1, 1		-11-	110	00		vietnoc Airbill		upmen	1:				1	Date	<u> эшрр</u>	ea:		
3		3			·			Airbill			•									
1.) Chain of Custody Number = Client Determined 2.) QC Codes: N = Normal Sample, TB = Trip Blank, FB	D = Field Duplicate. I	EB = Equipment Blank.	MS = Matrix S	pike Samp	le, MSD =	Matrix Spil		-		≈ Grab,	. C = C	omposite	:						1	For Lab Receiving Use Only
3.) Field Filtered: For liquid matrices, indicate with a - Y 4.) Matrix Codes: DW=Drinking Water, GW=Groundwa	- for yes the sample	was field filtered or - N	- for sample wa	s not field	filtered.									F=Fees	i N=N=	ลรลโ				Cysiolty Seal Intact? YES NO
4.) Matrix Codes: DW=Drinking Water, GW=Groundwa										, 11		aripe, u	Gine,	2	, ,,-,40				ļ	Cooler Temp:

WHITE = LABORATORY

YELLOW = FILE

6.) Preservative Type: HA = Hydrochloric Acid, NI = Nitric Acid, SH = Sodium Hydroxide. SA = Sulfuric Acid, AA = Ascorbic Acid, HX = Hexane, ST = Sodium Thiosulfate, If no preservative is added = leave field blank

PINK = CLIENT

rage: of	GEL Ch	ain of	Cus	stody	and			lyti	ical	Re	equ	est			2040 Charl Phone	Savag eston,	ge Roa SC 29 3) 556	9407 -8171	
Client Name: DTE ENERGY		Phone #: 7	34-5	86-5.	334			San	nple A	naly	sis Re	quest	ed <sup>(5)</sup>	(Fill	in the	num	ber of	f conta	iners for each test)
Project/Site Name: FERM! - 1		Fax #:					d this	iners	NI	NI	NI								< Preservative Type (
Address: 6400 North Dixie Hu	, NEWA	ort, n	tich	481	66		le be	conta			_								
Collected by: THomps MOW Send Resul							ated	ber of	1010	77	228		*						Comments Note: extra sample
Sample ID * For composites - indicate start and stop date/time	*Date Collected (mm-dd-yy)	*Time Collected (Military) (hhmm)	QC Code	Field Filtered <sup>(3)</sup>	Sample Matrix (4)		TSCA Regulated	Total number of containers	Uranium	602	N N								required for sample specific QC
MW381(S)	4-6-10	13:45	Ν	Y.	6W			1	X	X	X								
																			<u> </u>
		ļ <u>.</u>		ļ		_	ļ												
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		<u> </u>	<u></u>	<u> </u>	L	<u> </u>	<u> </u>		L										
TAT Requested: Normal: Rush: Specify:  Remarks: Are there any known hazards applicable to	(Subject to Surcha these samples			Yes the haz		No	)	Ci	rcle D	elivera	ble: C	of A	/_Q	C Sum	mary	/ Le	Samp East Cen	le Coll ern	vel 2 / Level 3 / Level ection Time Zone Pacific Other

Chain of Custody Signatures

Relinquished By (Signed)

Date

Time

Received by (signed)

Time

GEL PM:

Method of Shipment:

Date Shipped:

Airbill #:

1.) Chain of Custody Number = Client Determined

5.) Sample Analysis Requested: Analytical method requested (i.e. 8260B, 6010B/7470A) and number of containers provided for each (i.e. 8260B - 3, 6010B/7470A - 1).

Airbill #:

For Lab Receiving Use Only

Sustady Seal Intact?

YES NO

Coqler Temp:

C

<sup>2.)</sup> QC Codes: N = Normal Sample, TB = Trip Blank, FD = Field Duplicate, EB = Equipment Blank, MS = Matrix Spike Sample, MSD = Matrix Spike Duplicate Sample, G = Grab, C = Composite

<sup>3.)</sup> Field Filtered: For liquid matrices, indicate with a - Y - for yes the sample was field filtered or - N - for sample was not field filtered.

<sup>4.)</sup> Matrix Codes: DW=Drinking Water, GW=Groundwater, SW=Surface Water, WW=Waste Water, W=Water, SD=Soil, SD=Sediment, SL=Studge, SS=Solid Waste, O=Oil, F=Filter, P=Wipe, U=Urine, F=Fecal, N=Nasal

<sup>6.)</sup> Preservative Type: HA = Hydrochloric Acid, NI = Nitric Acid, SH = Sodium Hydroxide, SA = Sulfuric Acid, AA = Ascorbic Acid, HX = Hexane, ST = Sodium Thiosulfate, If no preservative is added = leave field blank

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Page: of Project #:	GEL Ch	ain of	Cu	etady	v and	a A	ma	1274	امما	D	.~	004		1			s, LLC	
GEL Quote #:		ain vi	Cui	sivu	y air	u A	llia	ıy t	icai	i IX	cyu	est		1	Sava; leston	-		
GEL Quote #: COC Number (1):	CEL Work Onder No.	- <b>L</b>			^		11							1			5-8171	
PO Number:	GEL Work Order Nur	nder:			2	201	814							l	(843)			
Client Name: DTE ENER	94	.Phone #:	734-	586-5	5334			San	nple A	Analy:	sis Red	uested (	5) (Fill	in th	e num	ber o	f conta	iners for each test)
Project/Site Name: FERMi - 1		Fax #:					ıld this	iners	NI	NI	NI							< Preservative Type (6)
Address: 6400 North Dixie	Hw), Newport.	Mich	48	166			ple be idered:		_									
Collected by: THOMAS MOW					·com	,	P		'ANIUM	26	20							Comments Note: extra sample is
	*Date Collected	*Time	<u> </u>	T	T		gula	l i	3	1	4	1						required for sample
Sample ID  * For composites - indicate start and stop dat		Collected (Military) (hhmm)	QC Code	Filtered ()	Sample Matrix (4)		TSCA Regulated	Total number	1	RA	8							specific QC
MW388(5)	4-6-10	11:20	N	Y	6W			1	X	1	X							
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TAT Requested: Normal: Rush:	Specify: (Subject to Surch	rge) Fax Re	sults:	Yes	• /	N	0	Ci	rcle D	elivera	ble: C	of A / I	OC Sum	ımarv	· / [	evel 1		vel 2 / Level 3 / Level 4
Remarks: Are there any known hazards of								1	.0.0 2			0111	20 Buil	iiiaiy	,			ection Time Zone
																East		Pacific
			• •													Cen	itrai untain	Other
Ch	nain of Custody Signatures											Sample	Shippi	ng an	d Del			ls
Relinquished By (Signed) Date Tir	· / / / /		Date	Time			GEL	PM:										
Janes 48-10 /	6:00	1/2 4	119/1	U C	830	)	Metho	od of S	hipmen	ıt:		-		Date	Shipp	ed:	• • •	
2	2		1 1				Airbil	11 #:										
3	3						Airbil	11 #:								•		
1.) Chain of Custody Number = Client Determined 2.) QC Codes: N = Normal Sample, TB = Trip Blank, FD = F	Field Duplicate, EB = Fourpment Blank.	MS = Matrix Si	nike Samp	le, MSD =	Matrix Spil	ke Dupi			= Grab	. C = Cc	mnosite	~	•				F	or Lab Receiving Use Only
3.) Field Filtered: For liquid matrices, indicate with a • Y • fo 4.) Matrix Codes: DW=Drinking Water, GW=Groundwater,	r yes the sample was field filtered or - N	- for sample wa	s not field	filtered.								-1 leina E-C	ont Ni-1					Custody Seal Intact?
5.) Sample Analysis Requested: Analytical method requested	(i.e. 8260B, 6010B/7470A) and number	of containers pr	ovided for	r each (i.e.	8260B - <b>3</b> ,	6010B/	74701 .	- 1).										YES NO Cooler Temp:
6.) Preservative Type: HA = Hydrochloric Acid, NI = Nitric	Acid, SH = Sodium Hydroxide, SA = Su			: Acid, HX		ST = Sc	odium T		le If no			dded = leave	tield blar	nk				10 c

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Page: of	GEL Ch		Cu	stody	y an		. <b>na</b> 5081		ica	l Re	equ	iest			2040 Char Phon	Savag leston e: (84)	ge Roa , SC 2	9407 5-8171	
	9 9	Phone #:	734 -:	5 86 5	334			Sai	mple .	Analy	sis Re	quest	ed <sup>(5)</sup>						siners for each test)
Project/Site Name: FERM! - 1	· ·	Fax #:					ıld this	1 10	<del></del>	NI	Γ								< Preservative Type (6)
Address: 6400 North Dix		port 1	nich	481	11	1	ple be idered:	contai											
Collected by: THomas Mow						,	Fe .	ber of	100	226	228								Comments Note: extra sample is
Sample ID  * For composites - indicate start and stop do	*Date Collected  (mm-dd-yy)	*Time Collected (Military) (hhmm)	QC Code	Field Filtered (3	Sample Matrix (4)	Radioactive	TSCA Regulated	Total number of container	Vravion	8			·						required for sample specific QC
MW 393(S)	4-1-10	15:15	N	Y	600			1											
6w-4	4-6-10	09:30	N	Y	GW			,											
									1										
						1	<del> </del>		1.					_				<del>                                     </del>	
			<u> </u>			$\vdash$	$\vdash$	<del>                                     </del>	+	<u> </u>				<u>-</u>	-	$\vdash$	<del>                                     </del>	$\vdash$	
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		<del> </del>	-		-	}	-	-	┼	-	-							<del>                                     </del>	
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				ļ	ļ		<u> </u>												
·			<u> </u>																
TAT Requested: Normal: Rush:	Specify: (Subject to Surcha	rge) Fax Re	sults:	Yes	,	N N	0	C	ircle D	elivera	ble: (	Cof A	/ 00	Sum	marv	/ 1	evel 1	/ Ie	vel 2 / Level 3 / Level 4
Remarks: Are there any known hazards	applicable to these samples												<del>.</del>				Samp East Cen Mou	tern tral untain	ection Time Zone Pacific Other
	Chain of Custody Signatures  Received by Lsi		Date	Time						<del></del>		Sam	ple St	ippir	ng an	d Del	ivery	Detai	ls
Kemiquision 2) (Signo)		/7			N corion	_	GEL	PM:											
4-8-16/	16:00 1	16	4191	10 (	)83	<u>0</u>	Meth	od of S	Shipme	nt:					Date	Shipp	ed:		
2	2 /						Airbi	11 #:											
3	3						Airbi	11#:										<del>,</del>	
<ol> <li>Chain of Custody Number = Client Determined</li> <li>QC Codes: N = Normal Sample, TB = Trip Blank, FD =</li> <li>Field Filtered: For liquid matrices, indicate with a - Y -</li> <li>Matrix Codes: DW=Drinking Water, GW=Groundwater</li> <li>Sample Analysis Requested: Analytical method requests</li> <li>Preservative Type: HA = Hydrochloric Acid, NI = Nitric</li> </ol>	for yes the sample was field filtered or - N; SW=Surface Water, WW=Waste Water, ed (i.e. 8260B, 6010B/7470A) and number	<ul> <li>for sample wa</li> <li>W=Water, SO</li> <li>of containers p</li> </ul>	s not field =Soil, SD= rovided fo	filtered. Sediment, i r each (i.e.	SL=Sludge 82608 - 3,	e, SS=Se 6010B	olid Was /7470A	ste, O=( - 1).	Oil, <b>F</b> =F	ilter, P=	Wipe, U	J=Urine,		•				F	Custody Seal Intact? YES NO Cooler Temp:
	TE = LABORATORY			)W = FI						CLIE									

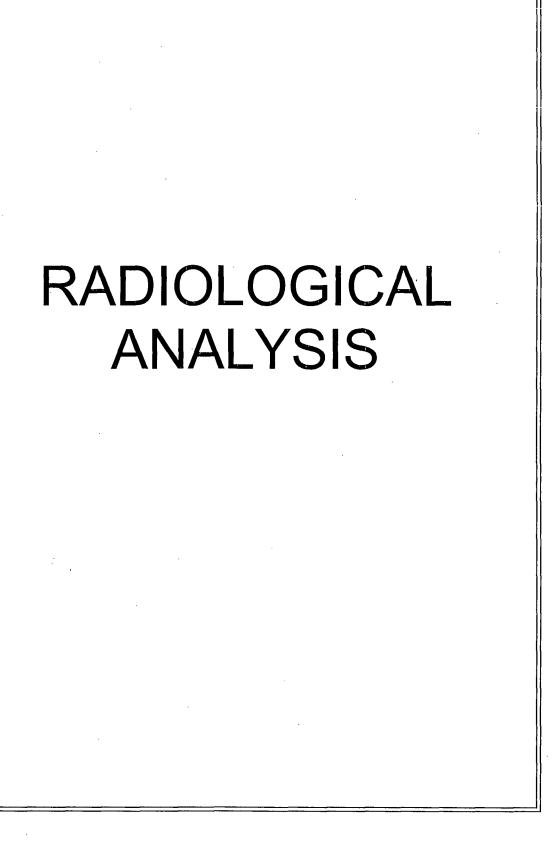


## SAMPLE RECEIPT & REVIEW FORM

	ived By: SL	т		14.7 ~	Date Received: 4910
Susp	ected Hazard Information	Yes	ž		Counts > x2 area background on samples not marked "radioactive", con- Radiation Safety Group of further investigation.
COC	/Samples marked as radioactive?		1		ximum Counts Observed*: 20 c/m
Class	ified Radioactive II or III by RSO?		1	1	
COC	/Samples marked containing PCBs?		1	1/	
Shipp	ed as a DOT Hazardous?		1	Haz	ard Class Shipped: UN#:
Samp	les identified as Foreign Soil?		V		
	Sample Receipt Criteria	Yes	NA NA	No	Comments/Qualifiers (Required for Non-Combraning Items)
1	Shipping containers received intact and sealed?	<b>✓</b>			Circle Applicable: seals broken damaged container leaking container other (describe)
2	Samples requiring cold preservation within $0 \le 6$ deg. C?		ý		ice bags blue ice dry ice none other (describe)
3	Chain of custody documents included with shipment?	/			
4	Sample containers intact and sealed?	/			Circle Applicable: seals broken damaged container leaking container other (describe)
5	Samples requiring chemical preservation at proper pH?	$\checkmark$			Sample ID's, containers affected and observed pH:  If Preservation added, Lot#:
6	VOA vials free of headspace (defined as < 6mm bubble)?		/		Sample ID's and containers affected:
7	Are Encore containers present?			<b>√</b>	off yes, immediately deliver to Volatiles laboratory)
8	Samples received within holding time?				Id's and tests affected:
9	Sample ID's on COC match ID's on bottles?	/			Sample ID's and containers affected:  Sample ID's affected:
10	Date & time on COC match date & time on bottles?		/		No date time on containers.
11	Number of containers received match number indicated on COC?	1			Sample ID's affected:
12	COC form is properly signed in relinquished/received sections?	<b>√</b>			
Com	ments: Fed 9 x 7957 530				·
	8723 II 7957 S3				
	7957 S				
	PM (or PMA) review: Init				1 Date 4 9 10

List of current GEL Certifications as of 03 May 2010

State	Certification				
Arizona	AZ0668				
Arkansas	88-0651				
CLIA	42D0904046				
California – NELAP	01151CA				
Colorado	GEL				
Connecticut	PH-0169				
Dept. of Navy	NFESC 413				
EPA Region 5	WG-15J				
Florida – NELAP	E87156				
Georgia	E87156 (FL/NELAP)				
Georgia DW	967				
Hawaii	N/A				
ISO 17025	2567.01				
Idaho	SC00012				
Illinois – NELAP	200029				
Indiana	C-SC-01				
Kansas – NELAP	E-10332				
Kentucky	90129				
Louisiana – NELAP	03046				
Maryland	270				
Massachusetts	M-SC012				
Nevada	SC00012				
New Jersey - NELAP	SC002				
New Mexico	FL NELAP E87156				
New York - NELAP	11501				
North Carolina	233				
North Carolina DW	45709				
Oklahoma	9904				
Pennsylvania – NELAP	68-00485				
South Carolina	10120001/10120002				
Tennessee	TN 02934				
Texas - NELAP	T104704235-07B-TX				
U.S. Dept. of Agriculture	S-52597				
Utah – NELAP	GEL				
Vermont	VT87156				
Virginia	00151				
Washington	C1641				



#### Radiochemistry Case Narrative Detroit Edison Company (ROIT) SDG 250814

#### Method/Analysis Information

Product: Alphaspec U, Liquid

Analytical Method: DOE EML HASL-300, U-02-RC Modified

Analytical Batch Number: 973991

Sample ID	Client ID
250814001	MW393 (S) Duplicate
250814002	MW393 (D)
250814003	MW381 (S)
250814004	MW388 (S)
250814005	MW393 (S)
250814006	GW-4
1202092556	Method Blank (MB)
1202092557	250814002(MW393 (D)) Sample Duplicate (DUP)
1202092558	250814002(MW393 (D)) Matrix Spike (MS)
1202092559	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP** Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-011 REV# 18.

#### **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met.

#### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

#### **Quality Control (QC) Information:**

#### Blank Information

The blank volume is representative of the sample volume in this batch.

#### Designated QC

The following sample was used for QC: 250814002 (MW393 (D)).

#### **QC** Information

All of the QC samples met the required acceptance limits.

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

Sample 250814001 (MW393 (S) Duplicate) was recounted due to a peak shift.

#### Miscellaneous Information:

#### Data Exception (DER) Documentation

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Manual Integration**

No manual integrations were performed on data in this batch.

#### **Additional Comments**

Additional comments were not required for this sample set.

#### **Qualifier** information

Manual qualifiers were not required.

#### Method/Analysis Information

Product: GFPC, Ra228, Liquid

Analytical Method: EPA 904.0/SW846 9320 Modified

Analytical Batch Number: 974116

Sample ID	Client ID
250814001	MW393 (S) Duplicate
250814002	MW393 (D)
250814003	MW381 (S)
250814004	MW388 (S)
250814005	MW393 (S)
250814006	GW-4
1202092902	Method Blank (MB)
1202092903	250820001(Mallards Effluent Grab) Sample Duplicate (DUP)
1202092904	250820001(Mallards Effluent Grab) Matrix Spike (MS)
1202092905	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-009 REV# 15.

#### Calibration Information:

#### **Calibration Information**

All initial and continuing calibration requirements have been met.

#### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

#### **Quality Control (QC) Information:**

#### Blank Information

The blank volume is representative of the sample volume in this batch.

#### **Designated QC**

The following sample was used for QC: 250820001 (Mallards Effluent Grab).

#### **QC** Information

All of the QC samples met the required acceptance limits.

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

#### **Chemical Recoveries**

All chemical recoveries meet the required acceptance limits for this sample set.

#### **Miscellaneous Information:**

#### Data Exception (DER) Documentation

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Additional Comments**

Additional comments were not required for this sample set.

#### **Qualifier information**

Manual qualifiers were not required.

#### Method/Analysis Information

Product: Lucas Cell, Ra226, liquid

Analytical Method: EPA 903.1 Modified

Analytical Batch Number: 974610

Sample ID	Client ID
250814001	MW393 (S) Duplicate
250814002	MW393 (D)
250814003	MW381 (S)
250814004	MW388 (S)
250814005	MW393 (S)
250814006	GW-4
1202094146	Method Blank (MB)
1202094147	250814002(MW393 (D)) Sample Duplicate (DUP)
1202094148	250814002(MW393 (D)) Matrix Spike (MS)
1202094149	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-008 REV# 13.

#### **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met.

#### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

#### **Quality Control (QC) Information:**

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### **Designated QC**

The following sample was used for QC: 250814002 (MW393 (D)).

#### QC Information

All of the QC samples met the required acceptance limits.

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

#### **Miscellaneous Information:**

#### Data Exception (DER) Documentation

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Additional Comments**

The blank result 1202094146 (MB) is greater than the MDC but less than the detection limit.

#### **Qualifier information**

Manual qualifiers were not required.

#### **Certification Statement**

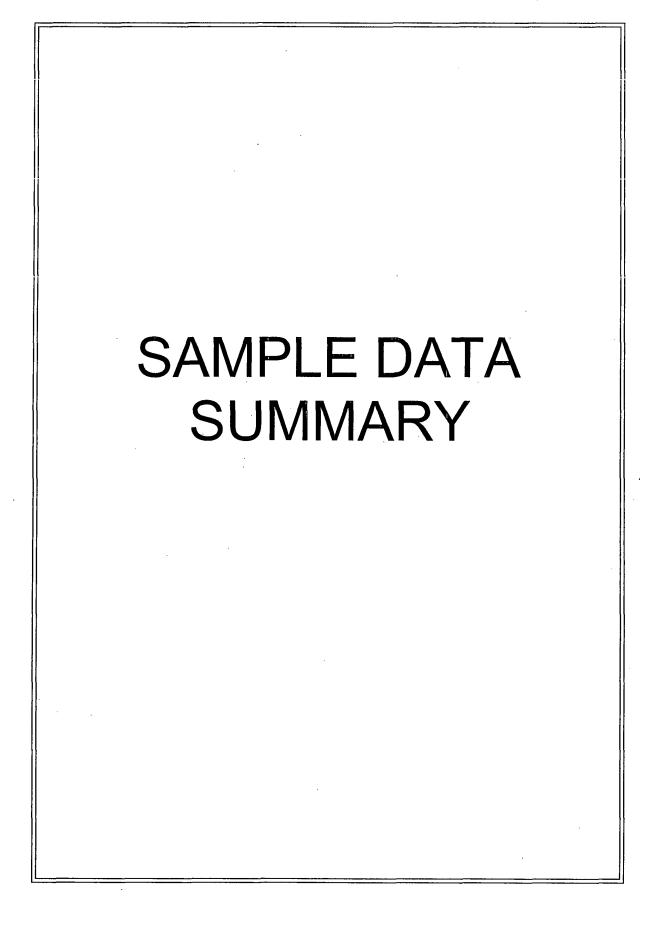
Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

#### **Review Validation:**

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

The following data validator verified the information presented in this case narrative:

Reviewer/Date:	fall Bbellatt	4 Z\$  <sub>10</sub>
110 / 10 / 10 / 10 / 10 / 10 / 10 / 10	•	



2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

# Certificate of Analysis Report for

ROIT001 Detroit Edison Company Client SDG: 250814 GEL Work Order: 250814

#### The Qualifiers in this report are defined as follows:

- \* A quality control analyte recovery is outside of specified acceptance criteria
- \*\* Analyte is a surrogate compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the RL or LOQ.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Amanda Rasco.

	KANSbell A	
Reviewed By:		

Report Date: April 27, 2010

ROIT00116 ROIT001

Project:

Client ID:

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## **Certificate of Analysis**

Company: Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Matrix: Collect Date: Receive Date:

Collector:

MW393 (S) Duplicate 250814001

Ground Water

01-APR-10 15:50 09-APR-10

Client Sample ID: Sample ID:

Client

			Chent								
Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Alpha Spec Analys	is										
Alphaspec U, Liquid "As	Received"										
Pct Uranium-235		1.46	•			percent		JXH2 04/17/10	1427 97	73991	1
Uranium-233/234		14.4	+/-1.99	0.471	1:00	pCi/L					
Uranium-235/236		1.13	+/-0.626	0.424	1.00	pCi/L					
Uranium-238		11.8	+/-1.81	0.471	1.00	pCi/L					
Rad Gas Flow Proporti	onal Counting										
GFPC, Ra228, Liquid "A	s Received"										
Radium-228	U	1.34	+/-1.26	2.02	3.00	pCi/L		JXC5 04/16/10	0842 97	4116	2
Rad Radium-226						•					
Lucas Cell, Ra226, liquid	l "As Received"								,		
Radium-226	U	0.0765	+/-0.150	0.282	1.00	pCi/L		KSD1 04/26/10	1450 97	4610	3

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	DOE EML HASL-300, U-02-RC Modified	

2

3

EPA 904.0/SW846 9320 Modified EPA 903.1 Modified

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Liquid "As Received"			85.1	(15%-125%)
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			73.9	(15%-125%)

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Report Date: April 27, 2010

ROIT00116 ROIT001

Project:

Client ID:

## **Certificate of Analysis**

Company: Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: Sample ID:

MW393 (D)

250814002

Matrix: Collect Date: Ground Water 01-APR-10 10:40

Receive Date: Collector:

09-APR-10

Client

Parameter	Oualifier	Result	Uncertainty	DL	RL ·	Units	DE	A al-vetData	Time	D-4-h	M-41-2
<u>.</u>	Quanner		Oncertainty	DL	KL '	Units	DF	AnalystDate	1 mie	baten	Method
Rad Alpha Spec Analysis											
Alphaspec U, Liquid "As Rece	ived"							•			
Pct Uranium-235	U	2.69				percent		JXH2 04/15/10	0741 9	73991	1
Uranium-233/234		0.577	+/-0.436	0.440	1.00	pCi/L					
Uranium-235/236	U	0.0746	+/-0.198	0.471	1.00	pCi/L					
Uranium-238	U	0.419	+/-0.387	0.485	1.00	pCi/L					
Rad Gas Flow Proportional	Counting		•						•		
GFPC, Ra228, Liquid "As Rec	eived"										
Radium-228	U	1.02	+/-1.25	2.12	3.00	pCi/L		JXC5 04/16/10	0842 9	74116	2
Rad Radium-226						•					
Lucas Cell, Ra226, liquid "As	Received"			,							
Radium-226		1.05	+/-0.377	0.412	1.00	pCi/L		KSD1 04/26/10	1450 9	74610	3
						F			0		=

The following Analytical Methods were performed

Method	Description Description	Analyst Comments
1	DOE EML HASL-300, U-02-RC Modified	

2

EPA 904.0/SW846 9320 Modified

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Liquid "As Received"			91.1	(15%-125%)
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			76.4	(15%-125%)

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Report Date: April 27, 2010

ROIT00116 ROIT001

Project:

Client ID:

## **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: Sample ID:

MW381 (S) 250814003

Matrix: Collect Date: Receive Date:

Collector:

Ground Water 06-APR-10 13:45 09-APR-10

Client

Parameter	Qualifier	Result	Uncertainty	DL.	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Alpha Spec Analysis											
Alphaspec U, Liquid "As Reco	eived"					×					
Pct Uranium-235	U	0.222				percent		JXH2 04/15/10	0741 9	73991	1
Uranium-233/234		4.57	+/-1.13	0.345	1.00	pCi/L					
Uranium-235/236	U	0.0463	+/-0.184	0.493	1.00	pCi/L					
Uranium-238		3.24	+/-0.947	0.216	1.00	pCi/L					
<b>Rad Gas Flow Proportional</b>	Counting					•					
GFPC, Ra228, Liquid "As Re	ceived"										
Radium-228	U	-0.455	+/-1.38	2.77	3.00	pCi/L		JXC5 04/16/10	0842 9	74116	2
Rad Radium-226						•					
Lucas Cell, Ra226, liquid "As	Received"										
Radium-226		0.377	+/-0.236	0.316	1.00	pCi/L		KSD1 04/26/10	1450 9	74610	3

The following Analytical Methods were performed

Method	Description	Analyst Comments	
1	DOE EML HASL-300, U-02-RC Modified		

2

EPA 904.0/SW846 9320 Modified

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Liquid "As Received"			103	(15%-125%)
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			71.5	(15%-125%)

Report Date: April 27, 2010

ROIT00116 ROIT001

Project: Client ID:

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## **Certificate of Analysis**

Company: Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

MW388 (S) 250814004

Client Sample ID: Sample ID: Matrix: Collect Date:

Ground Water 06-APR-10 11:20

Receive Date:

09-APR-10

Collector:

Client

Parameter	Qualifier	Result	Uncertainty	, DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Alpha Spec Analysis		<del>-</del>							***		-
Alphaspec U, Liquid "As Re	ceived"				•						
Pct Uranium-235	U	0.579				percent		JXH2 04/15/10	0741 9	73991	1
Uranium-233/234		3.76	+/-1.04	0.406	1.00	pCi/L					
Uranium-235/236	U	0.0907	+/-0.178	0.272	1.00	pCi/L					
Uranium-238		2.42	+/-0.826	0.220	1.00	pCi/L					
Rad Gas Flow Proportion	al Counting					-					
GFPC, Ra228, Liquid "As F	Received"										
Radium-228	U	1.45	+/-1.21	1.90	3.00	pCi/L		JXC5 04/16/10	0842 9	74116	2
Rad Radium-226						•					
Lucas Cell, Ra226, liquid "A	As Received"										
Radium-226		0.422	+/-0.240	0.270	1.00	pCi/L		KSD1 04/26/10	1450 9	74610	3

The following Analytical Methods were performed

Method	Description	Analyst Comments	
1	DOE EML HASL-300, U-02-RC Modified		

2

EPA 904.0/SW846 9320 Modified

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Liquid "As Received"			98.8	(15%-125%)
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			80.0	(15%-125%)

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Report Date: April 27, 2010

ROIT00116 ROIT001

Project:

**Analyst Comments** 

Client ID:

## **Certificate of Analysis**

Company: Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID:

Sample ID:

MW393 (S) 250814005

Collect Date: Receive Date:

Collector:

Ground Water 01-APR-10 15:15 09-APR-10

Matrix:

Client

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Alpha Spec Analys	sis										
Alphaspec U, Liquid "As	Received"										
Pct Uranium-235		1.39				percent		JXH2 04/15/10	0741 97	73991	1
Uranium-233/234		13.8	+/-2.12	0.406	1.00	pCi/L					
Uranium-235/236		1.15	+/-0.681	0.314	1.00	pCi/L					
Uranium-238	,	12.7	+/-2.03	0.254	1.00	pCi/L					
Rad Gas Flow Proportion	onal Counting					-					
GFPC, Ra228, Liquid "A	s Received"										
Radium-228	U	0.208	+/-1.41	2.69	3.00	pCi/L		JXC5 04/16/10	0843 97	74116	2
Rad Radium-226						•					
Lucas Cell, Ra226, liquid	l "As Received"										
Radium-226	U	0.162	+/-0.163	0.256	1.00	pCi/L		KSD1 04/26/10	1450 97	4610	3
•											

The following Analytical Methods were performed

Method	Description	
1	DOE EML HASL-300, U-02-RC Modified	
2	EPA 904.0/SW846 9320 Modified	

3

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Liquid "As Received"			85.1	(15%-125%)
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			64.8	(15%-125%)

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## **Certificate of Analysis**

Report Date: April 27, 2010

ROIT00116 ROIT001

Project: Client ID:

Company: Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: Sample ID: Matrix: Collect Date:

GW-4 250814006

Ground Water 06-APR-10 09:30

Receive Date: Collector:

09-APR-10

Client

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Alpha Spec Analysis	s							:			
Alphaspec U, Liquid "As F	Received"										
Pct Uranium-235	U	4.77				percent		JXH2 04/15/10	0741 97	3991	1
Uranium-233/234		0.885	+/-0.556	0.477	1.00	pCi/L					
Uranium-235/236	U	0.187	+/-0.299	0.510	1.00	pCi/L					
Uranium-238		0.582	+/-0.448	0.413	1.00	pCi/L					
<b>Rad Gas Flow Proportio</b>	nal Counting					-					
GFPC, Ra228, Liquid "As	Received"										
Radium-228	U	0.808	+/-1.21	2.12	3.00	pCi/L		JXC5 04/16/10	0843 97	4116	2
Rad Radium-226						•					
Lucas Cell, Ra226, liquid	"As Received"										
Radium-226		0.836	+/-0.289	0.188	1.00	pCi/L		KSD1 04/26/10	1450 97	4610	3

Method	Description	Analyst Comments	
1	DOE EML HASL-300, U-02-RC Modified		
2	EPA 904.0/SW846 9320 Modified	,	

3

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery %	Acceptable Limits
Uranium-232 Tracer	Alphaspec U, Liquid "As Received"			84.4	(15%-125%)
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			70.7	(15%-125%)



2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

**QC Summary** 

Report Date: April 27, 2010

Page 1 of 3

Detroit Edison - Fermi 1 PO Box 44440 Detroit, Michigan

Contact: Detroit, Michig

Workorder:

250814

Parmname			NOM	Sample	Qual	QC	Units	RPD%	REC%	Range Anlst	Date Time
Rad Alpha Spec				•							
Batch 973	3991										
QC1202092557	250814002	DUP		2.60		2.00				(00' 000') 11/110	04454000044
Pct Uranium-235			U	2.69	U	0.00	percent			(0%-20%) JXH2	04/15/10 07:41
Uranium-233/234				0.577		0.532	pCi/L	8.12		(0% - 100%)	
			Uncertainty	+/-0.436		+/-0.389	C1.7	0.00		2714	
Uranium-235/236			U	0.0746	U	0.00	pCi/L	0.00		N/A	
			Uncertainty	+/-0.198		+/-0.173	O: "			277.1	
Uranium-238			U	0	· U	0.393	pCi/L	0.00		N/A	
	1.00		Uncertainty	+/-0.387		+/-0.345					
QC1202092559 Pct Uranium-235	LCS					1.15	percent			•	04/15/10 07:41
	•					26.5	•				04/15/10 07.41
Uranium-233/234			Uncertainty				pCi/L			•	
H: 225/226			Uncertainty	•		+/-3.07 1.89	~C:/I				
Uranium-235/236			I Importainty			+/-0.927	pCi/L				
I I 229			Uncertainty 25.9			25.3	pCi/L		97.7	(75%-125%)	
Uranium-238						+/-3.00	рсис		91.1	(7370-12370)	
OC1202092556	MB		Uncertainty			47-3.00					
Pct Uranium-235	1110				U	0.00	percent				04/15/10 07:40
Uranium-233/234					U	0.107	pCi/L			,	
Craman 235/254			Uncertainty		Ü	+/-0.226	POND				
Uranium-235/236			Oncertainty		U	0.00	pCi/L				
Oraniam-255/250			Uncertainty		Ü	+/-0.204	pene			,	
Uranium-238	•		Oncertainty		U	-0.0202	pCi/L				
Oramani-250			Uncertainty		Ü	+/-0.170	PC#B				
QC1202092558	250814002	MS	Oncertainty			17 0.170					
Pct Uranium-235			Ü	2.69		0.793	percent			,	04/15/10 07:41
Uranium-233/234				0.577		24.9	pCi/L				
-			Uncertainty	+/-0.436		+/-2.82	•				
Uranium-235/236			Ŭ	0.0746		1.34	pCi/L				
			Uncertainty	+/-0.198		+/-0.726	•				
Uranium-238			25.9 U	0.419		26.0	pCi/L		100	(75%-125%)	
			Uncertainty	+/-0.387		+/-2.88	•				
Rad Gas Flow			•								
Batch 974	1116										
QC1202092903	250820001	DUP									
Radium-228		,	U	1.78	U	1.08	pCi/L	0.00		N/A JXC5	,04/16/10 08:43
			Uncertainty	+/-1.51		+/-1.32					
QC1202092905	LCS		•								
Radium-228			37.4			45.7	pCi/L		122	(75%-125%)	04/16/10 08:43
			Uncertainty			+/-4.42					
QC1202092902 Radium-228	MB				U	-1.15	pCi/L				04/16/10 08:43
						- 1 1	ni 1/1				0/1/16/111108:/14

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## **QC Summary**

Page 2 of 3

Workorder: 250814

Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range A	nist	Date Time
Rad Gas Flow Batch 974116									
QC1202092904 250820001 MS	Uncertainty		+/-0.995						
Radium-228	74.9 U Uncertainty	1.78 +/-1.51	81.6 +/-8.03	pCi/L		109	(75%-125%)	JXC5	04/16/10 08:43
<b>Rad Ra-226</b> Batch 974610	•								
QC1202094147 250814002 DUP Radium-226		1.05	0.735	pCi/L	34.9		· (0% - 100%) 1	KSD1	04/26/10 15:20
QC1202094149 LCS	Uncertainty	+/-0.377	+/-0.319						
Radium-226	24.2 Uncertainty		19.7 +/-1.37	pCi/L		81.6	(75%-125%)	-	04/26/10 15:20
QC1202094146 MB Radium-226			0.424	pCi/L					04/26/10 15:20
QC1202094148 250814002 MS	Uncertainty		+/-0.277						
Radium-226	121 Uncertainty	1.05 +/-0.377	106 +/-6.74	pCi/L		86.5	(75%-125%)		04/26/10 15:20

#### Notes:

The Qualifiers in this report are defined as follows:

- Analyte is a surrogate compound
- < Result is less than value reported
- Result is greater than value reported >
- Α The TIC is a suspected aldol-condensation product
- В For General Chemistry and Organic analysis the target analyte was detected in the associated blank.
- BD Results are either below the MDC or tracer recovery is low
- С Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of the sample
- F Estimated Value
- Н Analytical holding time was exceeded
- J Value is estimated
- M M if above MDC and less than LLD
- M Matrix Related Failure
- N/A RPD or %Recovery limits do not apply.
- ND Analyte concentration is not detected above the detection limit
- NJ Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- R Sample results are rejected
- U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.

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#### **QC Summary**

Workorder: 250814 Page 3 of 3 NOM Parmname Sample Qual QC Units RPD% REC% Range Anlst Date Time Gamma Spectroscopy--Uncertain identification UI UJ Gamma Spectroscopy--Uncertain identification Х Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier Y OC Samples were not spiked with this compound RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

Preparation or preservation holding time was exceeded

h

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

<sup>^</sup> The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

<sup>\*</sup> Indicates that a Quality Control parameter was not within specifications.



### a member of The GEL Group INC



PO Box 30712 Charleston, SC 29417 2040 Savage Road Charleston, SC 29407

P 843.556.8171 F 843.766.1178

www.gel.com

December 28, 2010

Mr. Tom Mow Detroit Edison - Fermi 1 PO Box 44440 Detroit, Michigan 48244

Re: Fermi 1 - PO# 4700246055

Work Order: 268144

Dear Mr. Mow:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on December 06, 2010. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4443.

Sincerely,

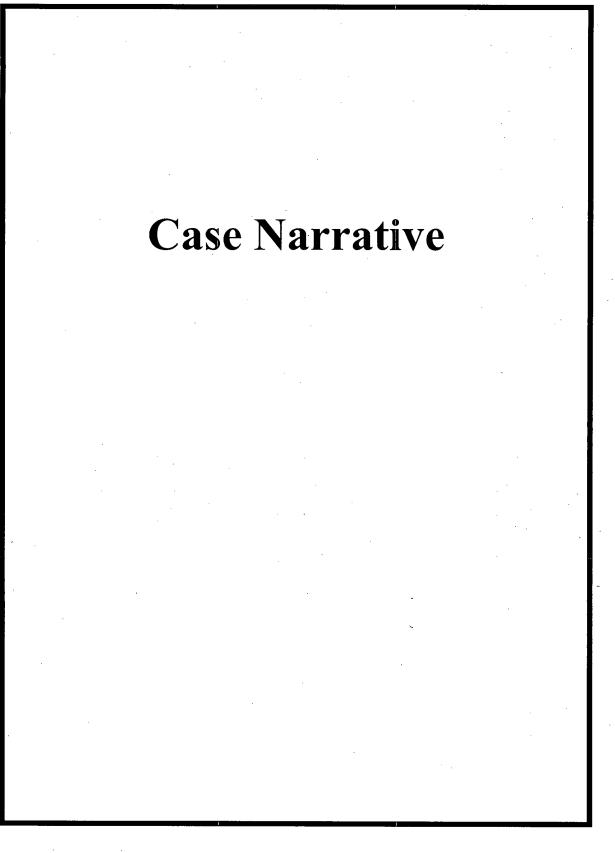
Richard Albee Project Manager

Purchase Order: 4700246055

Enclosures

# Table of Contents

Case Narrative	1
Chain of Custody	3
Radiological Analysis	7
Sample Data Summary	
Quality Control Data	29



## Case Narrative for Detroit Edison Company SDG: 268144

#### December 28, 2010

#### **Laboratory Identification:**

GEL Laboratories LLC 2040 Savage Road Charleston, South Carolina 29407 (843) 556-8171

#### **Summary**

**Sample Receipt** The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on December 06, 2010 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. Samples EFT-102010-6/S, EFT-102510-1/S, and EFT-102710-5/S were received at pH 7. Samples were preserved upon receipt per client request.

Sample Identification The laboratory received the following samples:

Laboratory ID	Client ID
268144001	EFT-102010-6/S
268144002	EFT-102510-1/S
268144003	EFT-102710-1/D
268144004	EFT-102010-4/S
268144005	EFT-102010-5/D
268144006	EFT-102810-GW4
268144007	EFT-102510-2/D
268144008	EFT-101310-GW3
268144009	EFT-102710-5/S
268144010	EFT-102810-1/I
268144011	EFT-101410-9/S
268144012	EFT-102510-8SR NEW
268144013	EFT-102010-4/D
268144014	EFT-101410-6/D
268144015	EFT-101410-GW2
268144016	EFT-11110-7/S

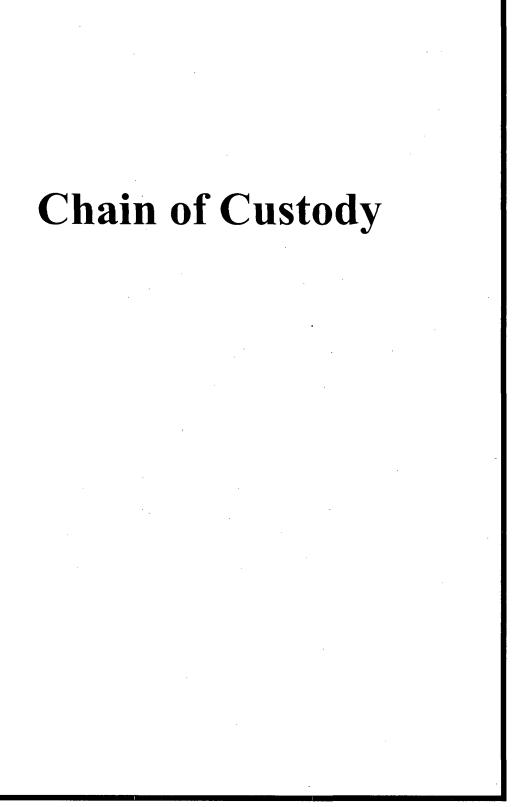
#### **Case Narrative**

Sample analyses were conducted using methodology as outlined in GEL Laboratories, LLC (GEL) Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

#### Data Package

The enclosed data package contains the following sections: General Narrative, Chain of Custody and Supporting Documentation, and data from the following fractions: Radiochemistry.

Richard Albee Project Manager



# FERMI 1 NUCLEAR POWER PLANT CHAIN-OF-CUSTODY

268144

														060	1 1 -7
PROJECT	SAMPLE PREP THO MAS	(printed)			SAMPLE TYPES			: AN	IALYSIS	TO BE PI	RFORM	ED			
LABORATORY ID	SAMPLE PREP				LL WATER 12 OTHER 1		analysis					-		ti i i i i i i i i i i i i i i i i i i	100
SAMRHEINUMBER	HSAMPLE TYPE TYPE (SEE CODE ABOVE)	Color of the State	TIME	COMPOSITE GRAB	STATIONILOCATION	NUMBER OF	gross:alpha/beta-a							CONTAINER	REMARK
EFT-102010-6/S	1	10/20/2010	16:30	<u> </u>		11	х							500 ML	
EFT-102510-1/S	-1-	10/25/2010	16:05			1	х							500 ML	
EFT-102710-1/D	1	10/27/2010	8:20			1	х							500 ML	
EFT-102010-4/\$	11	10/20/2010	11:50			1	x				·			500 ML	
EFT-102010-5/D	11	10/20/2010	14:55			1	<u> </u>							500 ML	·
EFT-102810-GW4	1	10/28/2010	8:25			1	x :	•						500 ML	
EFT-102510-2/D	1	10/25/2010	11:25			1	х	·						500 ML	
EFT-101310-GW3	1	10/13/2010	12:10			1	х							500 ML	
EFT-102710-5/S	1	10/27/2010	15:50			1	Х	,						500 ML	
EFT-102810-1/I	1	10/28/2010	9:50			1	х							500 ML	
EFT-101410-9/S	1	10/14/2010	11:55		9	1	х							500 ML	
EFT-102510-8SR NEW	1	10/25/2010	13:50			1	- X							- 500 ML	
EFT-102010-4/D	1	10/20/2010	12:55			1	х							500 ML	
EFT-101410-6/D	11	10/14/2010	9:40		<u> </u>	1	x							500 ML	
EFT-101410-GW2	1	10/14/2010	15:45			1	x							500 ML	
EFT-11110-7/S	11	11/1/2010	11:05			1	х		,					500 ML	
						<u> </u>							-	500 ML	
Verified 121-10 1	W. Parchy				· ·		4								,
PEL Ship a Display	INQUISHED BY rinted/signed)				RECEIVED BY. (printed/aigned)		(DD-MA	ATE/TIN	E / 24HR)				i i i	ИARKS.	
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GEL Laboratories LLC

# SAMPLE RECEIPT & REVIEW FORM

Clie	nt: ROTT			SDC	F/AR/COC/Work Order: 268144
Rec	eived By: Greg Tyler				Received: 12-6-10
Sus	pected Hazard Information	Yes	ž	*If ( furth	Counts > x2 area background on samples not marked "radioactive", contact the Radiation Safety Group for the investigation.
	//Samples marked as radioactive?		ĺΧ	Max	imum Counts Observed*: 60 CPM
_	sified Radioactive II or III by RSO? USamples marked containing PCBs?		Ż		· · · · · · · · · · · · · · · · · · ·
	ped as a DOT Hazardous?	-	Ť	Haza	ard Class Shipped: UN#:
	ples identified as Foreign Soil?	-	$\leq$		OTHI.
_	Sample Receipt Criteria	Yes	NA NA	°Z	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	$\lambda$			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Samples requiring cold preservation within $(0 \le 6 \text{ deg. C})$ ?		$\times$		Preservation Method:  Ice bags Blue ice Dry ice (None) Other (describe)
2a	Daily check performed and passed on IR temperature gun?	X	. "		Temperature Device Serial #: 453466 Secondary Temperature Device Serial # (If Applicable):
3	Chain of custody documents included with shipment?	X			
4	Sample containers intact and sealed?	X			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5	Samples requiring chemical preservation at proper pH?			X	Sample ID's, containers affected and observed pH: EFT-1076/0-6/5, ET-1075/0-1/5 and EFT-107-5/5 and pH of 7. If Preservation added, Lott: 739631
6	VOA vials free of headspace (defined as < 6mm bubble)?		X		Sample ID's and containers affected:
7	Are Encore containers present?			X	(If yes, immediately deliver to Volatiles laboratory)
8	Samples received within holding time?	X			ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	X			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	X			Sample ID's aifected:
11	Number of containers received match number indicated on COC?	X			Sample ID's affected:
12	COC form is properly signed in relinquished/received sections?	X			
13	Carrier and tracking number.				FedEx Air FedEx Ground UPS Field Services Courier Other  (961 2418) 468 3975 150 178 53
Con	ments (Use Continuation Form if needed):  PM (or PMA)				Please preserve samples as needed per Phone call with client. RA 12/7/10  RA Date 12/6/10 Page 1 of 1

List of current GEL Certifications as of 28 December 2010

Arizona Arkansas CLIA California – NELAP	AZ0668 88-0651 42D0904046
CLIA	42D0904046
California – NELAP	
	01·151CA
Colorado	GEL
Connecticut	PH-0169
Dept. of Navy	NFESC 413
EPA Region 5	WG-15J
Florida – NELAP	E87156
Georgia E	E87156 (FL/NELAP)
Georgia DW	967
Hawaii	N/A
ISO 17025	2567.01
Idaho	SC00012
Illinois – NELAP	200029
Indiana	C-SC-01
Kansas – NELAP	E-10332
Kentucky	90129
Louisiana – NELAP	03046
Maryland	270
Massachusetts	M-SC012
Nevada	SC00012
New Jersey - NELAP	SC002
	FL NELAP E87156
New York - NELAP	11501
North Carolina	233
North Carolina DW	45709
Oklahoma	9904
Pennsylvania – NELAP	68-00485
	10120001/10120002
Tennessee	· TN 02934
Texas – NELAP T	104704235-07B-TX
U.S. Dept. of Agriculture	S-52597
Utah – NELAP	GEL
Vermont	VT87156
Virginia	00151
Washington	C1641

Radiological Analysis

## Radiochemistry Case Narrative Detroit Edison Company (ROIT) SDG 268144

#### **Method/Analysis Information**

Product: GFPC, Gross A/B, liquid

Analytical Method: EPA 900.0/SW846 9310

Analytical Batch Number: 1059089

Sample ID	Client ID
268144001	EFT-102010-6/S
268144002	EFT-102510-1/S
268144003	EFT-102710-1/D
268144004	EFT-102010-4/S
268144005	EFT-102010-5/D
268144006	EFT-102810-GW4
268144007	EFT-102510-2/D
268144008	EFT-101310-GW3
268144009	EFT-102710-5/S
268144010	EFT-102810-1/I
268144011	EFT-101410-9/S
268144012	EFT-102510-8SR NEW
268144013	EFT-102010-4/D
268144014	EFT-101410-6/D
268144015	EFT-101410-GW2
268144016	EFT-11110-7/S
1202289947	Method Blank (MB)
1202289948	268144003(EFT-102710-1/D) Sample Duplicate (DUP)
1202289949	268144003(EFT-102710-1/D) Matrix Spike (MS)
1202289950	268144003(EFT-102710-1/D) Matrix Spike Duplicate (MSD)
1202289951	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-001 REV# 13.

#### **Calibration Information:**

## **Calibration Information**

All initial and continuing calibration requirements have been met. The discrimination settings are calibrated in beta discriminating mode to reduce beta to alpha crosstalk.

#### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### **Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

#### **Quality Control (QC) Information:**

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### **Designated QC**

The following sample was used for QC: 268144003 (EFT-102710-1/D).

#### **QC** Information

Samples 1202289949 (EFT-102710-1/D) and 1202289950 (EFT-102710-1/D) did not meet the alpha recovery requirement due to the matrix of the sample. The samples are similar in results.

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

Sample 1202289951 (LCS) was recounted due to high recovery. Sample 268144007 (EFT-102510-2/D) was recounted due to a detector lock out condition. Recount is being reported.

#### **Chemical Recoveries**

All chemical recoveries meet the required acceptance limits for this sample set.

#### **Gross Alpha/Beta Preparation Information**

High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating.

#### **Miscellaneous Information:**

#### Data Exception (DER) Documentation

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Additional Comments**

Sample 268144002 (EFT-102510-1/S) did not meet the alpha required detection limit due to low sample volume. No more volume could be used due to not exceeding the maximum net weight limit of the calibration curve. The sample counted for 500 minutes. Samples 268144002 (EFT-102510-1/S), 268144009 (EFT-102710-5/S) and 268144011 (EFT-101410-9/S) did not meet the beta required detection limit due to low sample volume. No more volume could be used due to not exceeding the maximum net weight limit of the calibration curve. The samples counted for 500 minutes.

#### **Qualifier Information**

Manual qualifiers were not required.

## **Certification Statement**

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

## **GEL LABORATORIES LLC**

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

# Qualifier Definition Report for

ROIT001 Detroit Edison Company Client SDG: 268144 GEL Work Order: 268144

#### The Qualifiers in this report are defined as follows:

- \* A quality control analyte recovery is outside of specified acceptance criteria
- \*\* Analyte is a surrogate compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.

#### Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature: 9 (0 THC 4 TH Name: Heather McCarty

Date: 30 DEC 2010 Title: Analyst II

**Sample Data Summary** 

#### GEL LADURATURIES LLU

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

---F----

Project:

Client ID:

Report Date: December 30, 2010

ROIT00116

ROIT001

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID:

EFT-102010-6/S

Sample ID:

268144001

Matrix:

Water

Collect Date:

20-OCT-10 16:30

Receive Date:

06-DEC-10

Collector:

Client

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gas Flow Prope	ortional Counting										
GFPC, Gross A/B, liq	quid "As Received"					**		_			
Alpha		4.08	+/-2.62	3.47	5.00	pCi/L		VXC2 12/27/10	1248 10	59089	1
Beta		4.81	+/-2.48	3.82	5.00	pCi/L					

The following Analytical Methods were performed

Method	Description	Analyst Comments	
1	EPA 900.0/SW846 9310		

## **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Report Date: December 30, 2010

ROIT00116

ROIT001

Project:

Client ID:

Detroit, Michigan 48244

Contact: Project:

Mr. Tom Mow

Client Sample ID:

Fermi 1 - PO# 4700246055 EFT-102510-1/S

Sample ID:

268144002

Matrix:

Water

Collect Date:

25-OCT-10 16:05

Receive Date:

06-DEC-10 '

Collector:

Parameter	Qualifier	Result	Uncertainty	DL	(RL)	Units	DF AnalystDate	Time Batch	Method
Rad Gas Flow Pro	portional Counting			,					
GFPC, Gross A/B,	liquid "As Received"								
Alpha	U·	0.852	+/-3.89	7.01	5.00	pCi/L	VXC2 12/27/	10 1946 1059089	1
Beta	U	-2.59	+/-3.77	6.75	5.00	pCi/L			
The following An	ialytical Methods were	performed		÷					
Method	Description				A	nalyst Comm	ents		
1	EPA 900 0/SV	/846 9310	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,						77.11

#### GEL LADONA I ONIES LLO

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## **Certificate of Analysis**

Company:

Detroit Edison - Fermi I

Address:

PO Box 44440

Report Date: December 30, 2010

ROIT00116

ROIT001

Project:

Client ID:

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID:

EFT-102710-1/D~

Sample ID:

268144003

Water

Matrix:

Collect Date:

27-OCT-10 08:20 -

Receive Date:

06-DEC-10 .

Collector:

Client

Parameter	Qualifier	Result	Uncertainty	DL	(RL)	Units	DF	AnalystDate	Time	Batch	Method
Rad Gas Flow Proporti	onal Counting									-	
GFPC, Gross A/B, liquid	"As Received"										
Alpha		.10.1	+/-4.18	3.41	5.00	pCi/L		VXC2 12/27/10	1248 1	059089	1
Beta		9.78	+/-3.45	4.92	5.00	pCi/L					
The following Analytic	al Mathada wara	naufaumad				•					

Method Description **Analyst Comments** EPA 900.0/SW846 9310

#### GEL LADUNA I UNIES LLU

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## **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Report Date: December 30, 2010

ROIT00116

ROIT001

Project:

Client ID:

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: EFT-102010-4/S

Sample ID:

268144004

Matrix:

Water

Collect Date:

20-OCT-10 11:50

Receive Date:

06-DEC-10

Collector:

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time B	atch	Method
Rad Gas Flow Prop	oortional Counting		······································								
GFPC, Gross A/B, In	iquid "As Received"										
Alpha	U	1.40	+/-1.69	2.78	5.00	pCi/L		VXC2 12/27/10	1248 1059	9089	1
Beta		7.44	+/-2.51	3.55	5.00	pCi/L					
The following Ana	lytical Methods were	performed									
Method	Description				A	nalyst Comme	nts				<del></del>
1	EPA 900.0/SW	846 9310									<del></del>

#### GEL LADUKA I UKIES LLU

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## **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Report Date: December 30, 2010

ROIT00116

ROIT001

Project:

Client ID:

Contact:

Detroit, Michigan 48244 Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID:

EFT-102010-5/D

Sample ID:

268144005

Matrix:

Water

Collect Date:

20-OCT-10 14:55

Receive Date:

06-DEC-10

Collector:

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gas Flow Pro	portional Counting										
GFPC, Gross A/B,	liquid "As Received"										
Alpha		3.53	+/-2.47	3.06	5.00	pCi/L		VXC2 12/27/10	1248 1	059089	1
Beta		9.40	+/-2.71	3.67	5.00	pCi/L					
The following An	alytical Methods were p	performed									
Method	Description				A	nalyst Comm	ents				
1	EPA 900 0/SW/	846 9310									

#### GEL LADORA I ORIES LL

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Report Date: December 30, 2010

ROIT00116

ROIT001

Project:

Client ID:

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID:

EFT-102810-GW4

Sample ID:

268144006

Matrix:

Water

Collect Date:

28-OCT-10 08:25

Receive Date:

06-DEC-10

Collector:

Parameter	Qualifier	Result	Uncertainty	· DL	RL	Units	DF	AnalystDate	Timę	Batch	Method
Rad Gas Flow Pro	portional Counting										
GFPC, Gross A/B, I	liquid "As Received"							•			
Alpha	-	3.96	+/-1.68	1.85	5.00	pCi/L		VXC2 12/27/10	1303 1	059089	1
Beta		5.76	+/-1.95	2.89	5.00	pCi/L					
The following An	alytical Methods were p	erformed									
Method	Description		•		A	nalyst Comm	ents				-
1	EPA 000 0/SW/9	246 0310			·						

#### GEL LADORA I ORIES LLO

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Report Date: December 30, 2010

ROIT00116

ROIT001

Project:

Client ID:

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID:

EFT-102510-2/D

Sample ID:

268144007

Sample ID.

Water

Matrix:

water

Collect Date:

25-OCT-10 11:25

Receive Date:

06-DEC-10

Collector:

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gas Flow Pro	portional Counting										
GFPC, Gross A/B,	liquid "As Received"							•			
Alpha		5.01	+/-3.40	4.82	5.00	pCi/L		VXC2 12/29/10	1335 1	059089	1
Beta		6.85	+/-2.24	2.82	5.00	pCi/L					
The following An	alytical Methods were p	erformed									
Method	Description				A	nalyst Com	ments			.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
1	EPA 900 0/SW8	46 9310						<del></del>			

## **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Report Date: December 30, 2010

ROIT00116

ROIT001

Project:

Client ID:

Detroit, Michigan 48244

Contact: Project:

Mr. Tom Mow

Fermi 1 - PO# 4700246055

Client Sample ID: EFT-101310-GW3

Sample ID:

268144008

Matrix:

Water

Collect Date:

13-OCT-10 12:10

Receive Date:

06-DEC-10

Collector:

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gas Flow Pro	portional Counting										
GFPC, Gross A/B,	liquid "As Received"										
Alpha	U	2.20	+/-1.56	2.38	5.00	pCi/L		VXC2 12/27/10	1941 1	059089	1
Beta		3.57	+/-2.02	3.30	5.00	pCi/L					
The following An	alytical Methods were	performed									
Method	Description				A	nalyst Comm	ents		***************************************		
1	EDA 000 0/SW	246 0210									

## **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Report Date: December 30, 2010

ROIT00116

ROIT001

Project:

Client ID:

Detroit, Michigan 48244

Contact: Project:

Mr. Tom Mow

Fermi 1 - PO# 4700246055

Client Sample ID:

EFT-102710-5/S

Sample ID:

268144009

Matrix:

Water

Collect Date:

27-OCT-10 15:50

Receive Date:

06-DEC-10

Collector:

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gas Flow Pro	portional Counting										
GFPC, Gross A/B,	liquid "As Received"	•									
Alpha	U	2.18	+/-2,12	3.45	5.00	pCi/L		VXC2 12/27/10	1948 1	059089	1
Beta	U	0.318	+/-3.02	5.21	5.00	pCi/L					
The following An	alytical Methods were	performed									
Method	Description		,		A	nalyst Comm	ents				
1	EPA 900 0/SV	/846 9310									

#### GEL LADURATURIES LLU

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# **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Report Date: December 30, 2010

ROIT00116

ROIT001

Project:

Client ID:

Detroit, Michigan 48244

Contact: Project:

Mr. Tom Mow

Client Sample ID:

Fermi 1 - PO# 4700246055

Cheffi Samp

EFT-102810-1/I

Sample ID:

268144010

Matrix:

Water

Collect Date:

28-OCT-10 09:50

Receive Date:

06-DEC-10

Collector:

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gas Flow Pro	portional Counting									******	,
GFPC, Gross A/B,	'iquid "As Received"	•				•		•			
Alpha		5.19	+/-1.73	1.92	5.00	pCi/L		VXC2 12/27/10	1941 1	059089	I
Beta		7.44	+/-1.87	2.84	5.00	pCi/L					
The following An	alytical Methods were	performed									
Method	Description				A	nalyst Comm	ents				
1	EPA 900.0/SW	846 9310				,					•

## **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Report Date: December 30, 2010

ROIT00116

ROIT001

Project:

Client ID:

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID:

EFT-101410-9/S

Sample ID:

268144011

Matrix:

Water

Collect Date:

14-OCT-10 11:55

Receive Date:

06-DEC-10

Collector:

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gas Flow Pro	portional Counting										
GFPC, Gross A/B,	liquid "As Received"										
Alpha	U	1.15	+/-2.63	4.71	5.00	pCi/L		VXC2 12/27/10	1948 1	059089	1
Beta	U	3.69	+/-3.51	5.86	5.00	pCi/L					
The following An	alytical Methods were p	erformed	•								
Method	Description				. A	nalyst Comm	ents				
1	EDA 000 0/SW/S	246 0310									

## **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Report Date: December 30, 2010

ROIT00116

ROIT001

Project:

Client ID:

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: EFT-102510-8SR NEW

Sample ID:

268144012

Water

Matrix: Collect Date:

25-OCT-10 13:50

Receive Date:

06-DEC-10

Collector:

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gas Flow Pro	portional Counting										
GFPC, Gross A/B,	liquid "As Received"					•		•			
Alpha		3.96	+/-2.69	3.46	5.00	pCi/L		VXC2 12/27/10	1939 1	059089	1
Beta		9.77	+/-3.43	4.88	5.00	pCi/L					
The following An	alytical Methods were	performed									
Method	Description				A	nalyst Comm	ents				
1	EPA 900 0/SW	846 9310									

## **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Report Date: December 30, 2010

ROIT00116

ROIT001

Project:

Client ID:

Contact:

Detroit, Michigan 48244 Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: EFT-102010-4/D

Sample ID:

268144013

Matrix:

Water

Collect Date:

20-OCT-10 12:55

Receive Date:

06-DEC-10

Collector:

Client

Parameter	Qualifier	Result	Uncertainty	$\mathbf{DL}$	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gas Flow Pro	portional Counting		<del></del>			,					
GFPC, Gross A/B, i	liquid "As Received"										
Alpha		6.35	+/-1.76	2.08	5.00	pCi/L		VXC2 12/27/10	1941 1	059089	1
Beta		7.69	+/-1.75	2.63	5.00	pCi/L					
The following An	alytical Methods were	performed									
Method	Description				A	nalyst Comm	ents				
1	EDA 000 0/SW	946 0210							-		

EPA 900.0/SW846 9310

#### GEL LADORA I ORIES LLO

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Report Date: December 30, 2010

ROIT00116

ROIT001

Project:

Client ID:

Detroit, Michigan 48244

Contact: Project:

Mr. Tom Mow Fermi 1 - PO# 4700246055

Client Sample ID:

EFT-101410-6/D

Sample ID:

268144014

Matrix:

Water

Collect Date:

14-OCT-10 09:40

Receive Date:

06-DEC-10

Collector:

Parameter .	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gas Flow Pro	portional Counting										
GFPC, Gross A/B,	liquid "As Received"								•		
Alpha		7.86	+/-2.65	2.85	5.00	pCi/L		VXC2 12/27/10	1941 1	059089	. 1
Beta		9.54	+/-3.24	5.09	5.00	pCi/L					
The following An	alytical Methods were p	performed									
Method	Description				A	nalyst Comm	ents				_ <del></del> _
1	EDA 000 0/\$W/	846 0310									

## **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Report Date: December 30, 2010

ROIT00116

ROIT001

Project:

Client ID:

Contact:

Detroit, Michigan 48244

Project:

Mr. Tom Mow

Client Sample ID:

Fermi 1 - PO# 4700246055 EFT-101410-GW2

Sample ID:

268144015

Matrix:

Water

Collect Date:

14-OCT-10 15:45

Receive Date:

06-DEC-10

Collector:

Client

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gas Flow Pro	portional Counting										
GFPC, Gross A/B,	liquid "As Received"								•		
Alpha		4.07	+/-1.74	2.54	5.00	pCi/L		VXC2 12/27/10	1948 1	059089	1
Beta		2.83	+/-1.61	2.64	5.00	pCi/L					
The following An	alytical Methods were	performed									
Method	Description				A	nalyst Comm	ents				
1	EDA 000 0/CW	946 0210									

EPA 900.0/SW846 9310

# **Certificate of Analysis**

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Report Date: December 30, 2010

ROIT00116

ROIT001

Project:

Client ID:

Detroit, Michigan 48244

Contact: Project:

Mr. Tom Mow

Client Sample ID:

Fermi 1 - PO# 4700246055

EFT-11110-7/S

Sample ID:

268144016

Matrix:

Water

Collect Date:

01-NOV-10 11:05

Receive Date:

06-DEC-10

Collector:

Client

Parameter	Qualifier	Result	Uncertainty	$\mathbf{DL}$	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gas Flow Prop	portional Counting			····		,					
GFPC, Gross A/B, l	iquid "As Received"	•	•								
Alpha		2.82	+/-2.05	2.56	5.00	pCi/L		VXC2 12/27/10	1939 1	059089	1
Beta		4.84	+/-2.79	4.36	5.00	pCi/L					
The following Ana	alytical Methods were	performed						•			
Method	Description				A	nalyst Comm	ents				
1	ED 4 000 0/GIV	046 0210									

EPA 900.0/SW846 9310

# **Quality Control Data**

## **GEL LABORATORIES LLC**

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

## **QC Summary**

Report Date: December 30, 2010

Page 1 of 2

Detroit Edison - Fermi 1 PO Box 44440 Detroit, Michigan

Contact:

Mr. Tom Mow

Workorder:

268144

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range Anlst	Date Time
Rad Gas Flow									
Batch 1059089									
QC1202289948 268144003 DUP									
Alpha		10.1		8.38	pCi/L	18.3		(0% - 100%) VXC	2 12/27/10 13:19
	Uncertainty	+/-4.18		+/-4.15					
Beta		9.78		8.34	pCi/L	15.8		(0% - 100%)	
	Uncertainty	+/-3.45		+/-3.08					
QC1202289951 LCS									
Alpha	127			158	pCi/L		124	(75%-125%)	12/28/10 07:44
	Uncertainty			+/-14.2					
Beta	497			522	pCi/L		105	(75%-125%)	
	Uncertainty			+/-17.9					
QC1202289947 MB									
Alpha			U	-0.494	pCi/L				12/27/10 13:13
	Uncertainty			+/-0.972					
Beta			U	-0.566	pCi/L				
0.0100000000000000000000000000000000000	Uncertainty			+/-1.97					
QC1202289949 268144003 MS	254	10.1		180	C: /I		66.8*	(750/ 1250/)	12/27/10 13:19
Alpha	_ <del>-</del>	+/-4.18		+/-26.7	pCi/L		00.6	(75%-125%)	12/2//10 15:19
D-44	Uncertainty 993	+/- <del>4</del> .18 9.78		1090	C:/I		109	(750/ 1250/)	
Beta					pCi/L		103	(75%-125%)	
OC1202289950 268144003 MSD	Uncertainty	+/-3.45		+/-38.6					
Alpha	254	10.1		178	pCi/L	0.974	66.1*	(0%-20%)	12/27/10 13:20
трпа	Uncertainty	+/-4.18		+/-26.7	PCUL		20.1	(070 2070)	12,2,,10 (3.20
Beta	993	9.78		1010	pCi/L	7.45	101	(0%-20%)	
Deta	Uncertainty	+/-3.45		+/-37.3	PCI/L	7.43	.01	(070-2070)	
	Oncertainty	1/-3.43		17-37.3					

#### Notes:

The Qualifiers in this report are defined as follows:

- \*\* Analyte is a surrogate compound
- < Result is less than value reported
- > Result is greater than value reported
- A The TIC is a suspected aldol-condensation product
- B For General Chemistry and Organic analysis the target analyte was detected in the associated blank.
- BD Results are either below the MDC or tracer recovery is low
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of the sample
- F Estimated Value
- H Analytical holding time was exceeded

#### GEL LABURATURIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

## **QC Summary**

Workorder: 268144 Page 2 of 2 Parmname NOM Sample Qual QC Units RPD% REC% Date Time Range Anist Value is estimated Analyte present, Reported value may be biased high. Actual value is expected to be lower. K Analyte present. Reported value may be biased low. Actual value is expected to be higher. L Μ M if above MDC and less than LLD Μ Matrix Related Failure RPD or %Recovery limits do not apply. N/A Analyte concentration is not detected above the detection limit ND NJ Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier One or more quality control criteria have not been met. Refer to the applicable narrative or DER. Q R Sample results are rejected U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD. UI Gamma Spectroscopy--Uncertain identification Gamma Spectroscopy--Uncertain identification UJ UL Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias. X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier Y QC Samples were not spiked with this compound

h Preparation or preservation holding time was exceeded

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the

RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.

RL is used to evaluate the DUP result.

\* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations:

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.



#### a member of The GEL Group INC



PO Box 30712 Charleston, SC 29417 2040 Savage Road Charleston, SC 29407

P 843.556.8171 F 843.766.1178

www.gel.com

June 30, 2011

Mr. Tom Mow Detroit Edison - Fermi 1 PO Box 44440 Detroit, Michigan 48244

Re: Fermi 1 - PO# 4700246055

Work Order: 279061

Dear Mr. Mow:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on May 31, 2011. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4443.

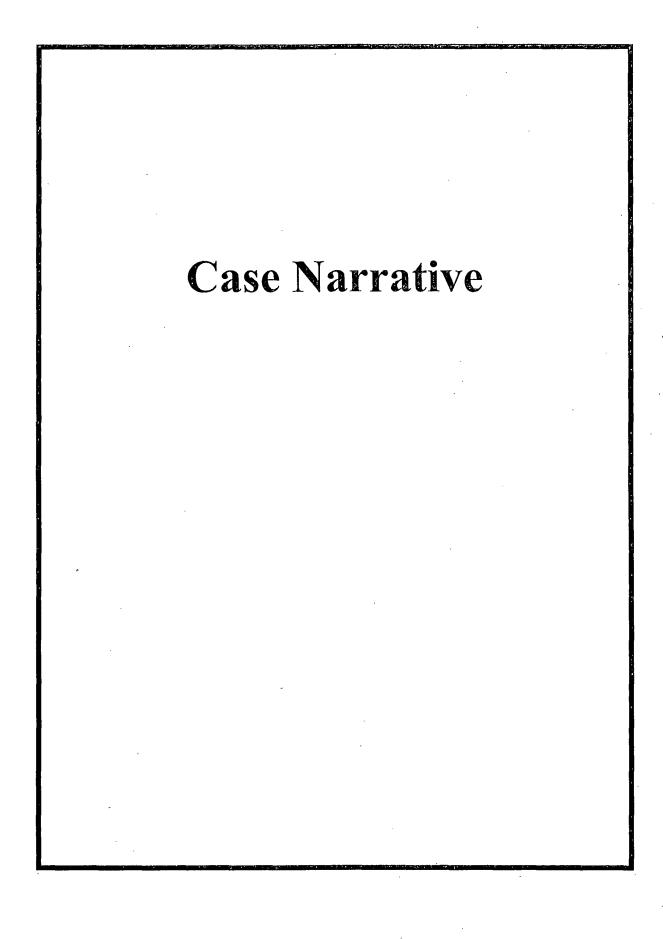
Sincerely,

Richard Albee Project Manager

Purchase Order: 4700246055 Enclosures

# Table of Contents

Case Narrative	1
Chain of Custody	3
Radiological Analysis	7
Sample Data Summary	25
Quality Control Data	39



# Case Narrative for Detroit Edison Company SDG: 279061

June 30, 2011

#### **Laboratory Identification:**

GEL Laboratories LLC 2040 Savage Road Charleston, South Carolina 29407 (843) 556-8171

#### **Summary**

Sample Receipt The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on May 31, 2011 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. Sample #EFT-51811-12I, 2 samples had a ph of 7. Sample #EFT-51811-12D, 2 samples had a ph of 7. Client approved for GEL to preserve samples to ph of 2 with Nitric acid. lot# K11061.

Sample Identification The laboratory received the following samples:

<u>Laboratory ID</u>	Client ID
279061001	EFT-51811-111
279061002	EFT-51811-11D
279061003	EFT-51811-12I
279061004	EFT-51811-12D
279061005	EFT-51911-13I

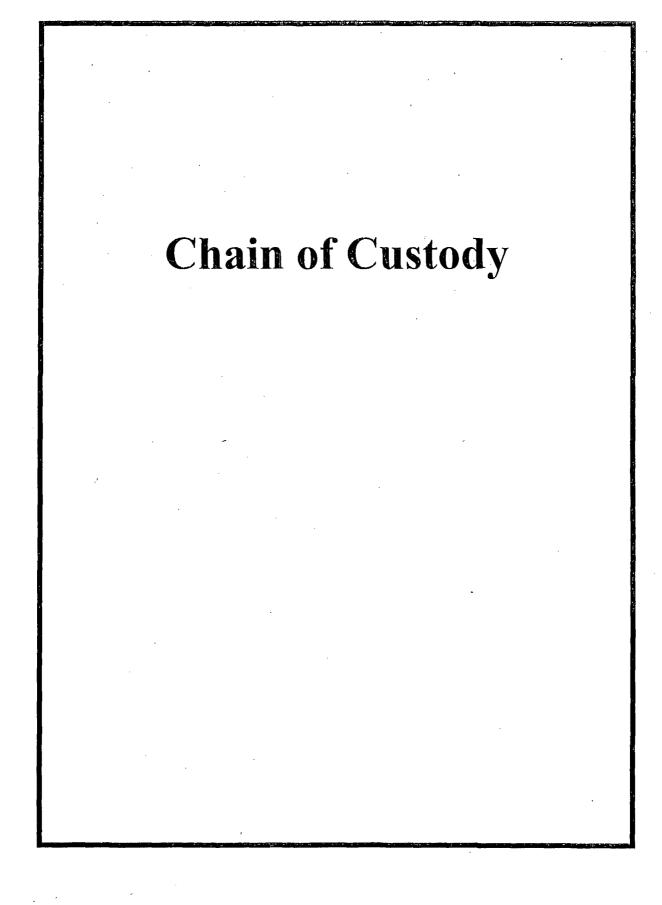
# Case Narrative

Sample analyses were conducted using methodology as outlined in GEL Laboratories, LLC (GEL) Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

#### Data Package

The enclosed data package contains the following sections: General Narrative, Chain of Custody and Supporting Documentation, and data from the following fractions: Radiochemistry.

Richard Albee Project Manager



FERMI 1 NUCLEAR POWER PLANT CHAIN-OF-CUSTODY 27906/ PROJECT SAMPLE PREP (printed) ANALYSIS TO BE PERFORMED THOMAS MOW FERMI-1 ABORATORY ID SAMPLE PREP (signature) GROUNDWATTER 2:0THERES SAMPLE STATION LOCATION OF SAMPLE NUMBER CONTAINER NUMBER (SEE CODE ABOVE) 5 Х 5/18/2011 9:15 Ferml 1 EFT-51811-111 **PLASTIC** 8750 mi 5 5/18/2011 16:00 Fermi 1 X X Х EFT-51811-11D Х PLASTIC 8750 ml EFT-51811-12 | 5/18/2011 15:25 Fermi 1 4 Х Х PLASTIC 8750 ml EFT-51B11-12D 5/18/2011 10:50 Fermi 1 X Х Х Χ Х **PLASTIC** 8750 ml 5/19/2011 10:00 Fermi 1 X EFT-51911-131 PLASTIC 1000 ml Site Contacts - Lynne Goodman 1-734-586-1205 or Thomas Mow 1-734-586-5334 RELINQUISHED BY
(printed/signed) RECEIVED BY: (printed/signed) DATE/TIME (printed/signed) (DD-MMM-YYYY / 24HR) Quantities peer checked during 5/25/11 loading. D. KESKITALO/OHKE SLITCH 5/25/11 Sarah Edward / Sarah Edwards THOMAS Mon / 72

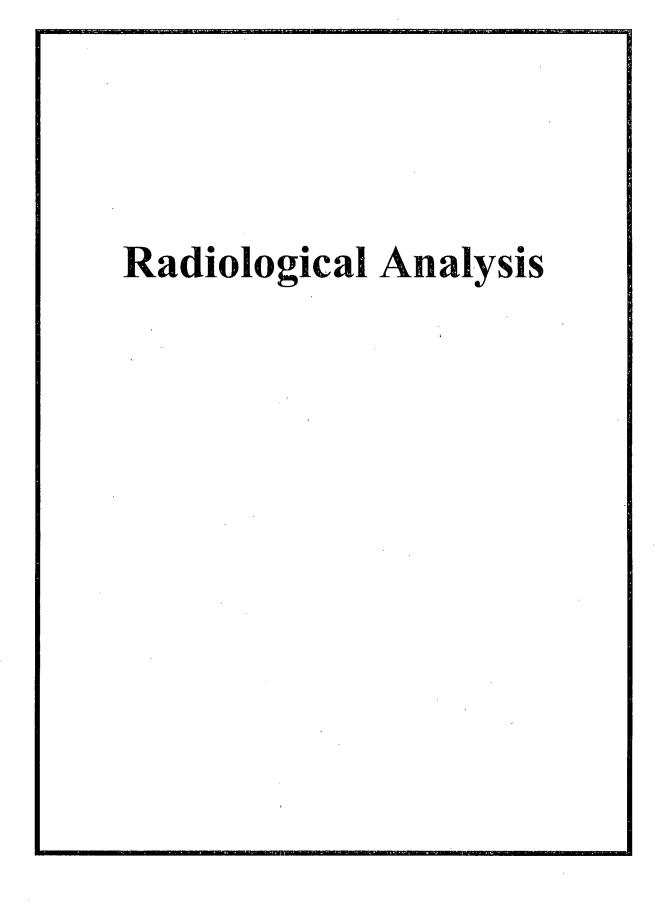


# SAMPLE RECEIPT & REVIEW FORM

Clie	nt: POIT			SDC	G/AR/COC/Work Order: 279061	
	eived By: SE			Dat	e Received: 5.31.11 @ 0825	
Sus	pected Hazard Information	Yes	ŝ	75.0		
CO	amples marked as radioactive? — Maximum Counts Observed*: 40 con					
Clas	sified Radioactive II or III by RSO?		_			
_	C/Samples marked containing PCBs?		_			
<b></b>	ped as a DOT Hazardous?		_	Haz	ard Class Shipped: UN#:	
Sam	ples identified as Foreign Soil?	<u> </u>		<u></u>		
<u> </u>	Sample Receipt Criteria	Yes	Ä	ĝ	Comments/Qualifiers (Required for Non-Conforming Items)  Circle Applicable:	
1	Shipping containers received intact and sealed?	_			Seals broken Damaged container Leaking container Other (describe)	
2	Samples requiring cold preservation within (0 ≤ 6 deg. C)?		_		Preservation Method:  24-26   Ice bags   Blue ice   Dry ice   None   Other (describe)	
2a	Daily check performed and passed on IR temperature gun?				Temperature Device Serial #: 61574649 Secondary Temperature Device Serial # (If Applicable):	
3	Chain of custody documents included with shipment?	_				
4	Sample containers intact and sealed?	_			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)	
5	Samples requiring chemical preservation at proper pH?		A	_	Sample ID's, containers affected and observed pil:  EFT-51811-11I - 25 ample 5 pt 3; EFF-51811-11D-1 sample pt 4  If Preservation added, Loit: K1061  See 15e 15w	
6.	VOA vials free of headspace (defined as < 6mm bubble)?				Sample ID's and containers affected:	
7	Are Encore containers present?				(If yes, immediately deliver to Volatiles laboratory)	
8	Samples received within holding time?				ID's and tests affected:	
9	Sample ID's on COC match ID's on bottles?	_			Sample ID's and containers affected:	
10	Date & time on COC match date & time on bottles?		45%		Sample ID's affected:	
11 1	Number of containers received match number indicated on COC?	_			Sample ID's affected:	
	Are sample containers identifiable as GEL provided?					
13	COC form is properly signed in relinquished/received sections?	_				
					Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other	
		'			(9612417) 4683975 15043005 - 250	
14	Carrier and tracking number.				(9612417) 4683975 1504 3029 - 26°	
***					(9612417) 4683978 1524 3012 -24°	
			6.74		Victory convoved present	
Com	ments (Use Continuation Form if needed):	C1	<b>&gt;</b> T -	~ IS	811-12I-25amples pH7 ** Client approved presented 811-12I-25amples pH7 b pH22 on necessary courtainers. U'aphone call 811-13I-for Sr, pH7 courtainers. U'aphone call 84 5/31/11	
		EF	· T -	<u>-</u> 518	11-13I-for Sr, pH 7 courtainers. Utaphone call RA 5/31/11	
					7.7 5/31/11 Page of	

List of current GEL Certifications as of 30 June 2011

State	Certification
Arkansas	88-0651
CLIA	42D0904046
California – NELAP	01151CA
Colorado	E87156 (FL/NELAP)
Connecticut	PH-0169
DoD ELAP – A2LA	2567.01
Florida – NELAP	E87156
Foreign Soils Permit USDA	P330-09-00191
Georgia	E87156 (FL/NELAP)
Georgia SDWA	967
Hawaii	E87156 (FL/NELAP)
ISO 17025	2567.01
Idaho	SC00012
Illinois – NELAP	200029
Indiana	C-SC-01
Kansas – NELAP	E-10332
Kentucky	90129
Louisiana – NELAP	03046 (Al33904)
Louisiana SDWA	LA110006
Maryland	270
Massachusetts	M-SC012
Mississippi	E87156 (FL/NELAP)
Nevada	SC00012
New Hampshire	2054
New Jersey - NELAP	SC002
New Mexico	E87156 (FL/NELAP)
New York - NELAP	11501
North Carolina	233
North Carolina DW	45709
Oklahoma	9904
Pennsylvania – NELAP	68-00485
South Carolina	10120001/10120002
Tennessee	TN 02934
Texas - NELAP	T104704235-10-3
Utah - NELAP	SC00012
Vermont	VT87156
Virginia	00151
Washington	C780
Wisconsin	999887790



# Radiochemistry Case Narrative Detroit Edison Company (ROIT) SDG 279061

# **Method/Analysis Information**

Product: Alphaspec U, Liquid

Analytical Method: DOE EML HASL-300, U-02-RC Modified

Analytical Batch Number: 1108271

Sample ID	Client ID
279061001	EFT-51811-111
279061002	EFT-51811-11D
279061003	EFT-51811-12I
279061004	EFT-51811-12D
1202409782	Method Blank (MB)
1202409783	279061001(EFT-51811-111) Sample Duplicate (DUP)
1202409784	279061001(EFT-51811-11I) Matrix Spike (MS)
1202409785	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-011 REV# 20.

### **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met.

#### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### **Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

#### **Quality Control (QC) Information:**

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### Designated QC

The following sample was used for QC: 279061001 (EFT-51811-111).

#### QC Information

All of the QC samples met the required acceptance limits.

# **Technical Information:**

# **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

Sample 279061003 (EFT-51811-12I) was recounted to verify activity. The recount is reported.

# Miscellaneous Information:

#### Data Exception (DER) Documentation

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Manual Integration**

No manual integrations were performed on data in this batch.

#### **Additional Comments**

Additional comments were not required for this sample set.

# **Qualifier Information**

Manual qualifiers were not required.

#### Method/Analysis Information

Product:	Alphaspec Pu, Liquid
1 I Vaact.	manual section and the section of th

Analytical Method: DOE EML HASL-300, Pu-11-RC Modified

Analytical Batch Number: 1108273

Sample 1D	Client ID
279061001	EFT-51811-11I
279061002	EFT-51811-11D
279061003	EFT-51811-12I
279061004	EFT-51811-12D
1202409786	Method Blank (MB)
1202409787	279061001(EFT-51811-111) Sample Duplicate (DUP)
1202409788	279061001(EFT-51811-11I) Matrix Spike (MS)
1202409789	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

# **SOP** Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with

#### **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met.

#### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

# Quality Control (QC) Information:

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

### Designated QC

The following sample was used for QC: 279061001 (EFT-51811-111).

#### **QC** Information

All of the QC samples met the required acceptance limits.

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

# Sample Re-prep/Re-analysis

Sample 279061002 (EFT-51811-11D) was recounted due to a suspected false positive. The recount is reported.

#### **Miscellaneous Information:**

#### **Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

# **Manual Integration**

No manual integrations were performed on data in this batch.

#### **Additional Comments**

Additional comments were not required for this sample set.

# **Qualifier Information**

Manual qualifiers were not required.

# Method/Analysis Information

**Product:** 

Gammaspec, Gamma, Liquid (Standard List)

Analytical Method:

EPA 901.1

Analytical Batch Number:

1111565

Sample ID	Client ID
279061001	EFT-51811-11I
279061002	EFT-51811-11D
279061003	EFT-51811-12I
279061004	EFT-51811-12D
1202417333	Method Blank (MB)
1202417334	279061001(EFT-51811-111) Sample Duplicate (DUP)
1202417336	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

# **SOP** Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-013 REV# 22.

#### **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met.

#### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

# Quality Control (QC) Information:

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

### Designated QC

The following sample was used for QC: 279061001 (EFT-51811-11I).

# QC Information

All of the QC samples met the required acceptance limits.

# **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

### Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

#### **Miscellaneous Information:**

#### **Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Additional Comments**

Additional comments were not required for this sample set.

#### **Qualifier Information**

Manual qualifiers were not required.

#### **Method/Analysis Information**

Product: GFPC, Ra228, Liquid

Analytical Method: EPA 904.0/SW846 9320 Modified

Analytical Batch Number: 1107735

Sample ID	Client 1D
279061001	EFT-51811-11I
279061002	EFT-51811-11D
279061003	EFT-51811-12I
279061004	EFT-51811-12D
1202408506	Method Blank (MB)
1202408507	279061004(EFT-51811-12D) Sample Duplicate (DUP)
1202408508	279061004(EFT-51811-12D) Matrix Spike (MS)
1202408509	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

# **SOP** Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-009 REV# 16.

#### **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met.

### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

# Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

#### **Quality Control (QC) Information:**

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### Designated QC

The following sample was used for QC: 279061004 (EFT-51811-12D).

#### **QC** Information

All of the QC samples met the required acceptance limits.

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

### Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

#### **Chemical Recoveries**

All chemical recoveries meet the required acceptance limits for this sample set.

#### **Miscellaneous Information:**

#### Data Exception (DER) Documentation

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### Additional Comments

Additional comments were not required for this sample set.

# **Qualifier Information**

Manual qualifiers were not required.

#### Method/Analysis Information

Product: GFPC, Sr89&Sr90, Liquid

Analytical Method: EPA 905.0 Modified

Analytical Batch Number: 1107743

Sample ID Client ID 279061001 EFT-51811-11I 279061002 EFT-51811-11D 279061003 EFT-51811-12I 279061004 EFT-51811-12D 279061005 EFT-51911-13I 1202408527 Method Blank (MB) 279061005(EFT-51911-13I) Sample Duplicate (DUP) 1202408528

1202408530

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-004 REV# 14.

#### **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met.

#### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

#### **Quality Control (QC) Information:**

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### **Designated OC**

The following sample was used for QC: 279061005 (EFT-51911-13I).

# QC Information

All of the QC samples met the required acceptance limits.

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

# Sample Re-prep/Re-analysis

Samples 1202408527 (MB), 279061001 (EFT-51811-111), 279061002 (EFT-51811-11D), 279061003 (EFT-51811-12I) and 279061004 (EFT-51811-12D) were recounted due to high MDCs. The recounts are reported.

#### **Chemical Recoveries**

All chemical recoveries meet the required acceptance limits for this sample set.

#### **Miscellaneous Information:**

#### **Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. The following DER was generated for this SDG:

DER 969111 was generated due to Result is more negative than the three sigma TPU. 1. Samples 279061001, 279061004, and 279061005 have strontium 89 results that are more negative than the three sigma TPU. 1. Reporting results

#### **Additional Comments**

The matrix spike, 1202408529 (EFT-51911-13I), aliquot was reduced to conserve sample volume.

#### **Qualifier Information**

Manual qualifiers were not required.

#### Method/Analysis Information

Product: GFPC, Gross A/B, liquid

Analytical Method: EPA 900.0/SW846 9310

Analytical Batch Number: 1109556

Sample ID	Client ID
279061001	EFT-51811-11I
279061002	EFT-51811-11D
279061003	EFT-51811-12I
279061004	EFT-51811-12D
1202412531	Method Blank (MB)
1202412532	279061003(EFT-51811-12I) Sample Duplicate (DUP)
1202412533	279061003(EFT-51811-12I) Matrix Spike (MS)
1202412534	279061003(EFT-51811-12I) Matrix Spike Duplicate (MSD)
1202412535	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP** Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-001 REV# 14.

# **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met. The discrimination settings are calibrated in beta discriminating mode to reduce beta to alpha crosstalk.

#### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

# **Quality Control (QC) Information:**

# **Blank Information**

The blank volume is representative of the sample volume in this batch.

# Designated QC

The following sample was used for QC: 279061003 (EFT-51811-12I).

#### **OC** Information

All of the QC samples meet the required acceptance limits with the following exceptions: Matrix Spike and Matrix Spike Duplicate, 1202412533 (EFT-51811-12I) and 1202412534 (EFT-51811-12I), do not meet the alpha recovery requirement due to the matrix of the sample. The samples are similar in results.

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

Samples 1202412533 (EFT-51811-12I), 1202412534 (EFT-51811-12I) and 1202412535 (LCS) were recounted due to low recovery. The recounts are reported.

#### **Chemical Recoveries**

All chemical recoveries meet the required acceptance limits for this sample set.

#### Gross Alpha/Beta Preparation Information

High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating.

#### Miscellaneous Information:

#### Data Exception (DER) Documentation

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Additional Comments**

Additional comments were not required for this sample set.

#### **Qualifier Information**

Manual qualifiers were not required.

#### Method/Analysis Information

Product: GFPC, Sr90, liquid

Analytical Method: EPA 905.0 Modified

Analytical Batch Number: 1115396

**Sample ID** Client ID 279061001 EFT-51811-11I

279061002	EFT-51811-11D .
279061003	EFT-51811-12I
279061004	EFT-51811-12D
279061005	EFT-51911-13I
1202425766	Method Blank (MB)
1202425767	279061001(EFT-51811-11I) Sample Duplicate (DUP)
1202425768	279061001(EFT-51811-11I) Matrix Spike (MS)
1202425769	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-004 REV# 14.

#### **Calibration Information:**

## **Calibration Information**

All initial and continuing calibration requirements have been met.

#### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

# **Quality Control (QC) Information:**

### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### Designated QC

The following sample was used for QC: 279061001 (EFT-51811-111).

#### **QC** Information

All of the QC samples met the required acceptance limits.

#### **Technical Information:**

### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

Samples were reprepped due to low recovery. The re-analysis is being reported.

#### **Chemical Recoveries**

All chemical recoveries meet the required acceptance limits for this sample set.

### **Miscellaneous Information:**

#### Data Exception (DER) Documentation

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Additional Comments**

The matrix spike, 1202425768 (EFT-51811-111), aliquot was reduced to conserve sample volume.

#### **Qualifier Information**

Manual qualifiers were not required.

# **Method/Analysis Information**

Product:

LSC, Tritium Dist, Liquid

Analytical Method:

EPA 906.0 Modified

Analytical Batch Number:

1109586

Sample ID	Client ID
279061001	EFT-51811-11I
279061002	EFT-51811-11D
279061003	EFT-51811-12I
279061004	EFT-51811-12D
1202412631	Method Blank (MB)
1202412632	279061001(EFT-51811-11I) Sample Duplicate (DUP)
1202412633	279061001(EFT-51811-11I) Matrix Spike (MS)
1202412634	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-002 REV# 19.

#### **Calibration Information:**

# **Calibration Information**

All initial and continuing calibration requirements have been met.

#### Standards Information

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

#### **Quality Control (QC) Information:**

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### Designated QC

The following sample was used for QC: 279061001 (EFT-51811-111).

#### **OC** Information

All of the QC samples met the required acceptance limits.

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

# Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

# **Miscellaneous Information:**

# Data Exception (DER) Documentation

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Additional Comments**

Additional comments were not required for this sample set.

#### **Qualifier Information**

Manual qualifiers were not required.

#### Method/Analysis Information

Product:	Liquid Scint Tc99, Liquid
Product:	Liquid Schit 1 (22), Liquid

Analytical Method: DOE EML HASL-300, Tc-02-RC Modified

Analytical Batch Number: 1110082

Sample ID	Client ID
279061001	EFT-51811-11I
279061002	EFT-51811-11D
279061003	EFT-51811-12I
279061004	EFT-51811-12D
1202413860	Method Blank (MB)
1202413861	279061001(EFT-51811-111) Sample Duplicate (DUP)
1202413862	279061001(EFT-51811-11I) Matrix Spike (MS)
1202413863	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with

GL-RAD-A-005 REV# 21.

#### **Calibration Information:**

#### Calibration Information

All initial and continuing calibration requirements have been met.

#### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

# Quality Control (QC) Information;

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### Designated QC

The following sample was used for QC: 279061001 (EFT-51811-111).

#### **QC** Information

All of the QC samples met the required acceptance limits.

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

#### **Miscellaneous Information:**

#### **Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Additional Comments**

Additional comments were not required for this sample set.

# **Qualifier Information**

Manual qualifiers were not required.

# Method/Analysis Information

Product: Lucas Cell, Ra226, liquid

Analytical Method: EPA 903.1 Modified

Analytical Batch Number: 1107697

Sample ID	Client ID
279061001	EFT-51811-11I
279061002	EFT-51811-11D
279061003	EFT-51811-12I
279061004	EFT-51811-12D
1202408406	Method Blank (MB)
1202408407	279061001(EFT-51811-11I) Sample Duplicate (DUP)
1202408408	279061001(EFT-51811-11I) Matrix Spike (MS)
1202408409	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP** Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-008 REV# 13.

#### **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met.

#### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

# **Quality Control (QC) Information:**

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### Designated QC

The following sample was used for QC: 279061001 (EFT-51811-111).

#### **QC** Information

All of the QC samples meet the required acceptance limits with the following exceptions: The sample and the duplicate, 1202408407 (EFT-51811-11I) and 279061001 (EFT-51811-11I), did not meet the relative percent difference requirement. However, they do meet the relative error ratio requirement with a value of 0.9539.

#### **Technical Information:**

### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

#### **Miscellaneous Information:**

#### Data Exception (DER) Documentation

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Additional Comments**

Additional comments were not required for this sample set.

# **Qualifier Information**

Manual qualifiers were not required.

# **Certification Statement**

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

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# Qualifier Definition Report for

ROIT001 Detroit Edison Company Client SDG: 279061 GEL Work Order: 279061

# The Qualifiers in this report are defined as follows:

- \* A quality control analyte recovery is outside of specified acceptance criteria
- \*\* Analyte is a surrogate compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.

#### Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature:

Name: Kate Gellatly

Date: 29 JUN 2011

Title: Analyst I

DER Report No.: 969111

Revision No.: 2

	DATA EXCEP	TION REPORT	
Mo.Day Yr. 23-JUN-11	Division: Radiochemistry	Quality Criteria: Specifications	Type: Process
Instrument Type: GFPC	Test / Method: EPA 905.0 Modified	<b>Matrix Type:</b> Liquid	Client Code: ROIT
Batch ID: 1107743	Sample Numbers: See below		
Potentially affected work order(s)(s Application Issues: Result is more negative than the thre			
Specification and Requirements Exception Description:		DER Disposition:	·
1. Samples 279061001, 279061004 results that are more negative than	, and 279061005 have strontium 89 the three sigma TPU.	1. Reporting results	
·			

Originator's Name:

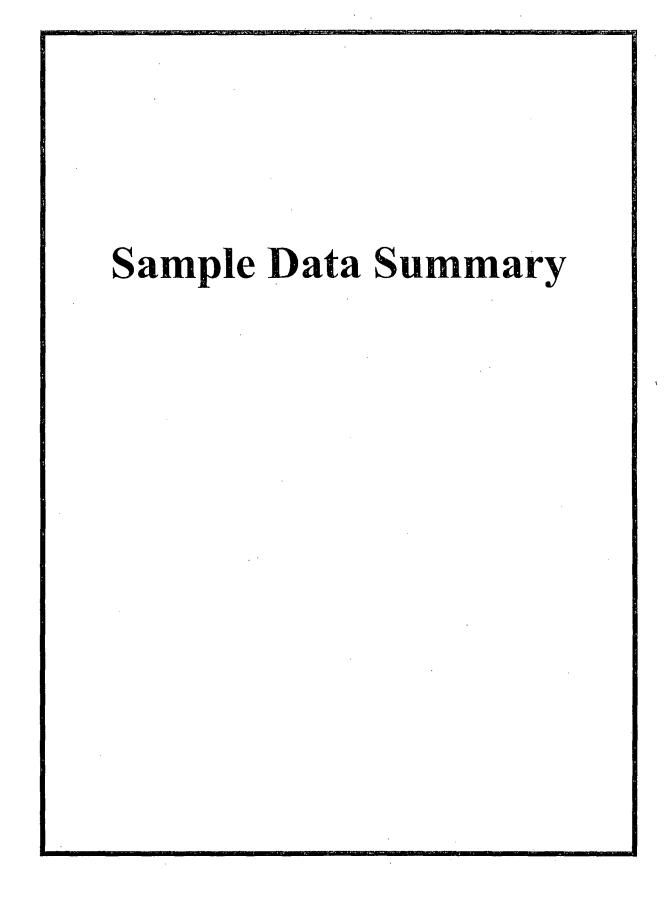
Kenshalla Oston

23-JUN-11

Data Validator/Group Leader:

Nat Long

23-JUN-11



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# **Certificate of Analysis**

Project:

Client ID:

ROIT00116

ROIT001

Report Date: June 29, 2011

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID:

EFT-51811-111

279061001

Sample ID: Matrix:

Ground Water

Collect Date: Receive Date: 18-MAY-11 09:15

31-MAY-11

Collector:

Client

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF Analyst Date	Tim	e Batch	Method
Rad Alpha Spec Analys	is									
Alphaspec Pu, Liquid "A	As Received"									
Plutonium-238	U	0.00204	+/-0.111	0.336	1.00	pCi/L	DDR1 06/09/11	0724	1108273	1
Plutonium-239/240	U	-0.0245	+/-0.105	0.282	1.00	pCi/L				
Plutonium-244	U	0.0387	+/-0.103	0.244	1.00	pCi/L				
Alphaspec U, Liquid "A	s Received"					•				
Pet Uranium-235	U	0.00				percent	DDR1 06/08/11	0933	1108271	2
Uranium-233/234	U	0.154	+/-0.263	0.485	1.00	pCi/L				
Uranium-235/236	U	0.00	+/-0.212	0.325	1.00	pCi/L				
Uranium-238	U	0.221	+/-0.303	0.485	1.00	pCi/L '				
Rad Gamma Spec Analy	ysis		•			•,	•			
Gammaspec, Gamma, L		rd List) "	'As Received"						,	
Actinium-228	U	-5,0	+/-14.2	21.5		pCi/L	KXG3 06/27/11	1233	1111565	3
Americium-241	บ	8.92	+/-19.1	31.5		pCi/L	KXG5 00/27/11	1233	1111303	,
Antimony-124	Ŭ	1.90	+/-10.9	19.2		pCi/L				
Antimony-125	บ	0.841	+/-10.2	17.2		pCi/L				
Barium-133	Ū	-0.698	+/-4.46	6.39		pCi/L				
Barium-140	บ	-75.1	+/-113	158		pCi/L				
Beryllium-7	บ	-14.7	+/-42.3	65.3		pCi/L				
Bismuth-212	U	19.1	+/-54.6	97.5		pCi/L				
Bismuth-214	U	-1.51	+/-9.69	16.4		pCi/L	*			
Cerium-139	U	-0.737	+/-3.52	5.64		pCi/L				
Cerium-141	U	5.34	+/-11.9	20.6		pCi/L				
Cerium-144	U	-18.7	+/-25.7	39.1		pCi/L				
Cesium-134	U	-2.71	+/-4.02	5.78		pCi/L				
Cesium-136	ប	16.6	+/-28.9	55.4		pCi/L				
Cesium-137	U	-0.59	+/-4.33	7.54	10.0	pCi/L				
Chromium-51	U	0.337	+/-69.6	118		pCi/L				
Cobalt-56	U	-0.581	+/-3.88	6.22		pCi/L				
Cobalt-57	U	0.644	+/-3.27	5.56		pCi/L	•			
Cobalt-58	U	1.24	+/-4.72	8.33		pCi/L				
Cobalt-60	U	-2.03	+/-3.78	5.39		pCi/L				
Europium-152	U	-7.0	+/-9.93	15.1		pCi/L				
Europium-154	Ŭ	3.33	+/-8.84	16.5		pCi/L				
Europium-155	U	-8.36	. +/-11.9	18.7		pCi/L				
Iridium-192	U	-1.01	+/-4.35	7.16		pCi/L				
Iron-59	U	12.4	+/-11.9	24.5		pCi/L				
Lead-210	U	-495	+/-509	793		pCi/L				
Lead-212	U	-2.35	+/-7.45	12.5		pCi/L				

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# **Certificate of Analysis**

Report Date: June 29, 2011

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: EFT-51811-111

Sample ID:

279061001

Project:

ROIT00116

Client ID: ROIT001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analys	t Date	Time	Batch N	1ethod
Rad Gamma Spec Ana	lysis									· · ·		
Gammaspec, Gamma,	Liquid (Standa	ard List) "	As Received"									
Lead-214	์ บ	14.7	+/-11.7	15.8		pĆi/L						
Manganese-54	U	0.206	+/-3.74	6.32		pCi/L						
Mercury-203	U	2.28	+/-5.52	9.88		pCi/L						
Neodymium-147	. <b>U</b>	76.5	+/-219	385		pCi/L						
Neptunium-239	· U	-3.51	+/-30.0	49.8		pCi/L						
Niobium-94	U	2.06	+/-3.14	5.90		pCi/L						
Niobium-95	U	5.58	+/-4.53	9.37		pCi/L						
Potassium-40	U	-7.01	+/-46.5	86.2		pCi/L						
Promethium-144	U	-0.0589	+/-3.16	5.34		pCi/L						
Promethium-146	U	-1.98	+/-3.93	5.88		pCi/L						
Radium-228	U	-5.0	+/-14.2	21.5		pCi/L						
Ruthenium-106	U	-3.17	+/-28.8	48.3		pCi/L						
Silver-110m	บ	-1.68	+/-3.67	5.75		pCi/L						
Sodium-22	U	1.09	+/-3.13	5.81		pCi/L						
Thallium-208	U	-1.66	+/-3.74	6.11		pCi/L						
Thorium-234	U	47.3	+/-176	322		pCi/L						
Tin-113	U	-0.651	+/-5.44	8.96		pCi/L						
Uranium-235	U	2.15	+/-25.7	42.9		pCi/L						
Uranium-238	U	47.3	+/-176	322		pCi/L						
Yttrium-88	U	0.0809	+/-3.85	6.60		pCi/L						
Zinc-65	บ	-3.83	+/-6.74	9.64	•	pCi/L						
Zirconium-95	U	3.65	+/-8.33	15.3		pCi/L						
Rad Gas Flow Proport	ional Counting	,			•							
GFPC, Gross A/B, liqu	iid "As Receiv	ed".			•							
Alpha	Ū	2.05	+/-3.06	5.05	5.00	pCi/L		CAS2	06/18/11	1001	1109556	4
Beta	U	2.52	+/-2.61	4.32	5.00	pCi/L						
GFPC, Ra228, Liquid	"As Received"											
Radium-228	U	1.03	+/-1.15	1.93	3.00	pCi/L		BXFI	06/09/11	1334	1107735	5
GFPC, Sr89&Sr90, Lie	quid "As Recei	ived"				•					,,,,,	•
Strontium-89	Ū	-2.16	+/-0.369	1.70	2.00	pCi/L		JXR1	06/17/11	1249	1107743	6
GFPC, Sr90, liquid "A	s Received"					-						
Strontium-90	U	0.0884	+/-1.07	1.94	2.00	pCi/L		JXR1 (	06/26/11	0957	1115396	7
Rad Liquid Scintillatio	n Analysis											
LSC, Tritium Dist, Liq	uid "As Recei	ved"										
Tritium	U	65.7	+/-293	529	700	pCi/L		EXK2	06/13/11	1647	1109586	8
Liquid Scint Tc99, Liq	uid "As Recei	ved"									*	

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# **Certificate of Analysis**

Report Date: June 29, 2011

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: EFT-51811-111

Sample ID:

279061001

Project:

ROIT00116

Client ID:

ROIT001

	<u> </u>		······································						
Parameter	Qualifier Result	Uncertainty	DL	RL	Units	DF Analys	t Date	Time Batc	h Method
Rad Liquid Scintillatio	n Analysis								***************************************
Liquid Scint Tc99, Liq	uid "As Received"								
Technetium-99	U 7.6	9 +/-16.6	28.5	50.0	pCi/L	MXPI	06/14/11	0820 1110083	2 9
Rad Radium-226									
Lucas Cell, Ra226, liqu	uid "As Received"								
Radium-226	2.6	7 +/-0.598	0.442	1.00	pCi/L	KSDI	06/08/11	1240 110769	7 10
The following Analyti	cal Methods were perf	ormed:							
Method	Description				Ana	lyst Comments			
1	DOE EML HASL-300, I	Pu-11-RC Modified							
2	DOE EML HASL-300, U	J-02-RC Modified							
3	EPA 901.1								
4	EPA 900.0/SW846 9310				,				
5	EPA 904.0/SW846 9320	Modified							
6	EPA 905.0 Modified								
7	EPA 905.0 Modified								
8	EPA 906.0 Modified								
9	DOE EML HASL-300, T	c-02-RC Modified							
10	EPA 903.1 Modified								
Surrogate/Tracer Reco	very Test			Re	sult Non	ninal Recov	ery%	Acceptable	Limits
Plutonium-242 Tracer	Alphaspec Pu, Liq	uid "As Received"					94.2	(15%-125	%)
Uranium-232 Tracer	Alphaspec U, Liqu	id "As Received"					81.9	(15%-125	%)
Barium-133 Tracer	GFPC, Ra228, Liq	uid "As Received"					79.6	(15%-125	%)
Strontium Carrier	•	, Liquid "As Receive					123	(25%-125	%)
Yttrium Carrier	GFPC, Sr89&Sr90	, Liquid "As Receive	d"			!	98.9	(25%-125	%)
Strontium Carrier	GFPC, Sr90, liquid						113	(25%-125	%)
Technetium-99m Tracer	Liquid Scint Tc99,	Liquid "As Received	d"		-		101	(15%-125	%)

Project:

Client ID:

ROIT00116

ROIT001

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

# **Certificate of Analysis**

Report Date: June 29, 2011

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: EFT-51811-11D

Sample ID:

279061002

Matrix: Collect Date: Ground Water 18-MAY-11 16:00

Receive Date:

31-MAY-11

Collector:

Client

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF Analyst Date	Time	e Batch	Method
Rad Alpha Spec Anal	lysis						***************************************			
Alphaspec Pu, Liquid	l "As Received"							-		
Plutonium-238	U	-0.0356	+/-0.154	0.411	1.00	pCi/L	DDR1 06/16/11	1525	1108273	i
Plutonium-239/240	U	0.0208	+/-0.157	0.453	1.00	pCi/L				
Plutonium-244	U	0.279	+/-0.293	0.355	1.00	pCi/L				
Alphaspec U, Liquid	"As Received"					-				
Pct Uranium-235	U	0.00				percent	DDR1 06/08/11	0933	1108271	2
Uranium-233/234	U	0.0848	+/-0.191	0.414	1.00	pCi/L				
Uranium-235/236	Ú	0.0555	+/-0.221	0.591	1.00	pCi/L				
Uranium-238	U	0.0898	+/-0.253	0.569	00.1	pCi/L				
Rad Gamma Spec An	nalysis									
Gammaspec, Gamma	, Liquid (Standa	rd List) "	'As Received"							
Actinium-228	້ ບ	1.15	+/-12.5	21.1		pCi/L	KXG3 06/27/11	1238	1111565	3 ,
Americium-241	บ	-22.3	+/-22.9	35.6		pCi/L				,
Antimony-124	U	2.75	+/-7.93	14.7		pCi/L				
Antimony-125	. U	-1.24	+/-7.96	13.0		pCi/L				
Barium-133	U	3.18	+/-4.40	7.12		pCi/L				
Barium-140	U	8.00	+/-81.7	135		pCi/L				•
Beryllium-7	U	-18	+/-37.3	57.0		pCi/L				
Bismuth-212	U	43.4	+/-37.4	73.9		pCi/L				
Bismuth-214	U	6.99	+/-7.69	13.6		pCi/L				
Cerium-139	U	-0.607	+/-3.48	5.60		pCi/L				
Cerium-141	U	-9.91	+/-10.5	15.1		pCi/L				
Cerium-144	U	11.3	+/-20.4	35.0		pCi/L				
Cesium-134	U	0.473	+/-3.15	5.43		pCi/L				
Cesium-136	U	-19.9	+/-28.9	41.2		pCi/L				
Cesium-137	U	1.03	+/-3.67	6.89	10.0	pCi/L				
Chromium-51	U	45.1	+/-58.6	107		pCi/L				
Cobalt-56	U	2.44	+/-3.93	7.23		pCi/L				
Cobalt-57	U	-0.015	+/-2.89	4.79		pCi/L				
Cobalt-58	U	-0.0765	1/-3.94	6.59		pCi/L				
Cobalt-60	U	2.45	+/-3.17	6.16		pCi/L				
Europium-152	U	0.401	+/-8.38	14.2		pCi/L				
Europium-154	U	-0.727	+/-6.24	10.2		pCi/L				
Europium-155	U	4.64	+/-10.6	18,3		pCi/L				
Iridium-192	U	-0.64	+/-4.00	6.47		pCi/L			١.	
Iron-59	U	0.658	+/-10.7	17.8		pCi/L				
Lead-210	U	221	+/-804	1410		pCi/L				
Lead-212	U	-2.92	+/-6.06	10.0		pCi/L				

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

# **Certificate of Analysis**

Report Date: June 29, 2011

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: EFT-51811-11D

Sample ID:

279061002

Project:

ROIT00116

Client ID:

ROIT001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF Analy	st Date	Time	Batch	Method
Rad Gamma Spec Anal	ysis					· · · · · · · · · · · · · · · · · · ·					
Gammaspec, Gamma, I	Liquid (Standa	ard List) "A	As Received"								
Lead-214	້ ບ	4.44	+/-9.67	13.8		pCi/L					
Manganese-54	U	0.237	+/-2.95	5.00		pCi/L					
Mercury-203	U	2.13	+/-5.08	8.97		pCi/L					
Ncodymium-147	U	35.5	+/-193	325		pCi/L					
Neptunium-239	U	-16	+/-27.3	43.0		pCi/L					
Niobium-94	ប	-0.489	+/-2.61	4.30		pCi/L					
Niobium-95	U	1.19	+/-4.48	7.84		pCi/L					
Potassium-40	U	-24.3	+/-31.7	46.9		pCi/L	_				
Promethium-144	. U	-2.1	+/-2.62	3.84		pCi/L					
Promethium-146	υ	1.24	+/-3.35	5.83		pCi/L					
Radium-228	U	1.15	+/-12.5	21.1		pCi/L					
Ruthenium-106	U	7.78	+/-23.6	42.4		pCi/L					
Silver-110m	U	-5.06	+/-3.38	4.49		pCi/L					
Sodium-22	U	0.412	+/-2.03	3.65		pCi/L					-
Thallium-208	U	0.910	+/-4.62	5.40		pCi/L					
Thorium-234	U	-44.9	+/-185	303		pCi/L					
Tin-113	U	-1.41	+/-4.10	6.53		pCi/L					
Uranium-235	U	8.76	+/-21.5	32.4		pCi/L					
Uranium-238	υ	-44.9	+/-185	303		pCi/L					
Yttrium-88	U	-1.27	+/-4.74	7.25		pCi/L					
Zinc-65	U	-4.29	+/-7.60	11.0		pCi/L					
Zirconium-95	U	-1.86	+/-7.51	12.2		pCi/L					
Rad Gas Flow Proportion	onal Counting										
GFPC, Gross A/B, liqui	id "As Receiv	ed"									
Alpha		6.65	+/-3.11	3.33	5.00	pCi/L	CAS2	06/18/11	1002	1109556	4
Beta	U	2.20	+/-2.94	4.96	5.00	pCi/L					
GFPC, Ra228, Liquid "	As Received"					-					
Radium-228	U	1.66	+/-1.35	2.17	3.00	pCi/L	BXFI	06/09/11	1334	1107735	5
GFPC, Sr89&Sr90, Liq	uid "As Recei	ived"	•			•					
Strontium-89	U	0.688	+/-1.08	1.89	2.00	pCi/L	JXRI	06/17/11	1249	1107743	6
GFPC, Sr90, liquid "As	Received"		•			-					
Strontium-90	U	-0.244	+/-0.825	1.70	2.00	pCi/L	JXR1	06/26/11	0958	1115396	7
Rad Liquid Scintillation	n Analysis	1									
LSC, Tritium Dist, Liqu	ıid "As Recei	ved"									
Tritium	U	49.3	+/-295	536	700	pCi/L	EXK2	06/13/11	1703	1109586	8
Liquid Scint Tc99, Liqu	iid "As Receiv	ved"			9	•					

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**Certificate of Analysis** 

Report Date: June 29, 2011

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: EFT-51811-11D

Project:

ROIT00116

Sample ID:

279061002

Client ID:

ROIT001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF Anal	yst Date	Time Batch	Method
Rad Liquid Scintillatio	n Analysis									
Liquid Scint Tc99, Liq	uid "As Recei	ved"						•		
Technetium-99	U	-5.77	+/-16.7	29.9	50.0	pCi/L	MXP	1 06/14/11	0836 1110082	9
Rad Radium-226										
Lucas Cell, Ra226, liqu	uid "As Receiv	ed"								3
Radium-226		2.54	+/-0,496	0.289	1.00	pCi/L	KSD	06/08/11	1240 1107697	10
The following Analyti	cal Methods w	vere perfo	rmed:							
Method	Description					Ar	nalyst Comme	nts		
I			-11-RC Modified							
2	DOE EML HA	ASL-300, U-	02-RC Modified	*						
,3	EPA 901.1		*						•	
4	EPA 900.0/SV	V846 9310								
5	EPA 904.0/SV	7846 9320 N	Modified							
6	EPA 905.0 Mc	odified								
7	EPA 905.0 Mc	odified								
8	EPA 906.0 Mc	odified								
9	DOE EML HA	ASL-300, To	-02-RC Modified							
10	EPA 903.1 Mc	odified								
Surrogate/Tracer Reco	very Test				Res	sult N	ominal Red	overy%	Acceptable L	Limits
Plutonium-242 Tracer	Alphasp	ec Pu, Liqu	id "As Received"					79.2	(15%-125%	(a)
Uranium-232 Tracer	Alphasp	ec U, Liqui	d "As Received"					84.2	(15%-125%	(a)
Barium-133 Tracer	GFPC,.1	Ra228, Liqu	id "As Received"					69.6	(15%-125%	(a)
Strontium Carrier			Liquid "As Receive					110	(25%-125%	•
Yttrium Carrier	•		Liquid "As Receive	:d"				95.6	(25%-125%	•
Strontium Carrier		•	"As Received"					90.7	(25%-125%	•
Technetium-99m Tracer	· Liquid S	Scint Tc99, I	Liquid "As Receive	d"				96.1	(15%-125%	<b>b</b> )

Project:

Client ID:

ROIT00116

ROIT001

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# **Certificate of Analysis**

Report Date: June 29, 2011

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: EFT-51811-12I

Sample ID:

279061003

Ground Water

Matrix: Collect Date:

18-MAY-11 15:25

Receive Date:

31-MAY-11

Collector:

Client

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF Analyst Date Ti	me Batch	Method
Rad Alpha Spec Ana	alysis								
Alphaspec Pu, Liqui	d "As Received"						•		
Plutonium-238	· U	-0.0386	+/-0.114	0.327	1.00	pCi/L	DDRI 06/09/11 072	4 1108273	1
Plutonium-239/240	U	-0.129	+/-0.132	0.465	1.00	pCi/L			•
Plutonium-244	U	0.0279	+/-0.111	0.297	1.00	pCi/L			•
Alphaspec U, Liquic	l "As Received"					•			
Pct Uranium-235	U	0.00				percent	DDR1 06/16/11 150	0 1108271	2
Uranium-233/234	-	0.780	+/-0.506	0.446	1.00	pCi/L			-,
Uranium-235/236	U	0.0995	+/-0.195	0.298	1.00	pCi/L			
Uranium-238		0.586	+/-0.451	0.492	1.00	pCi/L			
Rad Gamma Spec A	nalysis					•			
Gammaspec, Gamm	-	ard List) "	'As Received"						
Actinium-228	υ	4.71	+/-10.0	17.6		pCi/L	KXG3 06/27/11 124	4 1111565	3
Americium-241	U	-6.85	+/-13.0	19.6		pCi/L			_
Antimony-124	U	3.44	+/-7.40	14.0		pCi/L			
Antimony-125	U	5.72	+/-5.85	11.1		pCi/L			
Barium-133	U	-1.44	+/-2.99	4.86		pCi/L			
Barium-140	Ŭ	-36.2	+/-70.1	106		pCi/L			
Beryllium-7	U	8.15	+/-31.5	54.8		pCi/L			
Bismuth-212	U	12.2	+/-34.7	60.0		pCi/L			
Bismuth-214	U	-0.993	+/-6.63	10.7		pCi/L			
Cerium-139	U	0.209	+/-2.64	4.48		pCi/L			
Cerium-141	U	-7.24	+/-9.80	14.9		pCi/L			
Cerium-144	U	10.2	+/-17.3	30.6		pCi/L	•		
Cesium-134	U	2.86	+/-2.99	5.75		pCi/L			
Cesium-136	U	-12.8	+/-24.3	36.2		pCi/L	4		
Cesium-137	Ū	0.999	+/-2.34	4.13	10.0	pCi/L			
Chromium-51	บ	-8.0	+/-46.7	79.4		pCi/L			
Cobalt-56	U	0.745	+/-2.91	5.19		pCi/L	•		
Cobalt-57	U	-2.49	+/-2.32	3.64		pCi/L			
Cobalt-58	U	-0.128	+/-3.21	5.45		pCi/L			
Cobalt-60	U	-1.12	+/-2.22	3.08		pCi/L			
Europium-152	U	2.91	+/-6.99	12.5		pCi/L			
Europium-154	U	-3.4	+/-7.22	10.5		pCi/L			
Europium-155	U	-2.74	+/-8.20	13.8		pCi/L			
Iridium-192	U	1.05	+/-3.42	5.71		pCi/L			
Iron-59	U	4.19	+/-8.24	15.0		pCi/L			
Lead-210	U	376	+/-447	437		pCi/L			
Lead-212	U	-0.863	+/-5.79	9.39		pCi/L			

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# Certificate of Analysis

Report Date: June 29, 2011

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: EFT-51811-12I

Sample ID:

279061003

Project:

ROIT00116

Client ID:

ROIT001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF Analyst 1	Date	Time	Batch	Method
Rad Gamma Spec Anal	ysis										
Gammaspec, Gamma, I	iquid (Standa	rd List) "	'As Received"								
Lead-214	ໍ ` ບ	-0.242	+/-6.21	10.1	•	pCi/L					
Manganese-54	U	-2.6	+/-2.62	3.73		pCi/L					
Mercury-203	U	4.40	+/-4.39	7.82		pCi/L					
Neodymium-147	U	54.3	+/-197	342		pCi/L					
Neptunium-239	U	-7.68	+/-22.7.	37.9		pCi/L					
Niobium-94	U	0.747	+/-2.28	3.92		pCi/L					
Niobium-95	U	1.13	+/-3.19	5.77		pCi/L					
Potassium-40	U	-30.4	+/-29.4	49.1		pCi/L					
Promethium-144	U	-0.591	+/-2.56	4.03		pCi/L					
Promethium-146	U	-2.89	+/-3.05	4.50		pCi/L					
Radium-228	U	4.71	+/-10.0	17.6		pCi/L					
Ruthenium-106	U	-4.65	+/-23.5	37.7		pCi/L					
Silver-110m	U	-1.75	+/-2.47	3.55		pCi/L					
Sodium-22	U	-1.39	+/-2.54	3.60		pCi/L					
Thallium-208	U	-2.04	+/-3.17	4.79		pCi/L					
Thorium-234	U	-49.3	+/-138	230		pCi/L					
Tin-113	IJ	-0.364	+/-3.74	6.33		pCi/L					
Uranium-235	Ŭ	-4.19	+/-19.9	28.9	•	pCi/L					
Uranium-238	บ	-49.3	+/-138	230		pCi/L					
Yttrium-88	บ	1.92	+/-3.72	6.94		pCi/L					
Zinc-65	U	-3.08	+/-5.13	7.34		pCi/L					
Zirconium-95	U	2.27	+/-6.28	11.3		pCi/L					
Rad Gas Flow Proportion	onal Counting										
GFPC, Gross A/B, liqui	d "As Receive	ed"									
Alpha	U	-0.706	, +/-1.95	5.00	5.00	pCi/L	CAS2 06/1	18/11 1	1002 1	109556	4
Beta	U	3.95	+/-2.88	4.55	5.00	pCi/L					
GFPC, Ra228, Liquid ".	As Received"										
Radium-228	U	1.34	+/-1.03	1.63	3.00	pCi/L	BXF1 06/0	09/11 1	1334 1	107735	5
GFPC, Sr89&Sr90, Liq	uid "As Recei	ved"				•					
Strontium-89	U	-1.56	+/-0.613	1.91	2.00	pCi/L	JXR1 06/1	17/11 1	1249 1	107743	6
GFPC, Sr90, liquid "As	Received"										
Strontium-90	U	0.428	+/-1.06	1.88	2.00	pCi/L	JXR1 06/2	26/11 (	958 1	115396	7
Rad Liquid Scintillation	Analysis										
LSC, Tritium Dist, Liqu	iid "As Receiv	ed"									
Tritium	U	0.00	+/-289	534	700	pCi/L	EXK2 06/1	13/11 1	1719 1	109586	8
Liquid Scint Tc99, Liqu	iid "As Receiv	∕ed"									

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**Certificate of Analysis** 

Report Date: June 29, 2011

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID:

EFT-51811-12I

Project:

ROIT00116

Sample ID:

279061003

Client ID: ROIT001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF Analyst Date	Time Batch Metho
Rad Liquid Scintillatio	n Analysis							
Liquid Scint Tc99, Liq	uid "As Recei	ved"						`
Technetium-99	U	-13	+/-15.3	28.1	50.0	pCi/L	MXPI 06/14/11	0852 1110082 9
Rad Radium-226								
Lucas Cell, Ra226, liq	uid "As Receiv	ved"						
Radium-226		0.739	+/-0.307	0.362	1.00	pCi/L	KSD1 06/08/11	1240 1107697 10
The following Analyti	ical Methods v	vere perfo	rmed:					
Method	Description					Ana	lyst Comments	
1	DOE EML HA	ASL-300, Pu	-11-RC Modified					
2	DOE EML HA	ASL-300, U-	02-RC Modified					
3	EPA 901.1							
4	EPA 900.0/SV	V846 9310						
5	EPA 904.0/SV	V846 9320 N	1odified					
6	EPA 905.0 Mc	odified						
7	EPA 905.0 Mc	odified					•	
8	EPA 906.0 Mc	odified						
9	DOE EML HA	ASL-300, To	-02-RC Modified					
10	EPA 903.1 Mc	odified						
Surrogate/Tracer Reco	very Test				Res	ult Non	ninal Recovery%	Acceptable Limits
Plutonium-242 Tracer	Alphasp	ec Pu, Liqu	d "As Received"				92.6	(15%-125%)
Uranium-232 Tracer	Alphasp	ec U, Liquie	l "As Received"				88.6	(15%-125%)
Barium-133 Tracer	GFPC, 1	Ra228, Liqu	id "As Received"				94.2	(15%-125%)
Strontium Carrier	•		Liquid "As Received				112	(25%-125%)
Yttrium Carrier		-	Liquid "As Received	i" \			94.7	(25%-125%)
Strontium Carrier	•		'As Received"				107	(25%-125%)
Technetium-99m Tracer	Liquid S	Scint Tc99, I	iquid "As Received.	u			102	(15%-125%)

Project:

Client ID:

ROIT00116

ROIT001

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

# Certificate of Analysis

Report Date: June 29, 2011

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID:

Sample ID:

EFT-51811-12D

iipie ii).

279061004

Matrix:

Ground Water 18-MAY-11 10:50

Collect Date: Receive Date:

31-MAY-11

Collector:

Client

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF Analyst Date	Time Batch	Method
Rad Alpha Spec Anal	ysis								
Alphaspec Pu, Liquid	"As Received"					٠.			
Plutonium-238	U	-0.0721	+/-0.134	0.421	1.00	pCi/L	DDR1 06/09/11	0724 1108273	1
Plutonium-239/240	U	-0.187	+/-0.156	0.569	1.00	pCi/L			•
Plutonium-244	υ	0.0456	+/-0.121	0.288	1.00	pCi/L			
Alphaspec U, Liquid	"As Received"					•			
Pct Uranium-235	U	0.00				percent	DDR1 06/08/11	0933 1108271	2
Uranium-233/234	Ū	0.0924	+/-0.168	0.239	1.00	pCi/L	DDRI OURONII	0233 1100271	2
Uranium-235/236	Ū	0.00		0.296	1.00	pCi/L			
Uranium-238	Ü	0.00	+/-0.156	0.239	1.00	pCi/L			
Rad Gamma Spec An	alvsis					•	•		
Gammaspec, Gamma	-	rd List) "	'As Received"				r		
Actinium-228	,U	0.0965	+/-10.9	18.3		pCi/L	KXG3 06/27/11	1244 1111565	3
Americium-241	Ŭ	6.25	+/-5.32	9.29		pCi/L	TOTOS ON ENTIT	1211 1111505	,
Antimony-124	Ü	0,669	+/-11.2	18.7		pCi/L			
Antimony-125	U	2.83	+/-7.70	13.5		pCi/L			
Barium-133	U	-1.67	+/-3.42	5.57		pCi/L		•	
Barium-140	U	40.8	+/-84.2	147		pCi/L			
Beryllium-7	U	-0.86	+/-38.7	64.6		pCi/L			
Bismuth-212	U	19.1	+/-49.8	81.5		pCi/L			
Bismuth-214	U	-1.21	+/-7.42	11.9		pCi/L			
Cerium-139	U	-0.906	+/-2.67	4.38		pCi/L			
Cerium-141	U	2.16	+/-9.11	15.7		pCi/L			
Ccrium-144	U	7.48	+/-16.5	29.0		pCi/L			
Cesium-134	U	0.495	+/-3.31	5.73		pCi/L	•		
Cesium-136	U	-0.216	+/-26.4	43.5		pCi/L			
Cesium-137	U	-4.33	+/-4.42	7.94	10.0	pCi/L			
Chromium-51	U	45.5	+/-59.3	109		pCi/L			
Cobalt-56	U	0.466		7.30		pCi/L	•		
Cobalt-57	U	0.542	+/-2.17	3.79		pCi/L			
Cobalt-58	U	-0.695	+/-4.04	6.64		pCi/L			
Cobalt-60	U	-0.0587	+/-3.70	6.23		pCi/L			
Europium-152	U	3.43	+/-8.41	14.9		pCi/L			
Europium-154	U	0.748	+/-8.49	14.7		pCi/L			
Europium-155	U	-0.481	+/-8.13	14.1		pCi/L			
Iridium-192	U	-1.88	+/-4.09	6.62		pCi/L			
Iron-59	ı U	-4.39	+/-9.76	14.5		pCi/L			
Lead-210	. U	-8.28	+/-62.8	114		pCi/L	•		
Lead-212	Ü	-1.32	+/-6.01	9.64		pCi/L	at .		

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

# Certificate of Analysis

Report Date: June 29, 2011

Company:

Detroit Edison - Fermi'l

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: EFT-51811-12D

Sample ID:

279061004

Project:

ROIT00116

Client ID:

ROIT001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF Analy	st Date	Time	Batch	Method
Rad Gamma Spec A	nalysis	-									
Gammaspec, Gamma	a, Liquid (Standa	ard List) ".	As Received"								
Lead-214	<i>'</i> ' ' ' ' ' ' ' ' '	1.40	+/-6.74	11.2		pCi/L					
Manganese-54	U	0.657	+/-3.25	5.63		pCi/L					
Mercury-203	U	-0.157	+/-4.78	7.73		pCi/L	,				
Neodymium-147	U	-62.8	+/-203	320		pCi/L					
Neptunium-239	U	-10,7	+/-19.3	32.0		pCi/L					
Niobium-94	U	-1.33	+/-2.39	3.74		pCi/L					
Niobium-95	U	1.35	+/-4.25	7.54		pCi/L					
Potassium-40	U	15.6	+/-38.8	70.3		pCi/L					
Promethium-144	U	1.94	+/-3.16	5.79		pCi/L					
Promethium-146	U	-0.365	+/-3.40	5.64		pCi/L					
Radium-228	U	0.0965	+/-10.9	18.3		pCi/L					
Ruthenium-106	U	6.88	+/-27.6	46.7		pCi/L					
Silver-110m	U	-7.87	+/-3.55	4.25		pCi/L					
Sodium-22	U	0.066	+/-2.99	5.10		pCi/L					
Thallium-208	U	-2.21	+/-3.63	5.61		pCi/L					
Thorium-234	U	-71.4	+/-64.9	107		pCi/L					
Tin-113	U	4.14	+/-3.76	7.12		pCi/L					
Uranium-235	U	0.887	+/-18.7	30.5		pCi/L					
Uranium-238	U	-71.4	+/-64.9	107		pCi/L		;			
Yttrium-88	U	-0.0697	+/-3.59	6.07		pCi/L					
Zinc-65	U	1:07	+/-6.57	11.1		pCi/L					
Zirconium-95	U	-6.36	+/-8.21	12.4		pCi/L					
Rad Gas Flow Propo	ortional Counting	5					•				`
GFPC, Gross A/B, li	quid "As Receiv	ed"									
Alpha	· U	2,94	+/-2.64	3.48	5.00	pCi/L	CAS2	06/18/11	1002 1	109556	4
Beta		11.4	+/-3.58	4.77	5.00	pCi/L				107000	•
GFPC, Ra228, Liqui	d "As Received"					. •					
Radium-228		2.62	+/-1.24	1.80	3.00	pCi/L	BXF1	06/09/11	1334 1	107735	5
GFPC, Sr89&Sr90, I	Liquid "As Rece					·		00/02/11			
Strontium-89	υ	-164	+/-7.73	1.85	2.00	pCi/L	JXRI	06/17/11	1249 1	107743	6
GFPC, Sr90, liquid "	'As Received"					•	· ·				
Strontium-90	U	0.254	+/-0.669	1.23	2.00	pCi/L	JXR1	06/26/11	0958 1	115396	7
Rad Liquid Scintillat	tion Analysis					-					
LSC, Tritium Dist, L		ved"									
Tritium	U U	-103	+/-276	532	700	pCi/L	EXK2	06/13/11	1735 1	109586	. 8
Liquid Scint Tc99, L	iquid "As Recei	ved"									

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

# **Certificate of Analysis**

Report Date: June 29, 2011

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: EFT-51811-12D

Project:

ROIT00116

Sample ID:

279061004

Client ID: ROIT001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analys	st Date	Time	Batch	Method
Rad Liquid Scintillation	n Analysis		-									
Liquid Scint Tc99, Lic	juid "As Recei	ved"										
Technetium-99	U	-2.87	+/-15.7	27.8	50.0	pCi/L		MXP1	06/14/11	0908	1110082	9
Rad Radium-226												
Lucas Cell, Ra226, liq	uid "As Receiv	ved"										
Radium-226		3.09	+/-0.549	0.335	1.00	pCi/L		KSD1	06/08/11	1310	1107697	10
The following Analyt	ical Methods v	vere perfo	rmed:									
Method	Description					Ana	alyst Co	mment	S			
1	DOE EML HA	ASL-300, Pu	-11-RC Modified									
2	DOE EML HA	ASL-300, U-	02-RC Modified									
3	EPA 901.1											
4	EPA 900.0/SV	V846 9310										
5	EPA 904.0/SV	V846 9320 N	Modified									
6	EPA 905.0 Mc	odified										
7	EPA 905.0 Mc	odified										
8	EPA 906.0 Mc	odified										
9	DOE EML HA	ASL-300, To	-02-RC Modified									
10	EPA 903.1 Mc	odified										
Surrogate/Tracer Recovery Test					Re	sult No	minal	Reco	very%	Acce	otable L	imits
Plutonium-242 Tracer	Alphasp	ec Pu, Liqu	id "As Received"						84.1	(1:	5%-125%	)
Uranium-232 Tracer	Alphasp	ec U, Liquie	d "As Received"						92.8	(1:	5%-125%	)
Barium-133 Tracer	GFPC, I	Ra228, Liqu	id "As Received"						95.4	(1:	5%-125%	)
Strontium Carrier		-	Liquid "As Received						112	(2:	5%-125%	)
Yttrium Carrier		•	Liquid "As Received	"					98.5	(2:	5%-125%	)
Strontium Carrier			"As Received"						116	(2:	5%-125%	)
Technetium-99m Tracer	Liquid S	Scint Tc99, I	Liquid "As Received"	l .					103	$\alpha$ :	5%-125%	)

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## Certificate of Analysis

Project:

Client ID:

**Analyst Comments** 

ROIT00116

ROIT001

Report Date: June 29, 2011

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Sample ID:

Client Sample ID: EFT-51911-131

Sample ID
Matrix:

279061005 Ground Water

Collect Date: Receive Date:

19-MAY-11 10:00 31-MAY-11

Collector:

Method

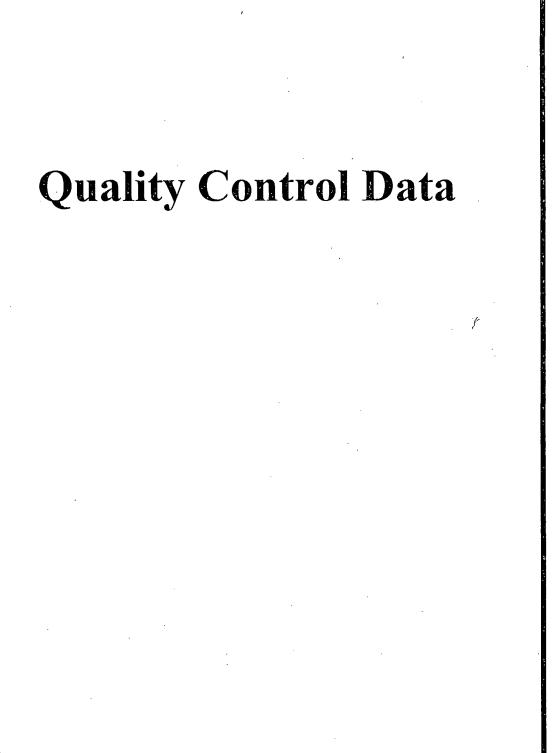
Client

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF Analyst Date	Time Batch	Method
Rad Gas Flow Propo	rtional Counting	<u></u>					, , , , , , , , , , , , , , , , , , , ,		
GFPC, Sr89&Sr90, I	Liquid "As Rece	ived"							
Strontium-89	U	-81.7	+/-5.24	1.87	2.00	pCi/L	JXR1 06/16/11	2236 1107743	1
GFPC, Sr90, liquid "	'As Received"							,	
Strontium-90	U	0.530	+/-1.08	1.90	2.00	pCi/L	JXR1 06/26/11	0958 1115396	2
The following Analy	utical Methode u	iere nerfo	rmed:		•				

The following Analytical Methods were performed:

Description EPA 905.0 Modified

2 EPA	905.0 Modified				
Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Strontium Carrier	GFPC, Sr89&Sr90, Liquid "As Received"			114	(25%-125%)
Yttrium Carrier	GFPC, Sr89&Sr90, Liquid "As Received"			100	(25%-125%)
Strontium Carrier	GFPC, Sr90, liquid "As Received"			109	(25%-125%)



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## **QC Summary**

Report Date: June 29, 2011

Page 1 of 12

Detroit Edison - Fermi 1 PO Box 44440

Detroit, Michigan Mr. Tom Mow

Contact:

Parmname			NOM	Sample	Qual	QC	Units	RPD%	REC%	Range Anlst	Date Time
Rad Alpha Spec								-			
	8271										
QC1202409783	279061001	DUP									
Pct Uranium-235			U	0.00	U	0.00	percent	0.00		N/A DDR1	06/08/11 09:33
Uranium-233/234			U	0.154	U	0.245	pCi/L	0.00		N/A	
J. J			Uncertainty	+/-0.263		+/-0.293	•				
Uranium-235/236			U	0.00	U	0.0533	pCi/L	0.00		N/A	
0.4			Uncertainty	+/-0.212		+/-0.212					
Uranium-238			U	0.221		0.541	pCi/L	10.9		(0% - 100%)	
Oramani-230			Uncertainty	+/-0.303		+/-0.434	Post			(0,0 100,0)	
QC1202409785	LCS		oneon anny	,, 515 45		., ., ., .					
Pct Uranium-235						0.748	percent				06/08/11 09:33
Uranium-233/234						21.3	pCi/L				
			Uncertainty			+/-2.71	•				
Uranium-235/236						1.08	pCi/L				
O. a			Uncertainty			+/-0.688	1				
Uranium-238			25.9			22.3	pCi/L		86.1	(75%-125%)	
Oraman 250			Uncertainty			+/-2.77	1,025			(1370 12370)	
QC1202409782	мВ										
Pct Uranium-235					U	0.00	percent				06/08/11 09:33
Uranium-233/234					U	0.138	pCi/L				
			Uncertainty			+/-0.315	•				
Uranium-235/236			,		U	-0.0298	pCi/L				
			Uncertainty			+/-0.250	•				
Uranium-238					U	0.201	pCi/L			•	
C.u			Uncertainty			+/-0.279	1				•
QC1202409784	279061001	MS	o			, , , ,,,,,					
Pct Uranium-235			U	0.00		0.538	percent				06/08/11 09:33
Uranium-233/234			U	0.154		24.4	pCi/L			•	
			Uncertainty	+/-0.263		+/-2.78					
Uranium-235/236			Ú	0.00		0.888	pCi/L				
			Uncertainty	+/-0.212		+/-0.598	• •				
Uranium-238			25.9 U	0.221		25.5	pCi/L		98.5	(75%-125%)	
220			Uncertainty	+/-0.303		+/-2.83				(,	
Batch 110	8273										
QC1202409787	279061001	DUP									
Plutonium-238	217001001	, 501	U	0.00204	U	-0.101	pCi/L	0.00		N/A DDR1	06/09/11 07:24
a.o			Uncertainty	+/-0.111	-	+/-0.125	1,0,11				2-1 <b>1 1</b> 1
Plutonium-239/240	1		U	-0.0245	U	-0.0506	pCi/L	0.00		N/A	
. momun-23/1240	•		Uncertainty	+/-0.105	_	+/-0.114	Pont			. 1/11	
Plutonium-244			U	0.0387	U	0.145	pCi/L	0.00		N/A	
1 1010muill-244			Uncertainty	+/-0.103	-	+/-0.180	I/CI/L	3,00		NIA	
			Oncorrainty	17-0.103		17-0.100					
QC1202409789	LCS.						•				

Workorder: 279061								Page 2 of 12				
Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range Anlst	Date Time			
Rad Alpha Spec								•				
Batch 1108273	•											
	Uncertainty											
•				+/-0.186								
Plutonium-239/240	20.4			20.6	pCi/L	•	101	(75%-125%) DDR1	06/09/11 07:24			
	Uncertainty			+/-2.61								
Plutonium-244			U	0.0445	pCi/L	,						
0.01000400000	Uncertainty			+/-0.177								
QC1202409786 MB Plutonium-238			Ū	0.00	pCi/L				06/09/11 07:24			
Flutonium-238	Uncertainty		U	+/-0.108	pc//L				00/09/11 07,24			
Plutonium-239/240	Oncertainty		U	0.042	pCi/L			•				
1 Intollium-239/240	Uncertainty		O	+/-0.111	pe#E							
Plutonium-244	Oncertainty		U	0.042	pCi/L	•						
1 Idiomani-244	Uncertainty		C	+/-0.111	рены							
QC1202409788 279061001 MS	Sheerlanky					~						
Plutonium-238	U	0.00204	U	-0.0585	pCi/L				06/09/11 07:24			
•	Uncertainty	+/-0.111		+/-0.122								
Plutonium-239/240	20.4 U	-0.0245		20.2	pCi/L		99	(75%-125%)				
	Uncertainty	+/-0.105		+/-1.98	•							
Plutonium-244	, U	0.0387	U	0.0886	pCi/L							
	Uncertainty	+/-0.103		+/-0.142								
Rad Gamma Spec Batch 1111565												
QC1202417334 279061001 DUP												
Actinium-228	U	-5.0	U	4.07	pCi/L	0.00		N/A KXG3	06/27/11 13:49			
	Uncertainty	+/-14.2		+/-13.4								
Americium-241	U	8.92	U	21.7	pCi/L	0.00		N/A				
	Uncertainty	+/-19.1	•	+/-24.5								
Antimony-124	U	1.90	U	-14.2	pCi/L	0.00		N/A				
	Uncertainty	+/-10.9		+/-15.6								
Antimony-125	U	0.841	U	1.12	pCi/L	0.00		N/A				
	Uncertainty	+/-10.2		+/-10.2								
Barium-133	U	-0.698	U	-2.12	pCi/L	0.00		N/A				
	Uncertainty	+/-4.46		+/-4.91								
Barium-140	U	-75.1	U	-16	pCi/L	0.00		N/A				
	Uncertainty	+/-113		+/-98.9								
Beryllium-7	U	-14.7		-11.3	pCi/L	0.00		N/A				
	Uncertainty	+/-42.3		+/-57.5	~	0.00						
Bismuth-212	U	19.1		-11.5	pCi/L	0.00		N/A				
Diamonth 214	Uncertainty	+/-54.6		+/-57.3	O!/F	0.00		<b>3.1/</b> 4				
Bismuth-214	U	-1.51 +/-9.69		-1.34	pCi/L	0.00		N/A				
Continue 120	Uncertainty U	-0.737		+/-8.09	C: //	0.00		<b>3.1/4</b>				
Cerium-139	Uncertainty	-0.737 +/-3.52		-1.22 +/-5.10	pCi/L	0.00		N/A				
Cerium-141	Uncertainty	5.34		14.0	pCi/L	0.00	•	N/A				
Certuin-141	Uncertainty	+/-11.9			pcuL	3.00		IN/A				
	Uncertainty			+/-16.5				•				

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# **QC Summary**

Workorder: 279061

Workorder: 279061					Page 3 of 1									
Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range Anlst	Date Time					
Rad Gamma Spec Batch 1111565														
Cerium-144	U	-18.7	U	-6.89	pCi/L	0.00		N/A						
	Uncertainty	+/-25.7		+/-31.6					,					
Cesium-134	U	-2.71	U	-1.87	pCi/L	0.00		N/A KXG3	06/27/11 13:49					
	Uncertainty	+/-4.02		+/-3.99										
Cesium-136	U	16.6	U	-12.7	pCi/L	0.00		N/A						
	Uncertainty	+/-28.9		+/-37.1		0.00								
Cesium-137	U	-0.59	U	2.58	pCi/L	0.00		N/A						
Chromium 51	Uncertainty	+/-4.33	, , ,	+/-4.09	C:/I	0.00	•	21/4						
Chromium-51	U	0.337 +/-69.6	U	-3.69	pCi/L	0.00		N/A						
Cobalt-56	Uncertainty U	-0.581	U	+/-81.0 -1.63	pCi/L	0.00								
Cobait-36	Uncertainty	+/-3.88	U	+/-5.72	pc#L	0.00		N/A						
Cobalt-57	U	0.644	Ħ	1.64	pCi/L	0.00		N/A						
Cobait-37	Uncertainty	+/-3.27	O	+/-4.22	pc//L	0.00		IN/A						
Cobalt-58	U	1.24	U	-2.13	pCi/L	0.00		N/A						
Cobail-30	Uncertainty	+/-4.72	Ü	+/-5.56	pen E	0.00		IN/A						
Cobalt-60	U	-2.03	U	-0.333	pCi/L	0.00		N/A	-					
0004.1	Uncertainty	+/-3.78	Ü	+/-2.77	роль			14/74						
Europium-152	. U	-7.0	U	3.74	pCi/L	0.00		N/A						
	Uncertainty	+/-9.93	_	+/-11.9	1.023			17/11						
Europium-154	U		υ÷	3.87	pCi/L	0.00		N/A						
•	Uncertainty	+/-8.84		+/-10.4	•									
Europium-155	Ŭ	-8.36	U	-10.2	pCi/L	0.00		N/A						
•	Uncertainty	+/-11.9		+/-14.0	•									
Iridium-192	Ü	-1.01	U	-1.93	pCi/L	0.00		N/A						
	Uncertainty	+/-4.35		+/-5.29										
Iron-59	υ	12.4	U	-15.2	pCi/L	0.00		N/A						
	Uncertainty	+/-11.9		+/-16.4				•						
Lead-210	U	-495	U	14.3	pCi/L	0.00		N/A						
	Uncertainty	+/-509		+/-956										
Lead-212	U	-2.35	U	1.33	pCi/L	0.00		N/A						
	Uncertainty	+/-7.45		+/-7.50										
Lead-214	U	14.7	U	5.78	pCi/L	0.00		N/A						
	Uncertainty	+/-11.7		+/-9.94										
Manganese-54	, U	0.206	U	-3.15	pCi/L	0.00		N/A						
	Uncertainty	+/-3.74		+/-4.08		0.00								
Mercury-203	U	2.28	U	-0.882	pCi/L	0.00		N/A						
N. 1	Uncertainty	+/-5.52	* *	+/-6.88	O1.7	0.00								
Neodymium-147	U	76.5	U	7.12	pCi/L	0.00		N/A						
Nontraine 220	Uncertainty	+/-219	11	+/-269	-C:#	0.00		23/4						
Neptunium-239	U	-3.51	U	-27.6	pCi/L	0.00	1	N/A						
Nichium 04	Uncertainty	+/-30.0	11	+/-37.2	~C:/I	0.00		N1/4						
Niobium-94	U	2.06	U	1.45	pCi/L	. 0.00	*	N/A						
Niobium-95	Uncertainty U	+/-3.14	T.I	+/-3.89 -2.49	ъС:/I	0.00		N1/4						
בע-וווווויסטורו	U	5.58	U	-2.49	pCi/L	0.00		N/A						

Workorder: 279061								Page 4 of 12		
Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range Anlst	Date Time	
Rad Gamma Spec				,						
Batch 1111565										
	Uncertainty									
	,,	+/-4.53		+/-4.43						
Potassium-40	υ	-7.01	U	-7.01	pCi/L	0.00		N/A KXG3	06/27/11 13:49	
	Uncertainty	+/-46.5		+/-49.3	•					
Promethium-144	Ŭ	-0.0589	U	-2.39	pCi/L	0.00		N/A		
	Uncertainty	+/-3.16		+/-3.97	•					
Promethium-146	Ŭ ·		U	2.74	pCi/L	0.00		N/A		
	Uncertainty	+/-3.93		+/-4.16	•					
Radium-228	Ŭ	-5.0	U	4.07	pCi/L	0.00		N/A		
	Uncertainty	+/-14.2		+/-13.4	•					
Ruthenium-106	U	-3.17	U	-21.2	pCi/L	0.00		N/A		
	Uncertainty	+/-28.8		+/-34.3	•					
Silver-110m	Ŭ	-1.68	U	2.29	pCi/L	0.00		N/A		
	Uncertainty	+/-3.67		+/-3.89	•					
Sodium-22	U	1.09	U	1.36	pCi/L	0.00		N/A		
	Uncertainty	+/-3.13		+/-3.72	1. ~					
Thallium-208	U	-1.66	U	2.63	pCi/L	0.00		N/A		
	Uncertainty	+/-3.74	•	+/-4.54	1.0			10/11		
Thorium-234	U	47.3	U	327	pCi/L	0.00		N/A		
	Uncertainty	+/-176		+/-376	1.00.00					
Tin-113	U	-0.651	U	2.05	pCi/L	0.00		N/A		
	Uncertainty	+/-5.44	_	+/-6.15	1.0			1771		
Uranium-235	U	2.15	U	-22.2	pCi/L	0.00		N/A		
255	Uncertainty	+/-25.7	-	+/-33.0	1.0			1011		
Uranium-238	U	47.3	U	327	pCi/L	0.00	,	N/A		
250	Uncertainty	+/-176	_	+/-376	po. z			1071		
Yttrium-88	U	0.0809	U	-2.75	pCi/L	0.00		N/A		
	Uncertainty	+/-3.85	-	+/-4.44	ponts			1071		
Zinc-65	U	-3.83	U	-3.03	pCi/L	0.00		N/A		
	Uncertainty	+/-6.74	Ü	+/-8.45	PONE			14/71		
Zirconium-95	U	3.65	U	-6.56	pCi/L	0.00		N/A		
Ziroomani ya	Uncertainty	+/-8.33	J	+/-8.28	PONE	0.00		14/71		
QC1202417336 LCS	Oncertainty	17-0.55		17-0.20			•			
Actinium-228			U	30.5	pCi/L				06/27/11 13:35	
	Uncertainty			+/-236	•					
Americium-241	2790			2800	pCi/L		101	(75%-125%)		
	Uncertainty			+/-297	•			(		
Antimony-124	•		υ	-29	pCi/L					
	Uncertainty	•		+/-68.7	•					
Antimony-125	,		U	-25.1	pCi/L			•		
•	Uncertainty			+/-120						
Barium-133	,		U	-27.7	pCi/L					
	Uncertainty			+/-48.7	1				•	
Barium-140	2		U	-38.1	pCi/L					
	Uncertainty		-	+/-323	1,0					

			QC BI	iiiiiiiai )	<u>Y</u>					
Workorder:	279061				_			Page 5	of 12	
Parmname		NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma S										
Batch	1111565	,								
Beryllium-7			U	-160	pCi/L					
		Uncertainty		+/-450	•					
Bismuth-212			U	91.5	pCi/L				KXG3	06/27/11 13:35
		Uncertainty		+/-629						
Bismuth-214	•		U	23.5	pCi/L					
		Uncertainty	•	+/-88.2						
Cerium-139				376	pCi/L					
		Uncertainty		+/-67.5						
Cerium-141			. U	-1.86	pCi/L					
0 : 144		Uncertainty	**	+/-60.7						
Cerium-144		**	U	-208	pCi/L				•	
Cool 124		Uncertainty	1	+/-226	0:4					
Cesium-134		I la conta la tar	υ	46.7	pCi/L					
Cesium-136		Uncertainty	U	+/-55.6	-0:/					
Cesmii-130		Unacetainte	U	-168	pCi/L					
Cesium-137		Uncertainty 6290		+/-157	-C:/I		104	(750/ 1050/)		
Cesium-137		Uncertainty		6560 +/-564	pCi/L		. 104	(75%-125%)		
Chromium-51		Oncertainty	U	-27.2						
Cinomiani-51		Uncertainty	Ü	+/-412	pCi/L					
Cobalt-56		Oncortainty	υ	-17.6	pCi/L					
, cooun 50		Uncertainty	Ü	+/-58.0	pear					
Cobalt-57		Checkumy		803	pCi/L					
		Uncertainty		+/-91.3	lion B					
Cobalt-58		,	U	-49.7	pCi/L					
,		Uncertainty		+/-56.5	•					
Cobalt-60		6810		6860	pCi/L		101	(75%-125%)		
		Uncertainty		+/-612	•			,		
Europium-152	2	,	U	107	pCi/L					
		Uncertainty	,	+/-112						
Europium-154	1		U	-14.2	pCi/L					4
		Uncertainty		+/-99.1						
Europium-155	5		U	62.0	pCi/L					
		Uncertainty		+/-101						
Iridium-192			U	22.4	pCi/L					
		Uncertainty		+/-38.8						
Iron-59			ប	14.1	pCi/L					
		Uncertainty		+/-142						
Lead-210	•	**		25700	pCi/L					
1 1 212		Uncertainty	**	+/-2940	0:4					
Lead-212		¥1	U	15.5	pCi/L					
Lead-214		Uncertainty	7 1	+/-66.5	-0'#					
Leau-214		Uncertainty	Ŭ	51.6	pCi/L					
Manganese-54	1	Uncertainty	U	+/-84.8 -28.7	»C:/I					
ivianganese-34	7		U	-20.1	pCi/L					

Workorder: 279061								Page 6 of 12				
Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time			
Rad Gamma Spec												
Batch 1111565							•					
	Uncertainty											
			+/-52.4	•								
Mercury-203			70.9	pCi/L				KXG3	06/27/11 13:35			
• • • • • • • • • • • • • • • • • • • •	Uncertainty		+/-55.2	1,				inido	00/2//11 15:55			
Neodymium-147	,	U	112	pCi/L								
•	Uncertainty		+/-667						1			
Neptunium-239	•	U	-270	pCi/L								
•	Uncertainty		+/-277	•								
Niobium-94		U	-0.335	pCi/L								
	Uncertainty		+/-43.0	•								
Niobium-95	Í	U	17.5	pCi/L								
	Uncertainty	•	+/-51.9	•								
Potassium-40	,	U	176	pCi/L								
	Uncertainty		+/-313									
Promethium-144	,	υ	8.99	pCi/L								
T.	Uncertainty		+/-43.1	1								
Promethium-146	<b>,</b>	U	28.1	pCi/L								
	Uncertainty		+/-60.1	1								
Radium-228	,	U	30.5	pCi/L								
	Uncertainty		+/-236	1								
Ruthenium-106		U	-269	pCi/L								
	Uncertainty		+/-435	•								
Silver-110m	·	U	26.8	pCi/L								
	Uncertainty		+/-61.4									
Sodium-22	·	U	5.33	pCi/L								
	Uncertainty		+/-34.2	•								
Thallium-208	·	U	8.23	pCi/L								
	Uncertainty		+/-45.9	•								
Thorium-234	ĺ	U	-696	pCi/L								
	Uncertainty		+/-742	•								
Tin-113	,	U	12.5	pCi/L								
	Uncertainty		+/-54.7	•					•			
Uranium-235	·	U	-27	pCi/L								
	Uncertainty	•	+/-200	•								
Uranium-238	•	U	-696	pCi/L								
	Uncertainty		+/-742	•								
Yttrium-88	·		1870	pCi/L								
	Uncertainty		+/-205	•								
Zinc-65	ŕ	U	30.4	pCi/L								
	Uncertainty		+/-135									
Zirconium-95	·	U	38.3	pCi/L								
	Uncertainty		+/-91.9	-								
QC1202417333 MB	-											
Actinium-228		U	2.16	pCi/L					06/27/11 13:21			
	Uncertainty		+/-16.4									

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## **QC Summary**

Workorder: 279061 Page 7 of 12 Parmname NOM Sample Qual QC Units RPD% REC% Range Anlst Date Time Rad Gamma Spec Batch 1111565 U Americium-241 3.11 pCi/L Uncertainty +/-17.3 Antimony-124 U -0.882KXG3 06/27/11 13:21 pCi/L Uncertainty +/-5.40 U Antimony-125 11.3 pCi/L Uncertainty +/-8.36 Barium-133 U -1.86 pCi/L Uncertainty +/-4.47 Barium-140 U 16.5 pCi/L Uncertainty +/-21.2 Beryllium-7 U 27.6 pCi/L Uncertainty +/-28.6 Bismuth-212 U -71.9 pCi/L Uncertainty +/-45.7 Bismuth-214 U 1.20 pCi/L Uncertainty +/-7.87 Cerium-139 U -3.64pCi/L +/-2.91 Uncertainty Cerium-141 U 5.02 pCi/L Uncertainty +/-6.19 Cerium-144 U 8.51 pCi/L Uncertainty +/-18.6 Cesium-134 U -1.74 pCi/L Uncertainty +/-2.79 Cesium-136 U 1.05 pCi/L Uncertainty +/-7.27 Cesium-137 U 0.720 pCi/L Uncertainty +/-2.91 Chromium-51 U -22.9 pCi/L Uncertainty +/-34.4 Cobalt-56 U 2.21 pCi/L Uncertainty +/-3.02 Cobalt-57 U -0.77 pCi/L Uncertainty +/-2.46 Cobalt-58 U 1.17 pCi/L Uncertainty +/-2.85 Cobalt-60 U -2.71 pCi/L Uncertainty +/-3.21 Europium-152 U -0.676 pCi/L Uncertainty +/-9.27 U Europium-154 -0.147 pCi/L Uncertainty +/-7.96 Europium-155 U 2.70 pCi/L Uncertainty +/-9.53 Iridium-192 U -0.298pCi/L

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Workorder: 279061			Page 8 of 12						
Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec				,					•
Batch 1111565									
	Uncertainty								
	` ` `		+/-3.04						
Iron-59		U	-5.37	pCi/L				KXG3	06/27/11 13:21
	Uncertainty		+/-6.06	1,02				inido	00/2//11 15,21
Lead-210		U	-72.3	pCi/L					
	Uncertainty		+/-591	1					
Lead-212	,	· U	-5.4	pCi/L	•				
	Uncertainty		+/-6.92	•					
Lead-214	•	Ū	5.06	pCi/L					
	Uncertainty		+/-8.33	•					
Manganese-54	·	U	0.312	pCi/L					
	Uncertainty		+/-2.98	•					
Mercury-203		U	-4.29	pCi/L					
	Uncertainty		+/-3.74	•					
Neodymium-147	•	U	-8.42	pCi/L					
	Uncertainty		+/-41.2	•					
Neptunium-239	•	U	8.21	pCi/L					
	Uncertainty		+/-25.7	•					
Niobium-94		U	-1.13	pCi/L					
	Uncertainty		+/-2.75	"•	*				
Niobium-95		U	-0.161	pCi/L					
	Uncertainty		+/-3.43	•					
Potassium-40		· U	-14.5	pCi/L					
	Uncertainty		+/-41.6	•					
Promethium-144		U	0.892	pCi/L					
	Uncertainty		+/-2.58						
Promethium-146		U	-4.71	pCi/L					
	Uncertainty		+/-4.07						•
Radium-228		U	2.16	pCi/L					
	Uncertainty		+/-16.4						
Ruthenium-106	•	U	-21.6	pCi/L					
	Uncertainty		+/-24.0						
Silver-110m		U	1.17	pCi/L					
	Uncertainty		+/-2.65						
Sodium-22		U	-0.123	pCi/L					
	Uncertainty		+/-2.79						
Thallium-208		U	-0.495	pCi/L					
	Uncertainty		+/-3.86						
Thorium-234		U	-51.3	pCi/L		•			
	Uncertainty		+/-157						
Tin-113		. U	3.55	pCi/L					
	Uncertainty		+/-4.26						•
Uranium-235		U	10.7	pCi/L					
	Uncertainty		+/-22.1						
Uranium-238		U	-51.3	pCi/L					

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### **QC Summary**

Workorder: 279061 Page 9 of 12 Parmname NOM Sample Qual Units RPD% REC% QC Range Anlst Date Time Rad Gamma Spec Batch 1111565 Uncertainty +/-157 Yttrium-88 U 1.04 pCi/L KXG3 06/27/11 13:21 Uncertainty +/-3.37 Zinc-65 U -6.93 pCi/L Uncertainty +/-6.89 Zirconium-95 U 3.35 pCi/L Uncertainty +/-5.18 **Rad Gas Flow** Batch 1107735 QC1202408507 279061004 DUP 2.62 U Radium-228 1.41 pCi/L 60.2 (0% - 100%) BXF1 06/09/11 13:34 +/-1.24 Uncertainty +/-1.17 QC1202408509 LCS Radium-228 99.3 59.0 58.6 pCi/L (75%-125%) 06/09/11 13:31 Uncertainty +/-3.61 QC1202408506 MB Radium-228 U 0.711 pCi/L 06/09/11 13:34 Uncertainty +/-1.17 QC1202408508 279061004 MS Radium-228 59.4 2.62 61.6 pCi/L 99.2 (75%-125%) 06/09/11 13:31 Uncertainty +/-1.24 +/-3.89 Batch 1107743 QC1202408528 279061005 DUP Strontium-89 U -81.7 U -1.38pCi/L 0.00 N/A JXR1 06/17/11 08:06 Uncertainty +/-5.24 +/-0.554 QC1202408530 LCS Strontium-89 3230 99.2 3210 pCi/L (75%-125%)06/17/11 08:07 Uncertainty +/-30.8 QC1202408527 MB Strontium-89 U 0.486 pCi/L 06/17/11 12:49 Uncertainty +/-0.790 OC1202408529 279061005 MS 9310 Strontium-89 U -81.7 7590 pCi/L 81.6 (75%-125%) 06/17/11 08:06 Uncertainty +/-5.24 +/-75.1 Batch 1109556 QC1202412532 279061003 DUP U Alpha U -0.706 0.691 pCi/L 0.00 N/A CAS2 06/18/11 10:00 Uncertainty +/-1.95 +/-2.46 Beta 3.95 5.53 pCi/L 33.3 (0% - 100%)Uncertainty +/-2.88 +/-3.11 QC1202412535 LCS 127 Alpha 110 pCi/L 86.4 06/19/11 07:31 (75%-125%) Uncertainty +/-11.9 Beta 479 95.4 457 pCi/L (75%-125%) Uncertainty +/-16.7 QC1202412531 MB

# **QC Summary**

Workorder:

279061

Page 10 of 12

Parmname <sup>-</sup>													
			NOM	Sample	Qual	<u>QC</u>	Units	RPD%	REC%	Range	Anlst	Date T	<u>ime</u>
Rad Gas Flow													
Batch 11095	556												
Alpha					U	1.67	pCi/L					06/18/11	10:00
			Uncertainty			+/-1.86	r						
Beta			· · · · · · · · · · · · · · · · · · ·		U	2.35	pCi/L				CAS2		
			Uncertainty			+/-2.55	F				0		
QC1202412533 2	79061003	MS	,										
Alpha			169 U	-0.706		118	pCi/L		69.7*	(75%-125%	)	06/19/11	07:31
			Uncertainty	+/-1.95		+/-18.2							
Beta			638 U	3.95		620	pCi/L		97.1	(75%-125%	)		
			Uncertainty	+/-2.88		+/-23.5							
QC1202412534 2	79061003	MSD											
Alpha			169 U	-0.706		123	pCi/L	4.17	72.6*	(0%-20%	)	06/19/11	07:31
			Uncertainty	+/-1.95		+/-18].7							
Beta			638 U	3.95		673	pCi/L	8.28	105	(0%-20%	)		
D . 1	.0.0		Uncertainty	+/-2.88		+/-24.5							
Batch 11153													
QC1202425767 2	79061001	DUP						0.00					
Strontium-90			U	0.0884	U	-0.913	pCi/L	0.00		N/	A JXRI	06/26/11	09:57
0.01202425260	1.00		Uncertainty	+/-1.07		+/-0.899							
QC1202425769 Strontium-90	LCS		120			123	pCi/L		103	(750/ 1050/	\ ·	06/26/11	00.50
Sitolitium-90						+/-6.30	pc//L		105	(75%-125%	,	06/26/11	09:38
QC1202425766	MB		Uncertainty			17-0.30					•		
Strontium-90					U	0.224	pCi/L					06/26/11	09:56
			Uncertainty			+/-1.04	•						07100
QC1202425768 2	79061001	MS	<b>,</b>										
Strontium-90			240 U	0.0884		223	pCi/L		93.1	(75%-125%	)	06/26/11	09:58
			Uncertainty	+/-1.07		+/-11.0							
Rad Liquid Scintillatio		*											
Batch 11095	86												
QC1202412632 2	79061001	DUP											
Tritium			· U	65.7	U	83.0	pCi/L	0.00		N/	A EXK2	06/13/11	18:08
			Uncertainty	+/-293		+/-296							
QC1202412634	LCS		2120			2500	0:4		118	(550) 1050/		06424	
Tritium			2120			2500	pCi/L		110	(75%-125%	)	06/13/11	18:40
QC1202412631	МВ		Uncertainty			+/-472							
Tritium	MB				U	-68.4	pCi/L					06/13/11	17.52
			Uncertainty		_	+/-280	P = " =					00/15/11	17.52
QC1202412633 2	79061001	MS	oncorrainty			., 200							
Tritium			2130 U	65.7		1960	pCi/L		91.7	(75%-125%	)	06/13/11	18:24
			Uncertainty	+/-293		+/-455					*		
Batch 11100	82												
QC1202413861 23	79061001	DUP											
Technetium-99			U	7.69	U	-3.34	pCi/L	0.00		N/	A MXP1	06/14/11	09:41
			Uncertainty	+/-16.6		+/-15.8							
QC1202413863	LCS								044				
Technetium-99			891			772	pCi/L		86.6	(75%-125%	)	06/14/11	10:13

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## **QC Summary**

Workorder: 279061 Page 11 of 12 Sample Qual REC% Parmname NOM Units RPD% Range Anlst Date Time Rad Liquid Scintillation 1110082 Batch Uncertainty +/-38.4 QC1202413860 MB Technetium-99 U -7.62 pCi/L MXP1 06/14/11 09:25 +/-15.7 Uncertainty OC1202413862 279061001 MS Technetium-99 891 7.69 826 pCi/L 92.7 (75%-125%) 06/14/11 09:57 +/-40.3 Uncertainty +/-16.6 Rad Ra-226 Batch 1107697 QC1202408407 279061001 DUP 2.67 2.04 pCi/L 26.5\* (0% - 20%) KSD1 06/08/11 13:10 Radium-226 Uncertainty +/-0.598 +/-0.482 QC1202408409 LCS Radium-226 24.7 23.7 pCi/L (75%-125%) 06/08/11 13:10 +/-1.48 Uncertainty QC1202408406 MB Radium-226 U -0.112 pCi/L 06/08/11 13:10 +/-0.145 Uncertainty QC1202408408 279061001 MS Radium-226 24.7 2.67 33.3 pCi/L (75%-125%) 06/08/11 13:10

+/-1.95

#### Notes:

The Qualifiers in this report are defined as follows:

- \*\* Analyte is a surrogate compound
- < Result is less than value reported
- > Result is greater than value reported
- A The TIC is a suspected aldol-condensation product
- B For General Chemistry and Organic analysis the target analyte was detected in the associated blank.

+/-0.598

Uncertainty

- BD Results are either below the MDC or tracer recovery is low
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of the sample
- F Estimated Value
- H Analytical holding time was exceeded
- J Value is estimated
- K Analyte present. Reported value may be biased high. Actual value is expected to be lower.
- L Analyte present. Reported value may be biased low. Actual value is expected to be higher.
- M M if above MDC and less than LLD
- M Matrix Related Failure
- N/A RPD or %Recovery limits do not apply.

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## **QC Summary**

Workorder: 279061 Page 12 of 12 RPD% REC% Parmname NOM Sample Qual Units Range Date Time ND Analyte concentration is not detected above the detection limit NJ Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier One or more quality control criteria have not been met. Refer to the applicable narrative or DER. Q R Sample results are rejected U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD. UI Gamma Spectroscopy--Uncertain identification UJ Gamma Spectroscopy--Uncertain identification UL Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.  $\mathbf{X}$ Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier Y QC Samples were not spiked with this compound ^ RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry. h Preparation or preservation holding time was exceeded

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

<sup>^</sup> The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

<sup>\*</sup> Indicates that a Quality Control parameter was not within specifications.



#### a member of The GEL Group INC



PO Box 30712 Charleston, SC 29417 2040 Savage Road Charleston, SC 29407

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www.gel.com

September 01, 2011

Mr. Tom Mow Detroit Edison - Fermi 1 PO Box 44440 Detroit, Michigan 48244

Re: Fermi 1 - PO# 4700246055

Work Order: 283848

Dear Mr. Mow:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on August 11, 2011. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4443.

Sincerely,

Dionne Francis for Richard Albee Project Manager

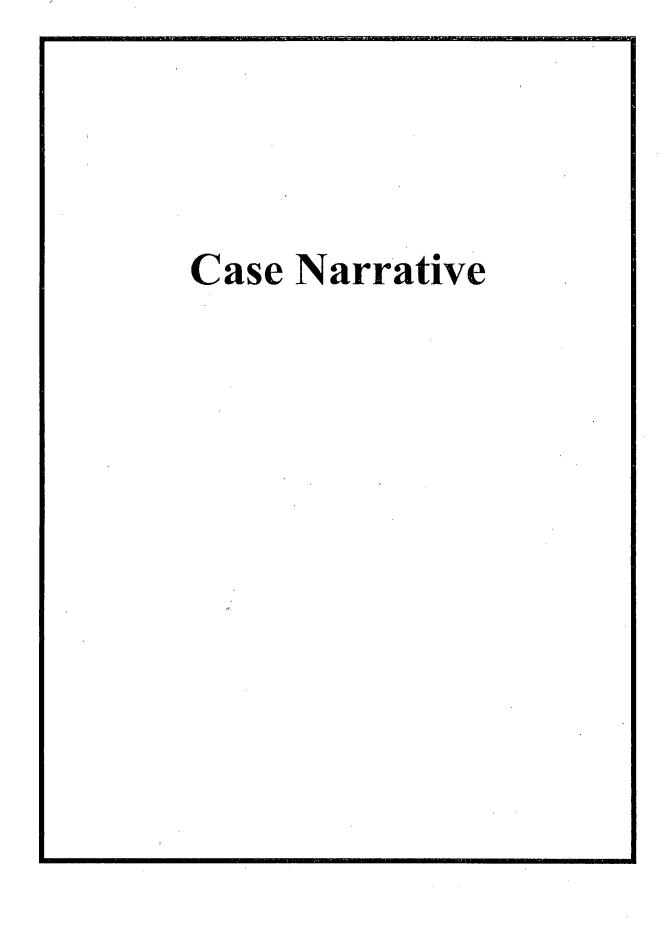
Purchase Order: 4700246055

Enclosures



# Table of Contents

Case Narrative	1
Chain of Custody	
Radiological Analysis	7
Sample Data Summary	15
Quality Control Data	17



#### Case Narrative for Detroit Edison Company SDG: 283848

September 01, 2011

#### **Laboratory Identification:**

GEL Laboratories LLC 2040 Savage Road Charleston, South Carolina 29407 (843) 556-8171

#### Summary

Sample Receipt The sample arrived at GEL Laboratories LLC, Charleston, South Carolina on August 11, 2011 for analysis. The sample was delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Sample Identification The laboratory received the following sample:

Laboratory ID Client ID 283848001 EFT-4811-13I

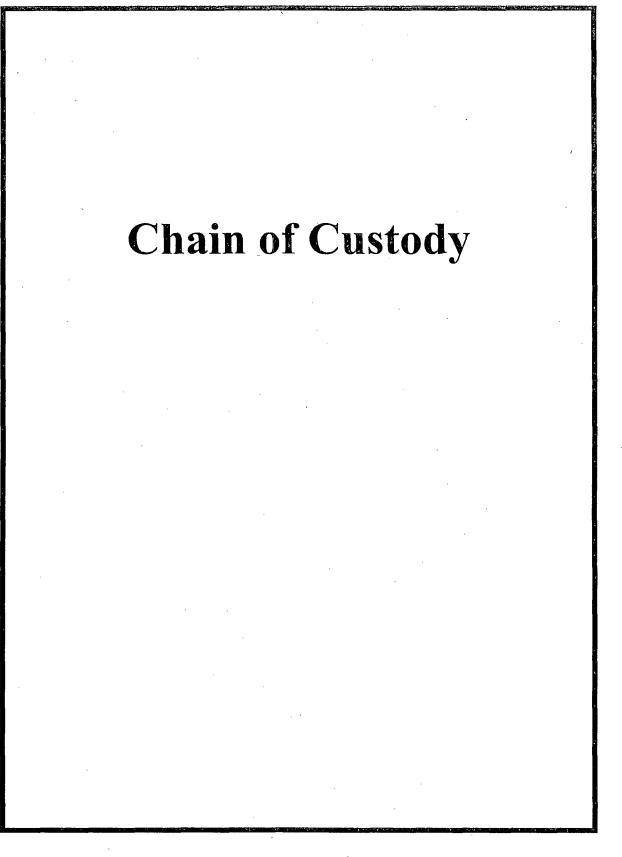
#### Case Narrative

Sample analyses were conducted using methodology as outlined in GEL Laboratories, LLC (GEL) Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

#### Data Package

The enclosed data package contains the following sections: General Narrative, Chain of Custody and Supporting Documentation, and data from the following fractions: Radiochemistry.

Dionne Francis for Richard Albee Project Manager



PROJECT

FERMI-1

LABORATORY ID

SAMPLE NUMBER

EFT-4811-131

SAMPLE

(SEE CODE ABOVE)

TYPE

28848 FERMI 1 NUCLEAR POWER PLANT CHAIN-OF-CUSTODY wells SAMPLE PREP (printed) ANALYSIS TO BE PERFORMED THOMPS MOW SAMPLE PREP (signature) LES CHOUNDWAVERENCED RES NUMBER OF CONTAINERS TIME Ra- 226 & Ra- 228 STATION LOCATION OR DATE CONTAINER NUMBER 13:45 Fermi 1 8/4/2011 Х Х PLASTIC 4000 ml

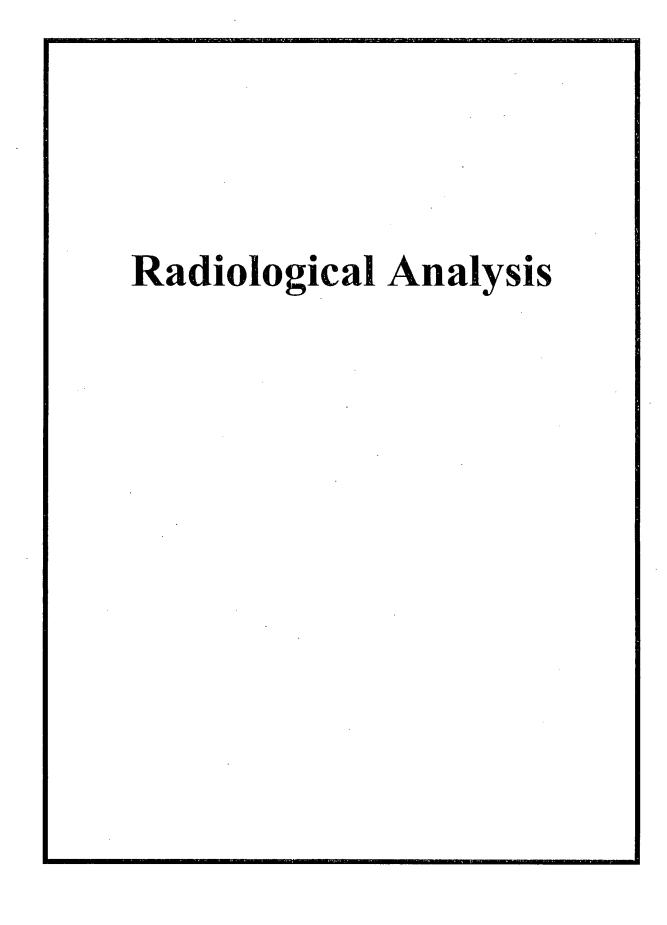
site Contacts - Lynne Goodman 1-734-586-1205 or Thomas Mow 1-734-	586-5334				
RELINQUISHED BY (printed/signed)	RECEI\ (printed	/ED BY. /signed)	PATE (DD-MMM-X	ЛІМЕ YYY/24HR)	REMARKS
THOMAS MON Ton - ON-			8/8/12	17:00	
	mite Konbar Mile	e Kanhas	8-11-11	0B55	
	·				



Clie	ent: ROIT			SDC	S/AR/COC/Work Order: 283848					
Rec	eived By:				Date Received: 9-11-11					
Sus	pected Hazard Information	Yes	ž	*If (	*If Counts > x2 area background on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.					
co	C/Samples marked as radioactive?	-	1		imim Counts Observed*: W					
	ssified Radioactive II or III by RSO?		/		internal counts cosci rea . (WW 20					
	C/Samples marked containing PCBs?		1							
_	oped as a DOT Hazardous?		0	Haz	ard Class Shipped: UN#:					
San	ples identified as Foreign Soil?		/							
	Sample Receipt Criteria	Yes	A Z	2°	Comments/Qualifiers (Required for Non-Conforming Items)					
1	Shipping containers received intact and sealed?	1/			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)					
2	Samples requiring cold preservation within (0 ≤ 6 deg. C)?		1		Preservation Method:  Ice bags Blue ice Dry ice (None) Other (describe)					
2a	Daily check performed and passed on IR temperature gun?	/			Temperature Device Serial #: Secondary Temperature Device Serial # (If Applicable):					
3	Chain of custody documents included with shipment?	/								
4	Sample containers intact and sealed?	/	2,109		Circle Applicable; Seals broken Damaged container Leaking container Other (describe)					
5	Samples requiring chemical preservation at proper pH?	1			Sample ID's, containers affected and observed pH:  If Preservation added, Lot#:					
6	VOA vials free of headspace (defined as < 6mm bubble)?		/		Sample ID's and containers affected:					
7	Are Encore containers present?			1	(If yes, immediately deliver to Volatiles laboratory)					
8	Samples received within holding time?	/			ID's and tests affected:					
9	Sample ID's on COC match ID's on bottles?	/			Sample ID's and containers affected:					
10	Date & time on COC match date & time on bottles?	/			Sample ID's affected:					
11	Number of containers received match number indicated on COC?	7			Sample ID's affected:					
12	Are sample containers identifiable as GEL provided?									
13	COC form is properly signed in relinquished/received sections?	<b>V</b>								
		/			Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other  8691 1149 2371					
14	Carrier and tracking number.									
		<u>L</u>		L						
Com	aments (Use Continuation Form if needed):	:								
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}										
<u> </u>										
į										
	DM (or DMA)				RA Date 8/11/11 Page 1 of 1					

List of current GEL Certifications as of 01 September 2011

State	Certification
Arkansas	88-0651
CLIA	42D0904046
California – NELAP	01151CA
Colorado	E87156 (FL/NELAP)
Connecticut	PH-0169
DoD ELAP – A2LA	2567.01
Florida - NELAP	E87156
Foreign Soils Permit USDA	P330-09-00191
Georgia	E87156 (FL/NELAP)
Georgia SDWA	967
Hawaii	E87156 (FL/NELAP)
ISO 17025	2567.01
Idaho	SC00012
Illinois - NELAP	200029
Indiana	C-SC-01
Kansas – NELAP	E-10332
Kentucky	90129
Louisiana – NELAP	03046 (Al33904)
Louisiana SDWA	LA110006
Maryland	270
Massachusetts	M-SC012
Mississippi	E87156 (FL/NELAP)
Nevada	SC00012
New Hampshire	2054
New Jersey - NELAP	SC002
New Mexico	E87156 (FL/NELAP)
New York - NELAP	11501
North Carolina	233
North Carolina DW	45709
Oklahoma	9904
Pennsylvania – NELAP	68-00485
South Carolina	10120001/10120002
Tennessee	TN 02934
Texas - NELAP	T104704235-11-4
Utah - NELAP	SC00012
Vermont	VT87156
Virginia	00151
Washington	C780-11
Wisconsin	999887790



#### Radiochemistry Case Narrative Detroit Edison Company (ROIT) SDG 283848

#### Method/Analysis Information

Product:

Alphaspec Pu, Liquid

Analytical Method:

DOE EML HASL-300, Pu-11-RC Modified

Analytical Batch Number:

1132061

Sample ID	Client ID
283848001	EFT-4811-13I
1202464473	Method Blank (MB)
1202464474	283848001(EFT-4811-13I) Sample Duplicate (DUP)
1202464475	283848001(EFT-4811-13I) Matrix Spike (MS)
1202464476	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-011 REV# 20.

#### **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met.

#### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

#### **Quality Control (QC) Information:**

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### Designated QC

The following sample was used for QC: 283848001 (EFT-4811-131).

#### **QC** Information

All of the QC samples met the required acceptance limits.

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

#### **Miscellaneous Information:**

#### **Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### Manual Integration

No manual integrations were performed on data in this batch.

#### **Additional Comments**

Additional comments were not required for this sample set.

#### **Qualifier Information**

Manual qualifiers were not required.

#### **Method/Analysis Information**

Product: GFPC, Ra228, Liquid

Analytical Method: EPA 904.0/SW846 9320 Modified

Analytical Batch Number: 1132661

Sample ID	Client ID
283848001	EFT-4811-13I
1202465998	Method Blank (MB)
1202465999	283848001(EFT-4811-13I) Sample Duplicate (DUP)
1202466000	283848001(EFT-4811-13I) Matrix Spike (MS)
1202466001	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP** Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-009 REV# 16.

#### **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met.

#### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

#### Quality Control (QC) Information:

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### Designated QC

The following sample was used for QC: 283848001 (EFT-4811-13I).

#### **OC** Information

All of the QC samples met the required acceptance limits.

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

Samples were reprecipitated due to high blank activity. The reprecipitated count is being reported.

#### **Chemical Recoveries**

All chemical recoveries meet the required acceptance limits for this sample set.

#### **Miscellaneous Information:**

#### Data Exception (DER) Documentation

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Additional Comments**

The matrix spike, 1202466000 (EFT-4811-13I), aliquot was reduced to conserve sample volume.

### **Qualifier Information**

Manual qualifiers were not required.

### Method/Analysis Information

Product: Liquid Scint Tc99, Liquid

Analytical Method: DOE EML HASL-300, Tc-02-RC Modified

Analytical Batch Number: 1132749

Sample 1D	Client ID
283848001	EFT-4811-13I
1202466266	Method Blank (MB)
1202466267	283848001(EFT-4811-131) Sample Duplicate (DUP)
1202466268	283848001(EFT-4811-13I) Matrix Spike (MS)
1202466269	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP** Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-005 REV# 21.

#### Calibration Information:

#### **Calibration Information**

All initial and continuing calibration requirements have been met.

#### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

#### **Quality Control (QC) Information:**

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### Designated QC

The following sample was used for QC: 283848001 (EFT-4811-131).

#### **OC** Information

All of the QC samples met the required acceptance limits.

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

#### **Miscellaneous Information:**

#### **Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Additional Comments**

Additional comments were not required for this sample set.

### **Qualifier Information**

Manual qualifiers were not required.

#### Method/Analysis Information

**Product:** 

Lucas Cell, Ra226, liquid

Analytical Method:

EPA 903.1 Modified

Analytical Batch Number:

1131716

Sample ID	Client ID
283848001	EFT-4811-13I
1202463642	Method Blank (MB)
1202463643	283848001(EFT-4811-13I) Sample Duplicate (DUP)
1202463644	283848001(EFT-4811-13I) Matrix Spike (MS)
1202463645	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-008 REV# 13.

#### **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met.

#### Standards Information

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

### Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

#### **Quality Control (QC) Information:**

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### Designated QC

The following sample was used for QC: 283848001 (EFT-4811-13I).

#### QC Information

All of the QC samples met the required acceptance limits.

### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

#### **Miscellaneous Information:**

#### **Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Additional Comments**

Additional comments were not required for this sample set.

#### **Qualifier Information**

Manual qualifiers were not required.

#### **Certification Statement**

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

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# Qualifier Definition Report for

ROIT001 Detroit Edison Company Client SDG: 283848 GEL Work Order: 283848

#### The Qualifiers in this report are defined as follows:

- \* A quality control analyte recovery is outside of specified acceptance criteria
- \*\* Analyte is a surrogate compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.

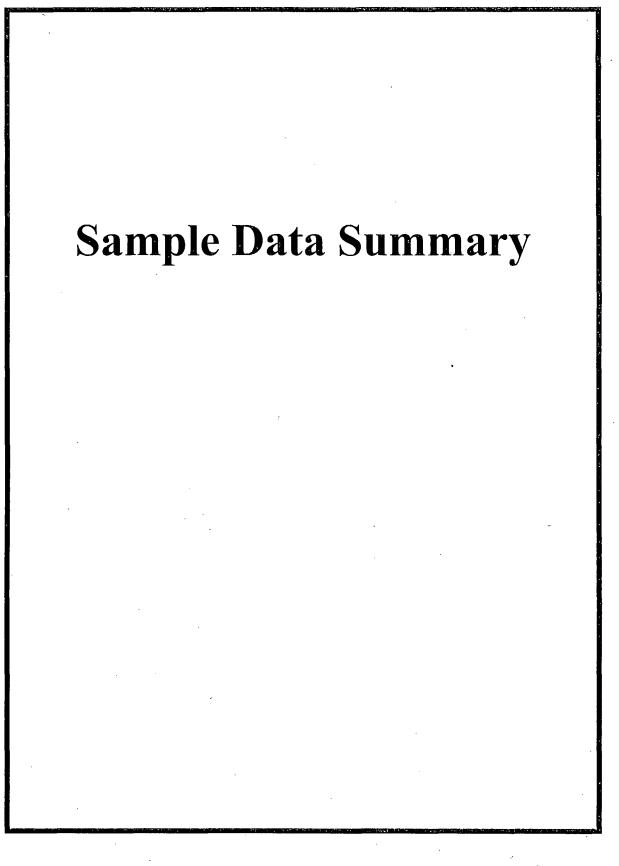
#### Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature: 9(0 THO MCCarty Name: Heather McCarty

Date: 01 SEP 2011 Title: Analyst II



Project:

Client ID:

ROIT00116

ROIT001

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## **Certificate of Analysis**

Report Date: September 1, 2011

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Sample ID:

Client Sample ID: EFT-4811-13I

Matrix:

283848001

Widti ix.

Ground Water 04-AUG-11 13:45

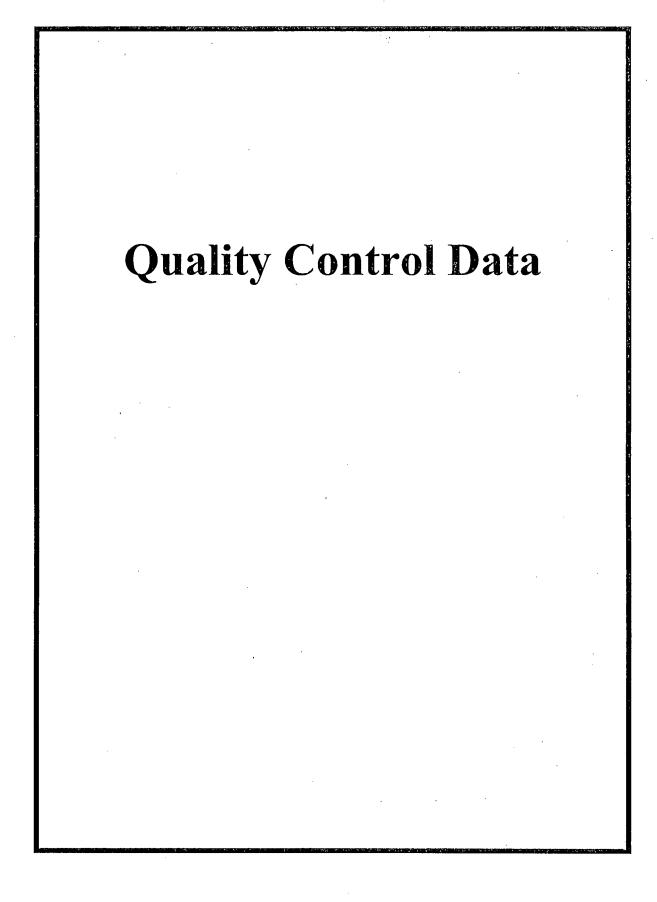
Collect Date: Receive Date:

11-AUG-11

Collector:

Client

Parameter	Qualifier	Result	Uncertainty	DL	RL	Unit	s DF	Analys	t Date	Time	Batch	Method
Rad Alpha Spec Anal	lysis											
Alphaspec Pu, Liquid	l "As Received"											
Plutonium-238	U	0.0219	+/-0.117	0.324	1.00	pCi/L		JXD2	08/18/11	1007 1	132061	1 .
Plutonium-239/240	Ŭ	0.011	+/-0.171	0.440	1.00	pCi/L	,					
Plutonium-244	Ü	0.00	+/-0.107	0.164	1.00	pCi/L						
Rad Gas Flow Propor	tional Counting											
GFPC, Ra228, Liquid	l "As Received"											
Radium-228	υ	1.16	+/-0.880	1.35	.3.00	pCi/L		LXE3	08/31/11	1612 1	132661	2
Rad Liquid Scintillati	on Analysis					-						
Liquid Scint Tc99, Li	quid "As Receiv	ed"							•			
Technetium-99	· U	3.74	+/-20.6	35.8	50.0	pCi/L	,	TYJI	08/24/11	1641 1	132749	3
Rad Radium-226						•						
Lucas Cell, Ra226, lie	quid "As Receiv	ed"										
Radium-226	. บ	0.435	+/-0.348	0.522	1.00	pCi/L		KSDI	08/18/11	1415 1	131716	4
The following Analy	tical Methods w	ere perfo	rmed:			•						
Method	Description						Analyst Co	mments				
i	DOE EML HA	SL-300, Pu	-11-RC Modified			-1.5.2						
2	EPA 904.0/SW	846 9320 N	Modified									
3	DOE EML HA	SL-300, To	-02-RC Modified									
4	EPA 903.1 Mo	dified										
Surrogate/Tracer Rec	overy Test				R	esult	Nominal	Recov	ery%	Accep	table L	imits
Plutonium-242 Tracer Alphaspec Pu, Liquid "As Received"					1.0			-	79.2	(15	%-125%	)
Barium-133 Tracer	GFPC, R	a228, Liqu	id "As Received"					1	32.7	(15	%-125%	)
Technetium-99m Tracer	Liquid S	cint Tc99, I	Liquid "As Received"					9	98.9	(15	%-125%	)



# **QC Summary**

Report Date: September 1, 2011 Page 1 of 3

Contact:

PO Box 44440 Detroit, Michigan Mr. Tom Mow

Detroit Edison - Fermi 1

Workorder:

283848

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range Anlst	Date Time
Rad Alpha Spec			-						
Batch 1132061								÷	
QC1202464474 283848001 DUP					,				
Plutonium-238	U	0.0219	U	0.0455	pCi/L	0.00		N/A JXD2	08/18/11 10:07
	Uncertainty	+/-0.117		+/-0.133					
Plutonium-239/240	U	0.011	U	-0.013	pCi/L	0.00		N/A	
	Uncertainty	+/-0.171		+/-0.148					
Plutonium-244	U	0.00	U	0.0455	pCi/L	0.00		N/A	
	Uncertainty	+/-0.107		+/-0.133					
QC1202464476 LCS									•
Plutonium-238			U	0.0411	pCi/L				08/18/11 10:07
	Uncertainty			+/-0.120				•	
Plutonium-239/240	20.4			20.2	pCi/L		99	(75%-125%)	
	Uncertainty			+/-2.14					
Plutonium-244			U	0.00	pCi/L				
	Uncertainty			+/-0.115					
QC1202464473 MB			* *	0.017	01.0				0040411007
Plutonium-238	••		U	-0.017	pCi/L				08/18/11 10:07
20.00	Uncertainty			+/-0.116	G: /F				
Plutonium-239/240			U	0.00566	pCi/L				
	Uncertainty		.,	+/-0.125	21.5				
Plutonium-244			U	0.00	pCi/L				
OC1202464475 292949001 NG	Uncertainty			+/-0.111					
QC1202464475 283848001 MS Plutonium-238	U	0.0219	11	0.043	pCi/L				08/18/11 10:07
1 Idiomum-238	Uncertainty	+/-0.117	Ü	+/-0.126	JCI/L				06/16/11 10.07
Plutonium-239/240	20.4 U	0.011		20.1	pCi/L		98.9	(75%-125%)	
1 lutolium-233/240	Uncertainty	+/-0.171		+/-2.18	рсиц		70.7	(13/0-123/0)	
Plutonium-244	U	0.00	U	-0.0184	pCi/L				
1 Iutomum-244	Uncertainty	+/-0.107	O	+/-0.126	pent				
Rad Gas Flow	Oncertainty	17-0.107		17-0.120					
Batch 1132661									
QC1202465999 283848001 DUP	Ū	1.16	11	0.752	»C:/I	0.00		NI/A I VE2	09/21/11 16.12
Radium-228		+/-0.880	U	0.752	pCi/L	0.00		N/A LXE3	08/31/11 16:12
QC1202466001 LCS	Uncertainty	47-0.880		+/-0.747				,	
Radium-228	60.7			64.2	pCi/L		106	(75%-125%)	08/31/11 16:11
	Uncertainty			+/-4.52	pond			(1370 12370)	00/31/11 10:11
QC1202465998 MB	Oncortainty			17 1.52					
Radium-228			U	-0.164	pCi/L				08/31/11 16:12
	Uncertainty			+/-0.475	-				
QC1202466000 283848001 MS				•					
Radium-228	183 U	1.16		189	pCi/L		103	(75%-125%)	08/31/11 16:11

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## **QC Summary**

Workorder: 283848					_			Page 2 of 3	
Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range Anlst	Date Time
Rad Liquid Scintillation									
Batch 1132749									
QC1202466267 283848001 DUP									
Technetium-99	U	3.74	U	-7.06	pCi/L	0.00		N/A TYJI	08/24/11 17:14
	Uncertainty	+/-20.6		+/-20.2					
QC1202466269 LCS									
Technetium-99	1110			1060	pCi/L		95.3	(75%-125%)	08/24/11 17:46
	Uncertainty			+/-48.1					
QC1202466266 MB									
Technetium-99			U	-0.496	pCi/L				08/24/11 16:57
0.00001.00001.00001.00001	Uncertainty			+/-20.6					
QC1202466268 283848001 MS Technetium-99	1110 U	3.74		1060	C:/I		94.8	(750/ 1050/)	00/04/11 15 20
Technenum-99		3.74 +/-20.6			pCi/L		94.8	(75%-125%)	08/24/11 17:30
D 1D 446	Uncertainty	+/-20.0		+/-48.7					
Rad Ra-226 Batch 1131716									
QC1202463643 283848001 DUP					~.~	0.00			
Radium-226	U	0.435	U	0.194	pCi/L	0.00		N/A KSD1	08/18/11 14:50
OC1202463645 LCS	Uncertainty	+/-0.348		+/-0.380					
Radium-226	24.7			24.7	nCi/I		99.9	(750/ 1250/)	09/19/11 14.50
Radium-220				+/-1.89	pCi/L		22.2	(75%-125%)	08/18/11 14:50
OC1202463642 MB	Uncertainty		,	77-1.69					
Radium-226			U	0.0822	pCi/L				08/18/11 14:50
74444111 220	Uncertainty		Ü	+/-0.342	pen b				06/16/11 14.50
OC1202463644 283848001 MS	Oncommity			.7-0,572					
Radium-226	24.7 U	0.435		24.0	pCi/L		97.2	(75%-125%)	08/18/11 14:50
	Uncertainty	+/-0.348		+/-1.98				/	

#### Notes:

The Qualifiers in this report are defined as follows:

- \*\* Analyte is a surrogate compound
- < Result is less than value reported
- > Result is greater than value reported
- A The TIC is a suspected aldol-condensation product
- B For General Chemistry and Organic analysis the target analyte was detected in the associated blank.
- BD Results are either below the MDC or tracer recovery is low
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of the sample
- F Estimated Value
- H Analytical holding time was exceeded
- J Value is estimated
- K Analyte present. Reported value may be biased high. Actual value is expected to be lower.
- L Analyte present. Reported value may be biased low. Actual value is expected to be higher.

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### **QC Summary**

Workorder: 283848 Page 3 of 3 **Parmname** NOM Sample Qual OC Units RPD% REC% Range Date Time M if above MDC and less than LLD M Matrix Related Failure M N/A RPD or %Recovery limits do not apply. ИD Analyte concentration is not detected above the detection limit Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier NJ One or more quality control criteria have not been met. Refer to the applicable narrative or DER. Q R Sample results are rejected U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD. ŲΙ Gamma Spectroscopy--Uncertain identification UJ Gamma Spectroscopy--Uncertain identification Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias. Х Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier Y QC Samples were not spiked with this compound RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

\* Indicates that a Quality Control parameter was not within specifications.

Preparation or preservation holding time was exceeded

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

h



#### a member of The GEL Group INC



PO Box 30712 Charleston, SC 29417 2040 Savage Road Charleston, SC 29407

P 843.556.8171 F 843.766.1178

www.gel.com

September 26, 2011

Mr. Tom Mow Detroit Edison - Fermi 1 PO Box 44440 Detroit, Michigan 48244

Re: Fermi 1 - PO# 4700246055

Work Order: 285027

Dear Mr. Mow:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on August 31, 2011. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4443.

Sincerely,

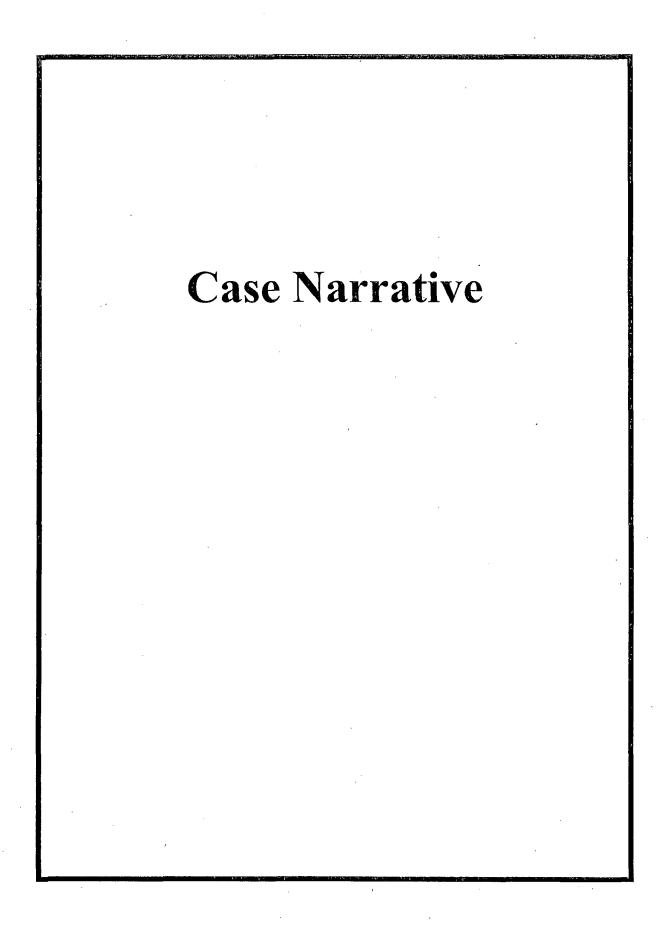
Dionne Francis for Richard Albee Project Manager

Purchase Order: 4700246055 Enclosures



# Table of Contents

Case Narrative	1
Chain of Custody	3
Radiological Analysis	7
Sample Data Summary	16
Ouality Control Data	19



### Case Narrative for Detroit Edison Company SDG: 285027

**September 26, 2011** 

#### **Laboratory Identification:**

GEL Laboratories LLC 2040 Savage Road Charleston, South Carolina 29407 (843) 556-8171

#### **Summary**

Sample Receipt The sample arrived at GEL Laboratories LLC, Charleston, South Carolina on August 31, 2011 for analysis. The sample was delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Sample Identification The laboratory received the following sample:

Laboratory ID Client ID 285027001 EFT-82211-13I

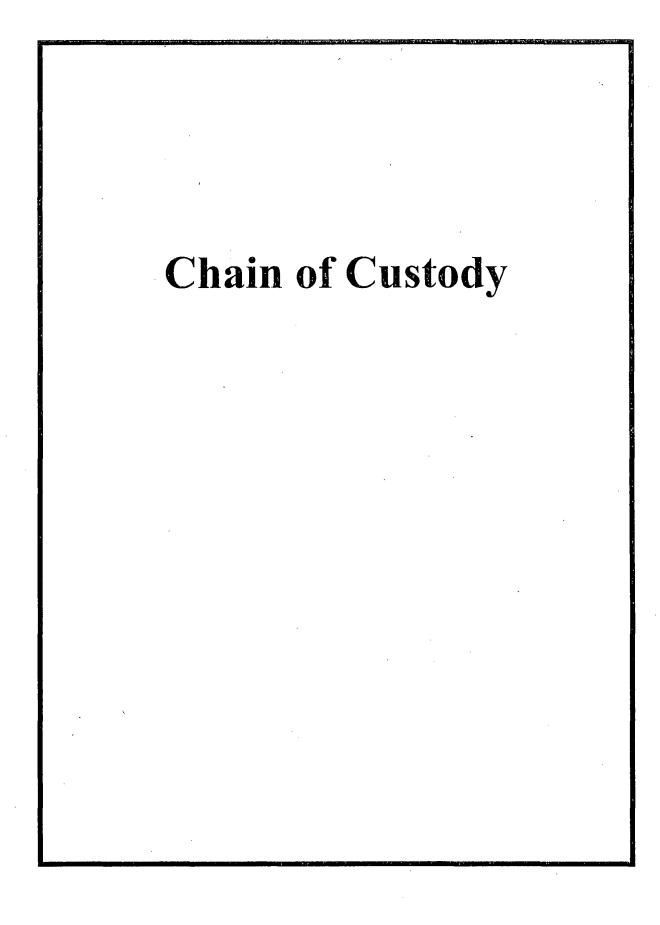
#### **Case Narrative**

Sample analyses were conducted using methodology as outlined in GEL Laboratories, LLC (GEL) Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

#### Data Package

The enclosed data package contains the following sections: General Narrative, Chain of Custody and Supporting Documentation, and data from the following fractions: Radiochemistry.

Dionne Francis for Richard Albee Project Manager



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Site Contacts - Lynne Goodm	nan 1-734-586-1205 o	Thomas Mow 1-734	-586-5334							····	· · · · · · · · · · · · · · · · · · ·	J		<u> </u>		
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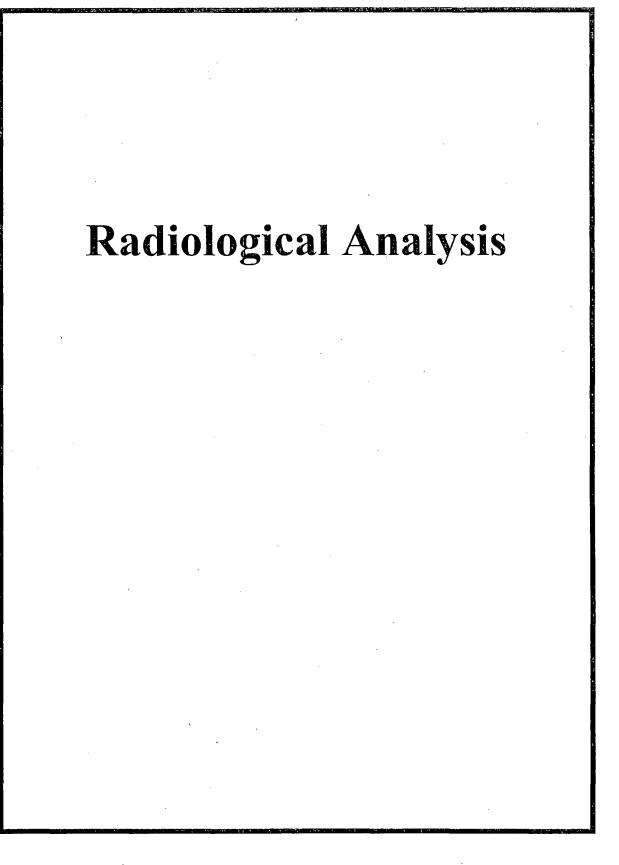


# SAMPLE RECEIPT & REVIEW FORM

Clie	ent: ROIT.			SDC	G/AR/COC/Work Order: 285027
Rec	eived By: MC	-			e Received: 8-3/-//
Sus	pected Hazard Information	Yes	ž	*If (	Counts > x2 area background on samples not marked "radioactive", contact the Radiation Safety Group for ner investigation.
co	C/Samples marked as radioactive?		V		imum Counts Observed*: RP 20
-	sified Radioactive II or III by RSO?		V		
-	C/Samples marked containing PCBs?		1	<del>/ , , , , , , , , , , , , , , , , , , ,</del>	
_	pped as a DOT Hazardous?		V	Haz	ard Class Shipped: UN#:
San	ples identified as Foreign Soil?	<u> </u>			
	Sample Receipt Criteria	Yes	A.	ž	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	/			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Samples requiring cold preservation within $(0 \le 6 \text{ deg. C})$ ?		V		Preservation Method:  Ice bags Blue ice Dry ice None Other (describe)
2a	Daily check performed and passed on IR temperature gun?	/			Temperature Device Serial #: (50) 132 Secondary Temperature Device Serial # (If Applicable):
3	Chain of custody documents included with shipment?				`
4	Sample containers intact and sealed?	V			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5	Samples requiring chemical preservation at proper pH?		$\checkmark$	·	Sample ID's, containers affected and observed pH:  If Preservation added, Lot#:
6	VOA vials free of headspace (defined as < 6mm bubble)?				Sample ID's and containers affected:
7	Are Encore containers present?			•	Af yes, immediately deliver to Volatiles laboratory)
8	Samples received within holding time?	/			ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	/			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?				Sample ID's affected:
11	Number of containers received match number indicated on COC?				Sample ID's affected:
12	Are sample containers identifiable as GEL provided?				
13	COC form is properly signed in relinquished/received sections?				
14	Carrier and tracking number.	<b>1</b>			Circle Applicable: FedEx Ar FedEx Ground UPS Field Services Courier Other  8691 1149 2408
Con	ments (Use Continuation Form if needed):				
					·
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	PM (or PMA) r	eviev	v: Init	ials	Date 0     Page of

List of current GEL Certifications as of 26 September 2011

State	Certification
Arizona	AZ0766
Arkansas	88-0651
CLIA	42D0904046
California – NELAP	01151CA
Colorado	E87156 (FL/NELAP)
Connecticut	PH-0169
DoD ELAP – A2LA	2567.01
Florida – NELAP	E87156
Foreign Soils Permit USDA	P330-09-00191
Georgia	E87156 (FL/NELAP)
Georgia SDWA	967
Hawaii	E87156 (FL/NELAP)
ISO 17025	2567.01
Idaho	SC00012
Illinois – NELAP	200029
Indiana	C-SC-01
Kansas – NELAP	E-10332
Kentucky	90129
Louisiana – NELAP	03046 (Al33904)
Louisiana SDWA	LA110006
Maryland	270
Massachusetts	M-SC012
Mississippi	E87156 (FL/NELAP)
Nevada	SC00012
New Hampshire	2054
New Jersey - NELAP	SC002
New Mexico	E87156 (FL/NELAP)
New York - NELAP	11501
North Carolina	233
North Carolina DW	45709
Oklahoma	9904
Pennsylvania - NELAP	68-00485
South Carolina	. 10120001/10120002
Tennessee	TN 02934
Texas - NELAP	T104704235-11-4
Utah – NELAP	SC00012
Vermont	VT87156
Virginia	00151
Washington	C780-11
Wisconsin	999887790



### Radiochemistry Case Narrative Detroit Edison Company (ROIT) SDG 285027

#### Method/Analysis Information

Product: Alphaspec U, Liquid

Analytical Method: DOE EML HASL-300, U-02-RC Modified

Analytical Batch Number: 1137920

Sample ID	Client ID
285027001	EFT-82211-13I
1202478522	Method Blank (MB)
1202478523	285027001(EFT-82211-13I) Sample Duplicate (DUP)
1202478524	285027001(EFT-82211-13I) Matrix Spike (MS)
1202478525	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP** Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-011 REV# 21.

#### **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met.

#### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

### **Quality Control (QC) Information:**

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### Designated QC

The following sample was used for QC: 285027001 (EFT-82211-13I).

#### **QC** Information

All of the QC samples met the required acceptance limits.

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

#### **Miscellaneous Information:**

#### Data Exception (DER) Documentation

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Manual Integration**

No manual integrations were performed on data in this batch.

#### **Additional Comments**

Additional comments were not required for this sample set.

#### **Qualifier Information**

Manual qualifiers were not required.

#### Method/Analysis Information

Product:	Gammaspec, Gamma,	, Liquid (Standard List)
* I Othuct.	Oummapiec, Oumma	Dictional Committee of Balbe

Analytical Method: EPA 901.1

Analytical Batch Number: 1140793

Sample ID	Client ID
285027001	EFT-82211-13I
1202485450	Method Blank (MB)
1202485451	285027001(EFT-82211-13I) Sample Duplicate (DUP)
1202485453	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

## **SOP** Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-013 REV# 22.

#### **Calibration Information:**

### **Calibration Information**

All initial and continuing calibration requirements have been met.

#### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

#### **Quality Control (QC) Information:**

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### Designated QC

The following sample was used for QC: 285027001 (EFT-82211-13I).

#### **QC** Information

All of the QC samples met the required acceptance limits.

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

#### **Miscellaneous Information:**

#### **Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Additional Comments**

Additional comments were not required for this sample set.

#### **Qualifier Information**

Manual qualifiers were not required.

### Method/Analysis Information

Product: GFPC, Gross A/B, liquid

Analytical Method: EPA 900.0/SW846 9310

Analytical Batch Number: 1139478

 Sample ID
 Client ID

 285027001
 EFT-82211-13I

 1202482196
 Method Blank (MB)

1202482197 285027001(EFT-82211-13I) Sample Duplicate (DUP)

1202482198 285027001(EFT-82211-13I) Matrix Spike (MS)

1202482199 285027001(EFT-82211-13I) Matrix Spike Duplicate (MSD)

1202482200 Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-001 REV# 14.

#### **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met. The discrimination settings are calibrated in beta discriminating mode to reduce beta to alpha crosstalk.

#### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

#### **Quality Control (QC) Information:**

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### **Designated QC**

The following sample was used for QC: 285027001 (EFT-82211-13I).

#### **QC** Information

All of the QC samples meet the required acceptance limits with the following exceptions: Refer to Data Exception Report (DER). The sample and the duplicate, 1202482197 (EFT-82211-131) and 285027001 (EFT-82211-13I), did not meet the beta relative percent difference requirement; however, they do meet the relative error ratio requirement with value of 2.0773. The matrix spike and matrix spike duplicate, 1202482198 (EFT-82211-13I) and 1202482199 (EFT-82211-13I), did not meet the alpha relative percent difference requirement; The relative error ratio between the matrix spike and matrix spike duplicate is 1.6819

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

#### **Chemical Recoveries**

All chemical recoveries meet the required acceptance limits for this sample set.

#### Gross Alpha/Beta Preparation Information

High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper

alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating.

#### **Miscellaneous Information:**

#### **Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. The following DER was generated for this SDG:

DER 1000757 was generated due to RDL less than MDA and Failed Recovery for MSD/PSD. 1. Sample 285014001 does not meet the beta required detection limit. The sample aliquot was reduced to the matrix of the sample. The sample was counted for 500 minutes. 2. The matrix spike duplicate 1202482199 does not meet the alpha recovery requirement. The matrix spike 1202482198 meets at 100.7%. The relative error ratio between the matrix spike and matrix spike duplicate is 1.6819. 1. Reporting results 2. Reporting results

#### **Additional Comments**

The matrix spike and matrix spike duplicate, 1202482198 (EFT-82211-13I) and 1202482199 (EFT-82211-13I), aliquots were reduced to conserve sample volume.

#### **Qualifier Information**

Manual qualifiers were not required.

#### Method/Analysis Information

Product: LSC, Tritium Dist, Liquid

Analytical Method: EPA 906.0 Modified

Analytical Batch Number: 1140357

 Sample ID
 Client ID

 285027001
 EFT-82211-13I

 1202484335
 Method Blank (MB)

 1202484336
 284658001(VY DOWNSTREAM) Sample Duplicate (DUP)

 1202484337
 284658001(VY DOWNSTREAM) Matrix Spike (MS)

 1202484338
 Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

#### **SOP** Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-002 REV# 19.

#### **Calibration Information:**

#### **Calibration Information**

All initial and continuing calibration requirements have been met.

#### **Standards Information**

Standard solutions for these analysis are NIST traceable or verified with a NIST traceable standard and used before the expiration dates.

#### Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

#### **Quality Control (QC) Information:**

#### **Blank Information**

The blank volume is representative of the sample volume in this batch.

#### Designated QC

The following sample was used for QC: 284658001 (VY DOWNSTREAM).

#### QC Information

All of the QC samples met the required acceptance limits.

#### **Technical Information:**

#### **Holding Time**

All sample procedures for this sample set were performed within the required holding time.

#### Sample Re-prep/Re-analysis

None of the samples in this sample set required reprep or reanalysis.

#### Miscellaneous Information:

#### **Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

#### **Additional Comments**

The matrix spike, 1202484337 (VY DOWNSTREAM), was reduced due to limited sample volume.

### **Qualifier Information**

Manual qualifiers were not required.

#### **Certification Statement**

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

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# Qualifier Definition Report for

ROIT001 Detroit Edison Company Client SDG: 285027 GEL Work Order: 285027

## The Qualifiers in this report are defined as follows:

- \* A quality control analyte recovery is outside of specified acceptance criteria
- \*\* Analyte is a surrogate compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.

#### Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature:

Name: Kate Gellatly

Date: 27 SEP 2011

Title: Analyst I

DER Report No.: 1000757

Revision No.: 1

	DATA EXCEP	TION REPORT	
Mo.Day Yr. 26-SEP-11	<b>Division:</b> Radiochemistry	Quality Criteria: Specifications	Type: Process
Instrument Type: GFPC	Test / Method: EPA 900.0/SW846 9310	Matrix Type: Liquid	Client Code: ALSV, ROIT, UCAT
Batch ID: 1139478	Sample Numbers: See Below		
Application Issues: RDL less than MDA Failed Recovery for MSD/PSD	SDG): 285014,285027,285282,285289,		
Specification and Requirements Exception Description:		DER Disposition:	
Sample 285014001 does not me The sample aliquot was reduced to was counted for 500 minutes.	et the beta required detection limit, the matrix of the sample. The sample	1. Reporting results	
<ol> <li>The matrix spike duplicate 12024 recovery requirement. The matrix s The relative error ratio between the duplicate is 1.6819.</li> </ol>	pike 1202482198 meets at 100.7%.	2. Reporting results	
			·
			·

Originator's Name:

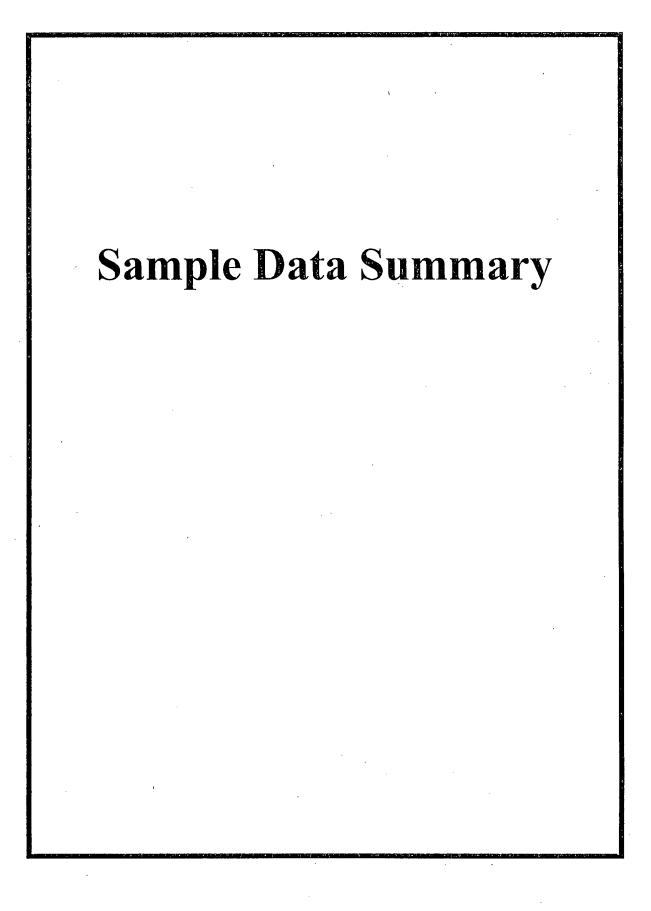
Kenshalla Oston

26-SEP-11

Data Validator/Group Leader:

Nat Long

26-SEP-11



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# Certificate of Analysis

Project:

Client ID:

ROIT00116

ROIT001

Report Date: September 26, 2011

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: EFT-82211-13I

Sample ID:

285027001

Matrix: Collect Date: Ground Water 22-AUG-11 14:40

Receive Date:

31-AUG-11

Collector:

Client

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF Analyst Date	Time	Batch	Method
Rad Alpha Spec Anal	lysis									·
Alphaspec U, Liquid	"As Received"		*							
Pct Uranium-235	U	0.00				percent	JXH2 09/06/11	1315 1	137920	1
Uranium-233/234		3.34	+/-1.14	0.483	1.00	pCi/L	31112 05/00/11	1313 1	137720	•
Uranium-235/236	U	0.0947	+/-0.251	0.597	1.00	pCi/L				
Uranium-238		2.75	+/-1.05	0.616	1.00	pCi/L				
Rad Gamma Spec An	alysis	_,,,				1				
Gammaspec, Gamma		ard List) "	As Received"							
Actinium-228	Ú	-8.7	+/-13.5	20.7		pCi/L	KXG3 09/16/11	1002 1	140793	2
Americium-241	U	-17.1	+/-30.0	47.3		pCi/L				_
Antimony-124	U	-3.15	+/-10.2	15.5		pCi/L				
Antimony-125	Ü	8.06	+/-7.72	14.2		pCi/L				
Barium-133	Ū	-1.84	+/-4.05	6.33		pCi/L				
Barium-140	Ü	-8.0	+/-13,2	18.3		pCi/L				
Beryllium-7	Ü	14.7	+/-32.3	58.0		pCi/L				
Bismuth-212	Ü	28.0	+/-40.1	73.5		pCi/L				
Bismuth-214	Ü	-0.591	+/-7.03	11.8		pCi/L				
Cerium-139	Ŭ	-2.2	+/-3.04	4.91		pCi/L				
Cerium-141	Ŭ	2.66	+/-7.37	13.0		pCi/L				
Cerium-144	บ	1.71	+/-19.1	33.1		pCi/L	•			
Cesium-134	Ū	2.77	+/-2.92	5.60		pCi/L				
Cesium-136	Ü	1.14	+/-13.6	23.6		pCi/L				
Cesium-137	Ū	-1.44	+/-2.97	4.62	10.0	pCi/L				
Chromium-51	บ	-5.33	+/-48.8	80.0		pCi/L				
Cobalt-56	Ü	-0.701	+/-3.82	6.13		pCi/L				
Cobalt-57	Ū	1.13	+/-2.65	4.70		pCi/L				
Cobalt-58	Ü	1.45	+/-3.00	5.41		pCi/L				
Cobalt-60	Ü	-0.615	+/-2.99	4.78		pCi/L				
Europium-152	Ū	-2.98	+/-9.10	14.5		pCi/L				
Europium-154	Ū	-3.63	+/-6.79	9.67		pCi/L				
Europium-155	Ū	4.80	+/-11.3	18.9		pCi/L	•			
Iridium-192	บ	0.489	+/-3.73	6.26		pCi/L				
Iron-59	Ü	2.67	+/-8.65	15.4		pCi/L				
Lead-210	Ü	119	+/-1090	1820		pCi/L				
Lead-212	Ŭ	2.59	+/-11.8	12.3		pCi/L				
Lead-214	ັບ	2.59	+/-7.70	12.8		pCi/L				
Manganese-54	Ŭ	0.182	+/-2.90	4.85		pCi/L				
Mercury-203	Ü	0.538	+/-4.21	7.11		pCi/L				
Neodymium-147	Ŭ	26.5	+/-80.7	143		pCi/L				

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# Certificate of Analysis

Report Date: September 26, 2011

Company:

Detroit Edison - Fermi 1

Address:

PO Box 44440

Detroit, Michigan 48244

Contact:

Mr. Tom Mow

Project:

Fermi 1 - PO# 4700246055

Client Sample ID: EFT-82211-13I

Sample ID:

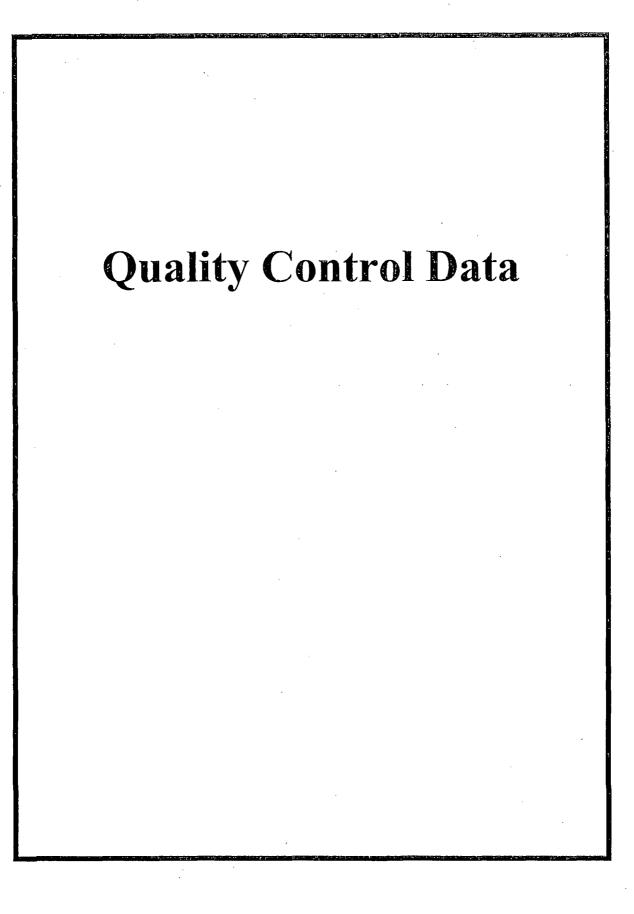
EFT-82211-131 285027001 Project:

ROIT00116

Client ID:

ROIT001

Parameter	Qualifier	Result	Uncertainty	, DL	RL	Units	DF Analy	yst Date	Time	Batch	Method
Rad Gamma Spec Ar	nalysis							700-10-10-10-10-10-10-10-10-10-10-10-10-1			
Gammaspec, Gamma	ı, Liquid (Standa	rd List) "	'As Received"		'						
Neptunium-239	Ū	-7. <del>5</del> 4	+/-28.0	47.6		pCi/L	•				
Niobium-94	U	0.969	+/-3.18	5.52		pCi/L					
Niobium-95	U	1.28	+/-3.23	5.50		pCi/L					
Potassium-40		101	+/-57.0	46.7		pCi/L					
Promethium-144	U	0.229	+/-2.95	4.99		pCi/L					
Promethium-146	U	-1.59	+/-3.43	5.56		pCi/L					
Radium-228	U	-8.7	+/-13.5	20.7		pCi/L					
Ruthenium-106	U	5.55	+/-26.1	45.3		pCi/L					
Silver-110m	U	-0.562	+/-2.78	4.53		pCi/L		,			
Sodium-22	U	-1.33	+/-2.40	3.39		pCi/L					
Thallium-208	U	0.316	+/-3.62	6.10		pCi/L		•			
Thorium-234	U	-103	+/-276	441		pCi/L					
Tin-113	U	-1.45	+/-4.83	7.65		pCi/L					
Uranium-235	U	-6.0	+/-21.7	35.7		pCi/L					1
Uranium-238	U	-103	+/-276	441		pCi/L					
Yttrium-88	U	0.464	+/-3.32	5.85		pCi/L					
Zinc-65	U	-6.1	+/-6.94	9.89		pCi/L				•	
Zirconium-95	U	-1.5	+/-6.69	10.8		pCi/L					
Rad Gas Flow Propor	rtional Counting										
GFPC, Gross A/B, lic	quid "As Receive	ed"									
Alpha	_ , ,	6.97	+/-4.12	4.79	5.00	pCi/L	DXF3	09/24/11	1424 1	139478	3
Beta		75.5	+/-6.98	4.31	5.00	pCi/L					
Rad Liquid Scintillati	ion Analysis					-					
LSC, Tritium Dist, Li	iquid "As Receiv	/ed"									
Tritium	Ū	113	+/-182	291	700	pCi/L	EXK2	09/13/11	1714 1	140357	4
The following Analy	tical Methods w	ere perfo	rmed:								
Method	Description					Ana	lyst Commen	nts			
1	DOE EML HA	SL-300, U-	02-RC Modified								
2	EPA 901.1										
3	EPA 900.0/SW	846 9310									
4	EPA 906.0 Mo										
Surrogate/Tracer Rec	overy Test				Re	esult Nor	ninal Reco	overy%	Accep	table L	imits
Uranium-232 Tracer	Alphaspo	ec U, Liquid	l "As Received"			W.W.		74.1	(15	%-125%)	)



# **QC Summary**

Report Date: September 26, 2011 Page 1 of 10

Detroit Edison - Fermi 1 PO Box 44440 Detroit, Michigan

Contact:

Mr. Tom Mow

Workorder:

285027

Parmname .	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range Anlst	Date Time
Rad Alpha Spec Batch 1137920									
QC1202478523 285027001 DUP									
Pct Uranium-235	U	0.00	U	0.00	percent	0.00		N/A JXH2	09/06/11 13:15
Uranium-233/234		3.34		3.66	pCi/L	9.18		(0% - 20%)	
	Uncertainty	+/-1.14		+/-1.08					
Uranium-235/236	U	0.0947	U	0.276	pCi/L	0.00		N/A	
	Uncertainty	+/-0.251		+/-0.343					
Uranium-238		2.75		2.59	pCi/L	6.05		(0% - 20%)	
	Uncertainty	+/-1.05		+/-0.897					
QC1202478525 LCS									
Pct Uranium-235				0.436	percent				09/06/11 13:15
Uranium-233/234				27.3	pCi/L				
	Uncertainty			+/-3.07					
Uranium-235/236				0.778	pCi/L				
	Uncertainty			+/-0.576			40-		•
Uranium-238	25.9			27.6	pCi/L		107	(75%-125%)	
001202479522 NB	Uncertainty			+/-3.09					
QC1202478522 MB Pct Uranium-235			U	0.00	percent				09/06/11 13:15
Uranium-233/234			U	-0.149	pCi/L				07/00/11 15.15
Oranium-233/234	Uncertainty		U	+/-0.185	I/CI/L			,	
Uranium-235/236	Oncertainty		U	-0.0252	pCi/L				
Oranium-233/230	Uncertainty		Ü	+/-0.212	pc//L				
Uranium-238	Oncertainty		υ	0.150	pCi/L				
Olamum-238	Uncertainty		Ü	+/-0.239	pe#L			•	
QC1202478524 285027001 MS	Checitanny			17 (1.23)					
Pct Uranium-235	U	0.00		1.08	percent				09/06/11 13:15
Uranium-233/234		3.34		25.6	pCi/L				
	Uncertainty	+/-1.14		+/-2.86	•				
Uranium-235/236	Ü	0.0947		1.74	pCi/L				
	Uncertainty	+/-0.251		+/-0.829	•				
Uranium-238	25.9	2.75		24.7	pCi/L		84.9	(75%-125%)	
	Uncertainty	+/-1.05		+/-2.81	•			•	
Rad Gamma Spec Batch 1140793									
QC1202485451 285027001 DUP				t				-	
Actinium-228	U	-8.7	U	3.31	pCi/L	0.00		N/A KXG3	09/16/11 14:57
	Uncertainty	+/-13.5		+/-10.1	•				
Americium-241	U	-17.1	U	-17.1	pCi/L	0.00		N/A	
	Uncertainty	+/-30.0		+/-22.7	• -				
Antimony-124	U	-3.15	U	5.84	pCi/L	0.00		N/A	•
•	Uncertainty	+/-10.2		+/-7.80	•				

		-24							
Workorder: 285027				Page 2 of 10					
Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range Anist	Date Time
Rad Gamma Spec Batch 1140793									
Antimony-125	, U	8.06		-2.61	pCi/L	0.00		N/A	
	Uncertainty	+/-7.72		+/-7.58					
Barium-133	U	-1.84	U	-5.64	pCi/L	0.00		N/A KXG3	09/16/11 14:57
	Uncertainty	+/-4.05		+/-4.08					
Barium-140	Ü	-8.0	U	4.52	pCi/L	0.00		N/A	
5 W 5	Uncertainty	+/-13.2		+/-11.8		0.00			
Beryllium-7	Ü	14.7	υ	4.83	pCi/L	0.00		N/A	
D'. 4 010	Uncertainty	+/-32.3		+/-33.2	0:11	0.00		- 41.	
Bismuth-212	U	28.0	U	-35.1	pCi/L	0.00		N/A	
Bismuth-214	Uncertainty U	+/-40.1		+/-42.4	C:/I	26.2		(00/ 1000/)	
Dismum-214	Uncertainty	-0.591 +/-7.03		17.1 +/-9.69	pCi/L	36.2		(0% - 100%)	
Cerium-139	U	-2.2	TI	0.509	pCi/L	0.00		NI/A	
Certain-139	Uncertainty	+/-3.04	O	+/-2.94	pc//L	0.00		N/A	
Cerium-141	U	2.66	IJ	7.24	pCi/L	0.00		N/A	
	· Uncertainty	+/-7.37	Ü	+/-8.10	pens	0.00		IN/A	
Cerium-144	U	1.71	U	-3.7	pCi/L	0.00		N/A	
	Uncertainty	+/-19.1		+/-20.5	l'en B			17/11	
Cesium-134	U	2.77	U	2.93	pCi/L	0.00		N/A	
	Uncertainty	+/-2.92		+/-2.89	r				
Cesium-136	Ü	1.14	υ	-0.648	pCi/L	0.00		N/A	
	Uncertainty	+/-13.6		+/-14.1	•				
Cesium-137	U	-1.44	U	-2.33	pCi/L	0.00		N/A	
	Uncertainty	+/-2.97		+/-3.60	-				•
Chromium-51	U	-5.33	U	5.23	pCi/L	0.00		N/A	
	Uncertainty	+/-48.8		+/-42.7					
Cobalt-56	U	-0.701	U	-0.774	pCi/L	0.00		N/A	
	Uncertainty	+/-3.82		+/-3.46					
Cobalt-57	U	1.13	U	2.13	pCi/L	0.00		N/A	
	Uncertainty	+/-2.65		+/-2.60					
Cobalt-58	U	1.45	. U	0.829	pCi/L	0.00		N/A	
	Uncertainty	+/-3.00		+/-3.14					
Cobalt-60	U	-0.615	U	-1.19	pCi/L	0.00		N/A	
	Uncertainty	+/-2.99	* 1	+/-3.12		0.00			
Europium-152	U	-2.98		-9.17	pCi/L	0.00		N/A	
Tourseine 154	Uncertainty	+/-9.10		+/-8.30	0:4	. 0.00			
Europium-154	U	-3.63		0.511	pCi/L	0.00		N/A	
Europium-155	Uncertainty U	+/-6.79		+/-9.21	C!/I	0.00		244	
Europium-155	Uncertainty	4.80 +/-11.3	U	6.08 +/-11.0	pCi/L	0.00		N/A	
Iridium-192	U	0.489	11		»Ci/I	0.00		X1/4	
marani-172	Uncertainty	+/-3.73	U	-0.0668 +/-3.45	pCi/L	0.00		N/A	
Iron-59	U	2.67	IJ	6.94	pCi/L	0.00		N/A	
42	Uncertainty	+/-8.65		+/-5.69	PCIL	0.00		IN/A	
Lead-210	U	119		811	pCi/L	0.00		N/A	
210	O	119	J	011	pe#b	0.00		IN/A	

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## **QC Summary**

Workorder: 285027 Page 3 of 10 Parmname NOM Sample Qual QC Units RPD% REC% Range Anlst Date Time Rad Gamma Spec Batch 1140793 Uncertainty +/-1090 +/-850 N/A KXG3 09/16/11 14:57 U 0.00Lead-212 U 2.59 1.38 pCi/L +/-11.8 +/-6.08 Uncertainty 0.00 U Lead-214 2.59 5.51 pCi/L N/A +/-7.70 +/-7.80 Uncertainty 0.00 0.182 U 1.34 pCi/L N/A Manganese-54 +/-2.90 +/-3.04 Uncertainty Mercury-203 0.538 U -6.14 pCi/L 0.00 N/A Uncertainty +/-4.21 +/-4.34 26.5 U 0.00 Neodymium-147 U 34.6 pCi/L N/A +/-80.7 +/-104 Uncertainty Neptunium-239 -7.54 U 11.5 pCi/L 0.00 N/A +/-28.0 +/-25.6 Uncertainty 0.969 0.00 U Niobium-94 0.458 pCi/L N/A Uncertainty +/-3.18 +/-2.75 U 0.00Niobium-95 U 1.28 0.276 pCi/L N/A +/-3.23 +/-3.71 Uncertainty 41.3 (0% - 100%) 101 Potassium-40 153 pCi/L Uncertainty +/-57.0 +/-60.5 0.00 Promethium-144 0.229 U 0.102 pCi/L N/A Uncertainty +/-2.95 +/-2.88 0.00 Promethium-146 U -1.59 U 0.731 pCi/L N/A Uncertainty +/-3.43 +/-3.26 Radium-228 U -8.7 U 3.31 pCi/L 0.00 N/A +/-13.5 +/-10.1 Uncertainty 0.00 U Ruthenium-106 U 5.55 10.4 pCi/L N/A +/-26.1 +/-24.6 Uncertainty 0.00 -0.562 U Silver-110m -3.39 pCi/L N/A +/-2.78 Uncertainty +/-2.85 Sodium-22 -1.33 U 0.00 U 0.131 pCi/L N/A +/-2.40 +/-3.26 Uncertainty 0.00 Thallium-208 U 0.316 U -3.2pCi/L N/A Uncertainty +/-3.62 +/-3.71 0.00 Thorium-234 -103 U -18.5pCi/L N/A +/-276 Uncertainty +/-173 0.00 Tin-113 U -1.45 U 2.90 pCi/L N/A Uncertainty +/-4.83 +/-3.96 Uranium-235 U -6.0 U -5.44 pCi/L 0.00 N/A +/-21.7 +/-22.0 Uncertainty -103 U 0.00Uranium-238 U -18.5pCi/L N/A +/-276 +/-173 Uncertainty 0.00 Yttrium-88 0.464 0.782 pCi/L N/A +/-3.32 +/-3.93 Uncertainty 0.00 U Zinc-65 U -6.1 2.48 pCi/L N/A

Wedlenden 205025	<u>Ve summary</u>									
Workorder: 285027						,		Page 4 o	of 10	
Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec Batch 1140793										
	Uncertainty									
•	•	+/-6.94		+/-6.93						
Zirconium-95	Ū	-1.5	U	1.56	pCi/L	0.00		N/A	KXG3	09/16/11 14:5
	Uncertainty	+/-6.69		+/-6.24						
QC1202485453 LCS	•			766	G: W					
Actinium-228	T1 4.1 4		U	76.5	pCi/L					09/16/11 14:13
'A magniphum 241	Uncertainty			+/-116			110	(250/ 1050/)		
Americium-241	2790			3060	pCi/L		110	(75%-125%)		
Antimony-124	Uncertainty		U	+/-297 -8.64	~C:/I					•
Antiniony-124	Uncertainty			+/-26.8	pCi/L					
Antimony-125	Oncertainty		U	9.70	pCi/L					
Antinony-123	Uncertainty		U	+/-67.3	DC1/L					
Barium-133	Oncertainty		U	1.66	pCi/L					
Darram 199	Uncertainty			+/-29.9	pc#L					
Barium-140	. Oncertainty		U	1.46	pCi/L					
Ballull-140	Uncertainty		Ü	+/-18.7	pent					
Beryllium-7	Checitamiy		U	22.4	pCi/L					
Delyman ,	Uncertainty		O	+/-211	pend					
Bismuth-212	oncertainty		U	24.9	pCi/L			•		
	Uncertainty			+/-330	po. 2		•			
Bismuth-214	,,		U	52.7	pCi/L					
	Uncertainty			+/-46.4						
Cerium-139	•			240	pCi/L					
	Uncertainty			+/-36.6	•					
Cerium-141	·		U	27.3	pCi/L				•	
	Uncertainty			+/-31.7	-					
Cerium-144			U	10.8	pCi/L					
	Uncertainty			+/-146						
Cesium-134			U	2.27	pCi/L					
	Uncertainty			+/-28.7			•			
Cesium-136			U	-24.2	pCi/L					
	Uncertainty			+/-42.1						
Cesium-137	6260			6710	pCi/L		107	(75%-125%)		
	Uncertainty			+/-577			•			
Chromium-51			U	-66.7	pCi/L					
	Uncertainty			+/-192						
Cobalt-56			U	4.85	pCi/L	•			•	
a	Uncertainty			+/-25.5						
Cobalt-57				635	pCi/L					
	Uncertainty			+/-61.7						
Cobalt-58	••		U	-9.07	pCi/L					
G 1 1 60	Uncertainty		•	+/-26.5			10-			
Cobalt-60	6590			6890	pCi/L		105	(75%-125%)		
	Uncertainty			+/-616						

Workorder: 285027		· · · · · · · · · · · · · · · · · · ·								
Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Page 5	Anlst	Date Time
Rad Gamma Spec										
Batch 1140793										
Europium-152			U	-65.8	pCi/L					
	Uncertainty			+/-69.8						
Europium-154			U	-0.742	pCi/L			( <u>6</u> )	KXG3	09/16/11 14:12
	Uncertainty			+/-46.2						
Europium-155			U	3.63	pCi/L					
	Uncertainty			+/-73.0						
Iridium-192			U	17.1	pCi/L					
	Uncertainty			+/-21.9	~					
Iron-59	11		U	-3.52	pCi/L					
1 1 210	Uncertainty			+/-57.7	O''					
Lead-210	M- containts			29200	pCi/L					
Lead-212	Uncertainty		U	+/-4100	-C:/I					
Lead-212	Uncertainty		U	-10.2 +/-40.8	pCi/L					
Lead-214	Oncertainty		U	-38	ъС:/I					
Leau-214	Uncertainty		U	+/-52.2	. pCi/L					
Manganese-54	Oncertainty		U	27.7	pCi/L					
Wanganese 54	Uncertainty		Ü	+/-25.0	PCDL					
Mercury-203	Oncertainty		U	12.6	pCi/L		,			
	Uncertainty		•	+/-22.4	POBL					
Neodymium-147			U	-49	pCi/L					
·	Uncertainty			+/-178						
Neptunium-239	·	•	U	112	pCi/L					•
	Uncertainty			+/-223	•					
Niobium-94	·		U	4.60	pCi/L					
	Uncertainty			+/-21.0	•				•	
Niobium-95	•		U	-4.67	pCi/L					
	Uncertainty			+/-23.7						
Potassium-40			U	-51.2	pCi/L					
	Uncertainty			+/-134						
Promethium-144			U	-20.7	pCi/L					
	Uncertainty			+/-21.8						•
Promethium-146			U	-4.99	pCi/L					
	Uncertainty			+/-33.3						
Radium-228			U	76.5	pCi/L					
D. 1. 1. 107	Uncertainty			+/-116	<b>~</b> 1.0					
Ruthenium-106	**		U	120	pCi/L					
Silver-110m	Uncertainty			+/-209						
Silver-110m	Unacetoiete			329	pCi/L					
Sodium-22	Uncertainty		U	+/-44.7 -0.0675	nC:/I					
	Uncertainty		U	-0.0673 +/-16.2	pCi/L					
Thallium-208	Oncertainty		U	25.2	pCi/L				•	
- nantum 200	Uncertainty		Ü	+/-24.4	PC//L					
Thorium-234	Oncortainty		U	-1190	pCi/L					
* 110.1011 #2T			•	-1190	PC//E					

Workorder: 285027					Page 6 of 10					
Parmmame	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time	
Rad Gamma Spec										
Batch 1140793										
	Uncertainty									
	•		+/-871							
Tin-113		U	-17.4	, pCi/L				KXG3	09/16/11 14:12	
	Uncertainty		+/-29.3	,					•	
Uranium-235		U	-147	pCi/L						
	Uncertainty		+/-136							
Uranium-238		U·	-1190	pCi/L					,	
	Uncertainty		+/-871							
Yttrium-88	•		1090	· pCi/L						
	Uncertainty		+/-103							
Zinc-65		U	27.0	pCi/L						
	Uncertainty		+/-59.6	-						
Zirconium-95	•	U	1.84	pCi/L					· ·	
	Uncertainty		+/-43.4	•					•	
QC1202485450 MB	·									
Actinium-228		U	-3.3	pCi/L					09/16/11 14:13	
	Uncertainty		+/-10.5							
Americium-241		U	-11	pCi/L						
	Uncertainty		+/-12.8							
Antimony-124		U	-3.22	pCi/L	•					
	Uncertainty		+/-5.84						•	
Antimony-125		U	-1.1	pCi/L						
	Uncertainty		+/-5.62		ė					
Barium-133	•	U	-2.38	pCi/L						
•	Uncertainty		+/-3.46	•	1					
Barium-140	•	υ	-3.24	pCi/L			1			
,	Uncertainty		+/-3.52	•						
Beryllium-7	•	U	-7.37	pCi/L						
	Uncertainty		+/-20.4	•						
Bismuth-212	,	U	22.6	pCi/L			•			
	Uncertainty		+/-35.6	•						
Bismuth-214	,	U	-3.03	pCi/L				,		
	Uncertainty		+/-6.10	1.02						
Cerium-139		U	0.357	pCi/L						
	Uncertainty		+/-1.87	Pend						
Cerium-141	·	U	1.34	pCi/L						
Cerum 141	Uncertainty		+/-3.32	pe#L						
Cerium-144	Oncertainty	Ŭ	-2.81	pCi/L						
Celium-144	Uncertainty	O	+/-13.0	pent						
Cesium-134	Oncertainty	U		~C:/I						
Cesiulii-134	I In contains	U	1.68	pCi/L		2				
Control 126	Uncertainty	U	+/-2.53	O://					*	
Cesium-136	11	U	-0.76	pCi/L					•	
Continue 127	Uncertainty	11	+/-3.30	O:/T						
Cesium-137	11	U	-0.0296	pCi/L						
	Uncertainty		+/-2.42	,						

Workorder: 285027	-	Page 7 of 10								
Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec Batch 1140793										
Chromium-51			U	-2.45	pCi/L					
	Uncertainty			+/-22.4						
Cobalt-56			Ù	-1.77	pCi/L				KXG3	09/16/11 14:13
	Uncertainty			+/-2.59						
Cobalt-57			U	-0.851	pCi/L					
•	Uncertainty			+/-1.79						
Cobalt-58	•	•	U	-1.0	pCi/L					
	Uncertainty			+/-2.54						
Cobalt-60			U	1.43	pCi/L					
	Uncertainty			+/-3.08						
Europium-152			U	-4.56	pCi/L					
	Uncertainty			+/-7.75						
Europium-154			U	4.59	pCi/L					
	Uncertainty			+/-6.80						
Europium-155			U	5.96	pCi/L					
	Uncertainty			+/-7.10						
Iridium-192			U	0.776	pCi/L					
	Uncertainty			+/-2.41						
Iron-59			U	-2.64	pCi/L		•			
	Uncertainty			+/-4.76						
Lead-210	•		U	106	pCi/L					
	Uncertainty			+/-318						
Lead-212			U	-1.52	pCi/L					
	Uncertainty			+/-4.83						
Lead-214			U	6.62	pCi/L					
	Uncertainty			+/-6.59						
Manganese-54			U	1.79	pCi/L				•	
•	Uncertainty			+/-2.39						
Mercury-203			U	0.00849	pCi/L					
	Uncertainty			+/-2.29						
Neodymium-147			U	11.7	pCi/L				•	
	Uncertainty			+/-20.1		•				
Neptunium-239			U	9.60	pCi/L					
	Uncertainty			+/-19.6						
Niobium-94			U	1.53	pCi/L,					
	Uncertainty			+/-2.60		,				
Niobium-95			U	0.00839	pCi/L					
	Uncertainty			+/-2.11		*				
Potassium-40			U	7.90	pCi/L					
	Uncertainty			+/-32.6						
Promethium-144			U	0.182	pCi/L					
	Uncertainty			+/-2.47						
Promethium-146			U	-0.704	pCi/L					
	Uncertainty			+/-3.13						
Radium-228			U	-3.3	pCi/L					

		QC St	mmar y	, •						
Workorder: 285027				Page 8 of 10						
Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time	
Rad Gamma Spec									•	
Batch 1140793										
	Uncertainty									
•			+/-10.5			*				
Ruthenium-106	••	U	-10.4	pCi/L				KXG3	09/16/11 14:13	
GH - 110	Uncertainty	, 11	+/-22.4	-C:/I						
Silver-110m	Uncertainty	U	-0.52 +/-2.31	pCi/L						
Sodium-22	Uncertainty	U	1.50	pCi/L						
Souldin-22	Uncertainty	O	+/-2.36	pent						
Thallium-208	Oncertainty	U	0.0626	pCi/L						
Thursday 200	Uncertainty	J	+/-2.82	Pons						
Thorium-234		υ	-29.9	pCi/L						
	Uncertainty		+/-122	•		,				
Tin-113	ŕ	U	0.685	pCi/L						
	Uncertainty		+/-3.12						•	
Uranium-235		U	-9.15	pCi/L						
	Uncertainty		+/-15.4							
Uranium-238		U	-29.9	pCi/L	•					
·	Uncertainty		+/-122							
Yttrium-88		U	-2.86	pCi/L						
	Uncertainty		+/-3.17						•	
Zinc-65		υ	2.96	pCi/L						
7: . 05	Uncertainty	<b>T</b> 1	+/-5.76	0.4						
Zirconium-95	I I a series in terms	U	-0.564	pCi/L						
Rad Gas Flow	Uncertainty		+/-4.21	•						
Batch 1139478										
QC1202482197 285027001 DUP	4									
Alpha		6.97 U	2.76	pCi/L	86.6		(0% - 100%	DXF3	09/24/11 14:36	
· · · · · · · · · · · · · · · · · · ·	Uncertainty	+/-4.12	+/-2.83	1,0,,2			(0,0 100,0	, 25	03,2 %	
Beta	<i>3</i>	75.5	56.6	pCi/L	28.6*		(0% - 20%)	)		
	Uncertainty	+/-6.98	+/-5.93	•						
QC1202482200 LCS	-			•			•			
Alpha	80.2		72.5	pCi/L		90.4	(75%-125%)	)	09/24/11 14:58	
	Uncertainty		+/-7.89							
Beta	331		330	pCi/L		99.6	(75%-125%)	)		
QC1202482196 MB	Uncertainty	,	+/-11.8							
QC1202482196 MB Alpha		U	-0.457	pCi/L					09/24/11 14:36	
Аірна	Uncertainty	O	+/-0.549	pe#E	•				09/24/11 14.30	
Beta	Oncortaining	U	0.113	pCi/L						
	Uncertainty		+/-1.66	•						
QC1202482198 285027001 MS	•	•								
Alpha	241	6.97	249	pCi/L		101	(75%-125%)	)	09/24/11 14:36	
	Uncertainty	+/-4.12	+/-30.5			• • •				
Beta	994	75.5	1170	pCi/L		110	(75%-125%)	)		
	Uncertainty	+/-6.98	+/-40.2	1						

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# **QC Summary**

Workorder: 285027						Page 9 of 10					
Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range Anlst	Date Time		
Rad Gas Flow											
Batch 1139478											
QC1202482199 285027001 MSD											
Alpha	241	6.97		185	pCi/L	29.8*	73.9*	(0%-20%) DXF3	09/24/11 14:36		
	Uncertainty	+/-4.12		+/-25.8							
Beta	994	75.5		1220	pCi/L	4.18	115	(0%-20%)			
	Uncertainty	+/-6.98	:	+/-40.7							
Rad Liquid Scintillation Batch 1140357											
QC1202484336 284658001 DUP											
Tritium	U	94.9	U	103	pCi/L	0.00		N/A EXK2	09/13/11 18:07		
	Uncertainty	+/-188		+/-190							
QC1202484338 LCS		ė									
Tritium	2090			2190	pCi/L		105	(75%-125%)	09/13/11 18:59		
	Uncertainty			+/-308							
QC1202484335 MB		,									
Tritium			U	108	pCi/L				09/13/11 17:40		
	Uncertainty			+/-187							
QC1202484337 284658001 MS	5240 11	04.0		5.470	.0://		102	(750/ 1250/)	00/12/11 10:22		
Tritium	5340 U	94.9		5470	pCi/L		102	(75%-125%)	09/13/11 18:33		
	Uncertainty	+/-188		+/-668							

#### Notes:

The Qualifiers in this report are defined as follows:

- Analyte is a surrogate compound
- < Result is less than value reported
- > Result is greater than value reported
- A The TIC is a suspected aldol-condensation product
- For General Chemistry and Organic analysis the target analyte was detected in the associated blank. В
- BD Results are either below the MDC or tracer recovery is low
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of the sample
- F Estimated Value
- Н Analytical holding time was exceeded
- J Value is estimated
- K Analyte present. Reported value may be biased high. Actual value is expected to be lower.
- L Analyte present. Reported value may be biased low. Actual value is expected to be higher.
- M if above MDC and less than LLD M
- M Matrix Related Failure
- N/A RPD or %Recovery limits do not apply.
- Analyte concentration is not detected above the detection limit ND
- Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier NJ

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## **QC Summary**

Workorder: 285027 Page 10 of 10 REC% Date Time NOM RPD% Range Anlst Sample Qual Units Parmname One or more quality control criteria have not been met. Refer to the applicable narrative or DER. Q R Sample results are rejected Analyte was analyzed for, but not detected above the MDL, MDA, or LOD. U UI Gamma Spectroscopy--Uncertain identification UJ Gamma Spectroscopy--Uncertain identification UL Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias. Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier Х QC Samples were not spiked with this compound Y ٨ RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

Preparation or preservation holding time was exceeded

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

h

<sup>^</sup> The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

<sup>\*</sup> Indicates that a Quality Control parameter was not within specifications.

# Fermi 1 NRC Docket No. 50-16 NRC License No. DPR-9

Attachment 5 to NRC-12-0012

"Updated Fermi 1 Groundwater Monitoring Data"

**Site Conceptual Model Recommendations and Actions** 

## Site Conceptual Model Recommendations and Actions

The recommendations were contained in the text of Section 8 of the Conestoga-Rovers & Associates (CRA) report. For ease of addressing each recommendation, this letter lists each of the recommendations and actions taken.

#### Recommendation 1:

CRA recommends the installation of additional monitoring wells at the Station. The purpose of the monitoring wells is to provide Intermediate and Deep monitoring points to the southeast and southwest and to provide additional control points for groundwater contouring.

#### Action:

Five new wells were installed in spring 2011. Three of the wells were of intermediate depth and two wells were deep wells. Two wells were installed to the southeast and two wells were installed to the southwest of the facility. The other well, EFT-13I as discussed in Recommendation 9, was installed near the Health Physics Building pad.

#### Recommendation 2:

After installation, CRA recommends additional rounds of groundwater samples and synoptic water level measurements be collected from all station monitoring wells.

#### Action:

Additional rounds of sampling from Fermi 1 monitoring wells were conducted in June and October 2011. Samples were taken from all Fermi 1 monitoring wells, except where insufficient water was obtainable. The sample results are included in the updated table. At the beginning of each monitoring round, groundwater level measurements were taken at each well, however, the new wells were monitored in May 2011 and the existing wells were monitored in June 2011. The groundwater elevation was measured for all monitoring wells on October 3-4, 2011 prior to the October monitoring round. On January 4, 2012, groundwater elevation was measured at the monitoring wells to obtain additional data. The groundwater elevation measurements and contour maps are provided in Attachment 6.

Attachment 5 NRC-12-0012 Page 2 of 4

#### Recommendation 3:

Groundwater samples should be analyzed for the groundwater radioactive isotopes presented in Section 4 of the CRA report.

#### Action:

This report contains data for samples taken through November 2011. At least four samples were taken from each of the new wells. Offsite analysis was performed for a sample from each well, with the other analyses being performed at the onsite laboratory. The offsite analysis included all of the following isotopes identified in Section 4 of the CRA report as being the radionuclides of concern for groundwater monitoring plus gross alpha:

- · Tritium (3H)
- · 22Na
- · 60Co
- · 90Sr
- · 99Tc
- · 137Cs
- · 226Ra
- · 228Ra
- · Uranium Isotopes

The onsite laboratory can detect tritium, Na-22, Co-60, Cs-137, Ra-226 and U-235 of the isotopes listed above. Offsite analysis had previously been performed on at least one round of samples from the older monitoring wells and since the activity detected in onsite analysis continued to be less than Minimum Detectable Activity, samples from the older wells were not sent offsite for analysis in 2011.

#### Recommendation 4:

Statistical analysis should be updated.

#### Action:

Attachment 2 contains the updated Table of Comparison of Analytical Results to Background, which is the table that provides the statistical analysis of the background well data for uranium and radium, and well sample data for uranium and radium isotopes, gross alpha and gross beta activity. Since the additional data is for monitoring wells, the calculations were unaffected. One sample of the additional data (Well EFT-12D) is marked as exceeding the upper tolerance limit (UTL) for the 90<sup>th</sup> percentile, 95% confidence level for total radium activity; however the sample analysis result of 5.71 pCi/L is very close to the calculated background UTL of 5.65 pCi/L. The sample shown from Well EFT-9S as slightly exceeding the UTL for Uranium was previously addressed in Reference 2.

Attachment 5 NRC-12-0012 Page 3 of 4

#### Recommendation 5:

Figure 13 of the CRA report provided recommended locations for the new wells. Locations shown are approximate since underground structures and other interferences need to be considered when siting the wells.

#### Action:

The five new wells were installed near the locations shown on figure 13 of Reference 2. Locations had to be moved slightly to avoid underground interferences.

#### Recommendation 6:

Fermi 1 should consider the placement of two separate clusters (EFT-11 I/D and EFT-12 I/D) of wells in the southern portion of the Station to further define both bedrock flow in the Deep zone and evaluate the potential for groundwater flow in the Intermediate zone. The wells should be positioned in the southwest and southeast corners of the Station.

#### Action:

Wells EFT-11I/D were installed to the southwest of the facility and Wells EFT-12I/D were installed in the southeastern portion of the facility.

Groundwater flow direction in the bedrock is similar to previous results reported (References 2 and 4), though the January 4, 2012 bedrock potentiometric surface map (contour map) indicates a more southeasterly flow direction. This may be due to natural variability or due to an anomolous reading of groundwater elevation at EFT-11D, possibly due to malfunction of the water level guage due to a weak battery. Some of the earlier potentiometric surface maps in Reference 4 show flow to the south-southeast. The majority of contour maps show that flow in the bedrock is to the south-southeast to the south-southwest quadrant. See attachment 6 for bedrock groundwater elevation contour maps. Maps are also included for the intermediate well elevations, however, there is not a continuous saturated permeable strata in the glacial clay between the intermediate wells. Wells EFT-11I and EFT-13I are monitoring the glacial clay. Wells EFT-11I and EFT-12I were placed deeper in the intermediate zone, such that they are monitoring the more permeable zone of weathered rock at the base of the glacial till, as well as the clay.

Attachment 5 NRC-12-0012 Page 4 of 4

#### Recommendation 7:

The screen interval for wells EFT-11I and EFT-12I should include the one-foot zone at the base of the glacial till (on top of bedrock), which is presumably more permeable than the overlying Glacial Lake Clays and Clay Fill. A final determination of the Intermediate screened interval will be made based on field observations (e.g., if only the bottom one-foot zone yields water, then the well screen will be restricted to this interval).

#### Action:

As shown in Reference 2, Attachment 4, the bottom of the screened interval for wells EFT-11I and EFT-12I includes the approximately two foot zone of weathered rock at the base of the glacial till.

#### Recommendation 8:

The completion interval for wells EFT-11D and EFT-12D should be deep enough to extend below the invert depths of the Station structures.

#### Action:

The bottom depth of wells EFT-11D and EFT-12D is at approximately 529 feet and 528 feet elevation, respectively, as shown in Reference 2, Attachment 4. The invert depth of the Reactor Building is at 539 feet (Reference 2, Attachment 1).

#### Recommendation 9:

Fermi 1 will also install an additional monitoring well (EFT-13I) in the intermediate zone near the Health Physics Building and associate sump. The well screen will be placed below the invert depth of the sump and extend to the top of bedrock.

#### Action:

The bottom of the Health Physics Building sump is at approximately 575 feet elevation. This well (EFT-13I) is one of the five new wells described above. The screen for well EFT-13I was placed from approximately 566 feet to 571 feet elevation, which is below the invert of the sump. The screen was not able to be placed at the top of the bedrock, since difficulty was experienced in advancing the hole prior to reaching the top of the bedrock. The goal of monitoring below the invert of the sump and in the Intermediate Zone was achieved.

### Fermi 1 NRC Docket No. 50-16 NRC License No. DPR-9

Attachment 6 to NRC-12-0012

"Updated Fermi 1 Groundwater Monitoring Data"

**Monitoring Well Groundwater Elevations and Maps** 

Well ID	Depth to Groundwater	Top of casing Elevation	Groundwater Elevation	Date	Time
EFT-1S		584.87			
EFT-11		584.86			
EFT-1D		584.86			
EFT-2S		583.33			
EFT-2D		583.12			
EFT-4S		587.16			
EFT-4D		587.34			
EFT-5S		586.64			
EFT-5D		586.89			
EFT-6S		585.63			
EFT-6D		585.71			
EFT-7S		584.94			
EFT-8SOld		582.86			
EFT-8SNew		582.95			
EFT-9S		583.01	· · · · · · · · · · · · · · · · · · ·		
EFT-10S		591.56			
EFT-11I	15.4	585.38	569.98	5/17/2011	13:00
EFT-11D	15.7	585.45	569.75	5/17/2011	13:10
EFT-12I	14.99	584.94	569.95	5/17/2011	13:25
EFT-12D	15.2	584.99	569.79	5/17/2011	13:20
EFT-13I	6.5	582.13	575.63	5/17/2011	13:45

Well ID	Depth to Groundwater	Top of casing Elevation	Groundwater Elevation	Date	Time
			9.0	- 0	
EFT-1S	5.69	584.87	579.18	6/5/2011	13:20
EFT-1I	Mud, couldn't measure	584.86			
EFT-1D	6.25	584.86	578.61	6/5/2011	13:25
EFT-2S	7.51	583.33	575.82	6/5/2011	10:00
EFT-2D	9.90	583.12	573.22	6/5/2011	10:05
EFT-4S	5.50	587.16	581.66	6/5/2011	10:15
EFT-4D	13.36	587.34	573.98	6/5/2011	10:20
EFT-5S	5.70	586.64	580.94	6/5/2011	10:45
EFT-5D	14.53	586.89	572.36	6/5/2011	10:50
EFT-6S	6.90	585.63	578.73	6/5/2011	10:55
EFT-6D	13.20	585.71	572.51	6/5/2011	11:05
EFT-7S	2.80	584.94	582.14	6/5/2011	11:15
EFT-8SOld	9.00	582.86	573.86	6/5/2011	12:00
EFT-8SNew	5.50	582.95	577.45	6/5/2011	12:05
EFT-9S	4.20	583.01	578.81	6/5/2011	13:40
EFT-10S	11.45	591.56	580.11	6/5/2011	14:00
EFT-11I		585.38			
EFT-11D		585.45			
EFT-12I		584.94			
EFT-12D		584.99			
EFT-13I		582.13			



Well ID	Depth to Groundwater	Top of casing Elevation	Groundwater Elevation	Date	Time
71.2					
EFT-1S		584.87			
EFT-1I		584.86			
EFT-1D		584.86			
EFT-2S		583.33			
EFT-2D		583.12			
EFT-4S		587.16			
EFT-4D		587.34		10.00	
EFT-5S		586.64			
EFT-5D		586.89		, 0	
EFT-6S		585.63			
EFT-6D		585.71			
EFT-7S		584.94		•	
EFT-8SOld		582.86			
EFT-8SNew		582.95	• • • • • • • • • • • • • • • • • • • •		
EFT-9S		583.01			
EFT-10S		591.56			
EFT-11I	16.6	585.38	568.78	8/4/2011	9:20
EFT-11D	16.9	585.45	568.55	8/4/2011	9:10
EFT-12I	15.7	584.94	569.24	8/4/2011	9:05
EFT-12D	16.9	584.99	568.09	8/4/2011	9:00
EFT-13I	0.1	582.13	582.03	8/4/2011	9:30

Well ID	Depth to Groundwater	Top of casing Elevation	Groundwater Elevation	Date	Time
EFT-1S	6.50	584.87	578.37	10/3/2011	8:45
EFT-11	8.82	584.86	576.04	10/3/2011	8:55
EFT-1D	12.54	584.86	572.32	10/3/2011	9:10
EFT-2S	3.50	583.33	579.83	10/3/2011	9:20
EFT-2D	11.23	583.12	571.89	10/3/2011	9:30
EFT-4S	6.93	587.16	580.23	10/3/2011	9:50
EFT-4D	15.50	587.34	571.84	10/3/2011	11:10
EFT-5S	6.10	586.64	580.54	10/3/2011	11:20
EFT-5D	14.96	586.89	571.93	10/3/2011	13:15
EFT-6S	6.25	585.63	579.38	10/3/2011	13:25
EFT-6D	14.20	585.71	571.51	10/3/2011	13:55
EFT-7S	4.70	584.94	580.24	10/3/2011	16:20
EFT-8SOld	9.00	582.86	573.86	10/3/2011	16:30
EFT-8SNew	3.70	582.95	579.25	10/3/2011	17:00
EFT-9S	2.20	583.01	580.81	10/4/2011	9:15
EFT-10S	22.00	591.56	569.56	10/4/2011	9:45
EFT-11I	14.5	585.38	570.88	10/4/2011	11:10
EFT-11D	17.3	585.45	568.15	10/4/2011	11:15
EFT-12I	15.3	584.94	569.64	10/4/2011	11:25
EFT-12D	16.6	584.99	568.39	10/4/2011	11:30
EFT-13I	2.2	582.13	579.93	10/4/2011	8:45

Well ID	Depth to Groundwater	Top of casing Elevation	Groundwater Elevation	Date	Time
	1				
EFT-1S		584.87	·		
EFT-1I		584.86			
EFT-1D		584.86			
EFT-2S		583.33			
EFT-2D	:	583.12			
EFT-4S		587.16			
EFT-4D		587.34			
EFT-5S		586.64			
EFT-5D		586.89	,		
EFT-6S		585.63			
EFT-6D		585.71			
EFT-7S		584.94			
EFT-8SOld		582.86			
EFT-8SNew		582.95			
EFT-9S		583.01			
EFT-10S	10.20	591.56	581.36	12/5/2011	8:45
EFT-11I	16.2	585.38	569.18	12/5/2011	9:22
EFT-11D	14.8	585.45	570.65	12/5/2011	9:33
EFT-12I	14.99	584.94	569.95	12/5/2011	9:39
EFT-12D	- 15.2	584.99	569.79	12/5/2011	9:47
EFT-13I	2.5	582.13	579.63	12/5/2011	9:12

Well ID	Depth to Groundwater	Top of casing Elevation	Groundwater Elevation	Date	Time
	600		11111		
EFT-1S	8.92	584.87	575.95	1/4/2012	13:59
EFT-1I	10.60	584.86	574.26	1/4/2012	13:56
EFT-1D	11.80	584.86	573.06	1/4/2012	13:51
EFT-2S	3.40	583.33	579.93	1/4/2012	10:44
EFT-2D	10.98	583.12	572.14	1/4/2012	10:55
EFT-4S	7.26	587.16	579.9	1/4/2012	11:01
EFT-4D	16.31	587.34	571.03	1/4/2012	11:09
EFT-5S	5.92	586.64	580.72	1/4/2012	11:15
EFT-5D	15.62	586.89	571.27	1/4/2012	11:23
EFT-6S	5.63	585.63	580	1/4/2012	11:38
EFT-6D	15.31	585.71	570.4	1/4/2012	11:50
EFT-7S	4.66	584.94	580.28	1/4/2012	14:10
EFT-8SOId	INACCESSIBLE	582.86	N/A	1/4/2012	
EFT-8SNew	4.26	582.95	578.69	1/4/2012	10:35
EFT-9S	3.74	583.01	579.27	1/4/2012	10:22
EFT-10S	16.81	591.56	574.75	1/4/2012	14:15
EFT-11I	17.1	585.38	568.28	1/4/2012	13:10
EFT-11D	14.2	585.45	571.25	1/4/2012	13:15
EFT-12I	16.12	584.94	568.82	1/4/2012	13:26
EFT-12D	15.95	584.99	569.04	1/4/2012	13:40
EFT-13I	FROZEN	582.13	N/A	1/4/2012	

