The Detroit Edison Company
One Energy Plaza, Detroit, MI 48226-1279

10 CFR 51.45
10 CFR 52.77

September 30, 2009
NRC3-09-0014

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

References:
1) Fermi 3
Docket No.: 52-033
2) Letter from Stephen Lemont (USNRC) to Peter W. Smith (Detroit Edison), "Requests for Additional Information Related to the Environmental Review for the Combined License Application for Fermi Nuclear Power Plant, Unit 3," dated May 12, 2009
3) Letter from Peter W. Smith (Detroit Edison) to USNRC, "Detroit Edison Company Response to NRC Requests for Additional Information Related to the Environmental Review," NRC3-09-0013 dated August 25, 2009

Subject: Detroit Edison Company Response to NRC Requests for Additional Information Related to the Environmental Review

In Reference 2, the NRC requested additional information to support the review of Part 3 (Environmental Report) of the Fermi 3 Combined License Application (COLA).

Through August 25, 2009, Detroit Edison has submitted responses to 70 of the 157 Requests for Additional Information (RAIs) which were provided in Reference 2. This letter provides 19 of the remaining 87 RAI responses.

The detailed schedule previously submitted by Detroit Edison (Reference 3) for responding to the remaining RAIs has been updated, accordingly. Appendix A identifies each of the 19 RAI responses contained in this letter as well as the corresponding attachment number. Appendix B identifies the remaining RAI responses that will be included in each of the remaining monthly response letters.

D095
NRO

Detroit Edison intends to respond to all the remaining RAIs by December 30th, 2009. Changes from previous letters are identified by footnotes in the appendices.

Three of the RAI responses in this letter contain electronic files submitted on CD as separate enclosures, as follows: AC7.2-1, AQ2.7-4, and HY5.3.2-2. Appendix C provides a list of files contained on each enclosed CD.

The file format and names on the enclosed CDs do not comply with the requirements for electronic submission in NRC Guidance Document, "Guidance for Electronic Submissions to the NRC," dated November 20, 2007; the files are not ".pdf" formatted. The NRC Staff requested the files be submitted in their native formats required by the software in which they are utilized to support the Environmental Report development.

If you have any questions, or need additional information, please contact me at (313) 235-3341.

I state under penalty of perjury that the foregoing is true and correct. Executed on the 30th day of September, 2009.

Sincerely,

Peter W. Smith, Director
Nuclear Development – Licensing
and Engineering
Detroit Edison Company

Appendices: Appendix A – List of RAI Responses Contained in this Letter
Appendix B – List of Future RAI Response Dates
Appendix C – List of Electronic Files on Enclosed CDs

Attachments: As listed in Appendix A

cc: Mark Tonacci, NRC Fermi 3 Project Manager (w/o attachments)
Stephen Lemont, NRC Fermi 3 Environmental Project Manager (w/o attachments)
Fermi 2 Resident Inspector (w/o attachments)
NRC Region III Regional Administrator (w/o attachments)
NRC Region II Regional Administrator (w/o attachments)
Supervisor, Electric Operators, Michigan Public Service Commission (w/o attachments)
Michigan Department of Environmental Quality
Radiological Protection and Medical Waste Section (w/o attachments)

Appendix A
NRC3-09-0014

List of RAI Responses Contained in this Letter

RAI Question	Subject	Attachment Number
AC7.1-1	Accidents	1
AC7.2-1	Accidents[1]	2
AC7.2-2	Accidents	3
AQ2.7-4	Air Quality and Meteorology[1]	4
CR2.5.3-1	Cultural Resources[2]	5
CR4.1.3-7	Cultural Resources	6
FC5.7-1	Fuel Cycle[2]	7
FC5.7-2	Fuel Cycle	8
HH5.4.1-3	Human Health	9
HY2.3.1-8	Hydrology	10
HY2.3.1-15	Hydrology	11
HY4.2.1-7	Hydrology	12
HY4.2.1-8	Hydrology	13
HY5.3.2-2	Hydrology[3]	14
NO3.7-1	Noise	15
NO4.4.1-1	Noise	16
NO5.8.1-1	Noise	17
TE4.3.1-5	Terrestrial Ecology[4]	18
TR7.4-1	Transportation	19

1 CD Enclosed
2 Advanced from October
3 Advanced from October, CD Enclosed
4 Advanced from November

Appendix B
NRC3-09-0014

List of Future RAI Response Dates

List of Future RAI Response Dates

Response Date	RAI Question	Subject
10/30/2009	AE4.3.2-1	Aquatic Ecology
	AQ4.4.1-1	Air Quality and Meteorology
	AQ5.8.1-1	Air Quality and Meteorology
	AQ6.4-1	Air Quality and Meteorology
	BC10.4.2-2	Benefit-Cost Balance
	HH4.5-2	Human Health
	HH4.5-3	Human Health
	HH5.11.7-1	Human Health
	HH5.4.3-3	Human Health
	HH5.4.4-1	Human Health
	HY5.11-1	Hydrology
	LU4.1.1-1	Land Use
	LU4.4.2-1	Land Use
	NO4.4.1-2	Noise
	SE4.4.2-10	Socioeconomics
	SE4.4.2-6	Socioeconomics
	TE4.3.1-6	Terrestrial Ecology
	TR3.8-1	Transportation
	TR3.8-2	Transportation
	TR3.8-3	Transportation
	TR3.8-4	Transportation
	TR3.8-5	Transportation
	TR4.8.3-2	Transportation
	GE1.2-1	General
11/23/2009	GE1.2-2	General
	AC7.3-1	Accidents
	AQ2.7-1	Air Quality and Meteorology
	AQ3.6.3-2	Air Quality and Meteorology
	AQ5.3.3.1-1	Air Quality and Meteorology
	HH4.5-1	Human Health
	HH4.5-4	Human Health
	HH5.4.2-2	Human Health
	HH5.4.3-1	Human Health
	HH5.4.3-2	Human Health
	HY4.2.1-3	Hydrology

Response Date	RAI Question	Subject
	HY5.2-1	Hydrology
	SE2.5.2-1	Socioeconomics
	SE4.4.2-7	Socioeconomics
	SE4.4.2-8	Socioeconomics
	TE2.4.1-10	Terrestrial Ecology
	GE1.2-3	General
12/30/2009	GE3.1-1	General
	GE4-1	General
	AE2.4.2-2	Aquatic Ecology
	AE2.4.2-3	Aquatic Ecology
	AE2.4.2-4	Aquatic Ecology
	AQ2.7-2[1]	Air Quality
	CR4.1.3-4	Cultural Resources
	HY2.3.1-1	Hydrology
	HY2.3.1-2	Hydrology
	HY2.3.1-3	Hydrology
	HY2.3.1-4	Hydrology
	HY2.3.1-7	Hydrology
	HY4.2.1-1	Hydrology
	HY4.2.1-11	Hydrology
	HY4.2.1-2	Hydrology
	HY4.2.1-4	Hydrology
	HY4.2.1-5	Hydrology
	HY4.2.1-6	Hydrology
	LU1.2-1b	Land Use
	SE2.5.2-2	Socioeconomics
	TE2.4.1-2	Terrestrial Ecology
	TE2.4.1-9	Terrestrial Ecology
	TE2.4.1-11	Terrestrial Ecology
	TE4.3.1-1	Terrestrial Ecology
	TE4.3.1-2	Terrestrial Ecology
	TE4.3.1-4	Terrestrial Ecology
	TR4.8.3-1	Transportation
12/30/2009	USACE-1	U.S. Army Corps of Engineers RAI
	USACE-2	U.S. Army Corps of Engineers RAI

1. Delayed from September Letter

Appendix C
NRC3-09-0014

List of Electronic Files on Enclosed CDs

Directory of MACCS2 Requested Files (Attachment 2 – RAI AC7.2-1)

Directory of D:\

09/24/2009 11:40 AM	<DIR>	MACCS2
0 File(s)	0 bytes	
1 Dir(s)	0 bytes free	

Directory of D:\MACCS2

09/24/2009 11:11 AM	<DIR>	ECON
09/24/2009 11:11 AM	<DIR>	EVAC
09/24/2009 11:11 AM	<DIR>	INPUT
09/24/2009 11:09 AM	<DIR>	MET
09/24/2009 11:08 AM	<DIR>	OUTPUT
09/24/2009 11:06 AM	<DIR>	POP
0 File(s) 0 bytes		
6 Dir(s) 0 bytes free		

Directory of D:\MACCS2\ECON

09/04/2009 08:12 AM	13,147	FERMEBWR.DAT*
1 File(s) 13,147 bytes		
0 Dir(s) 0 bytes free		

Directory of D:\MACCS2\EVAC

01/30/2009 08:14 AM	13,620	FERMEBWR.DAT*
1 File(s) 13,620 bytes		
0 Dir(s) 0 bytes free		

Directory of D:\MACCS2\INPUT

09/04/2009 08:31 AM	58,116	01MWRELH
09/04/2009 08:31 AM	58,118	10MWRELH
09/04/2009 08:31 AM	166,648	2XPR2002
09/04/2009 08:31 AM	15,746,611	bocdr_nin_rl
09/04/2009 08:31 AM	8,632,807	bocsd_nin_rl
09/04/2009 08:31 AM	13,650	DUBLDELY
09/04/2009 08:31 AM	13,682	DUBLEVAC
09/04/2009 08:31 AM	2,301	EVAC.cmd **
09/04/2009 08:31 AM	58,083	FERMEBWR
09/04/2009 08:31 AM	13,147	FERMEBWR (1)
09/04/2009 08:31 AM	13,620	FERMEBWR (2)

* DAT extension added
** TXT extension changed to CMD extension for indication of function
*** TXT extension changed to DAT extension for indication of function

09/04/2009	08:31 AM	13,652	HALFDELY
09/04/2009	08:31 AM	13,686	HALFEVAC
09/04/2009	08:31 AM	1,148	HEAT.cmd **
09/04/2009	08:31 AM	166,649	HFPR2002
09/04/2009	08:31 AM	58,117	MIDOFCNT
09/04/2009	08:31 AM	549	MOC.cmd **
09/04/2009	08:31 AM	549	NORN.cmd **
09/04/2009	08:31 AM	58,105	NORN4050
09/04/2009	08:31 AM	1,137	PRECIP.cmd **
09/04/2009	08:31 AM	549	RUN.cmd **
09/04/2009	08:31 AM	185	RUNALL.cmd **
09/04/2009	08:33 AM	10,025,162	t-at_nin_nchr_fr_r1
09/04/2009	08:33 AM	549	TOC.cmd **
09/04/2009	08:33 AM	58,111	TOPOFCNT
09/04/2009	08:32 AM	12,859,480	t_at_nin_tsl2x_r1
09/04/2009	08:32 AM	6,201,594	t_ndp_nin_byp_r1
09/04/2009	08:32 AM	6,814,371	t_ndp_nin_cciw_r1
09/04/2009	08:32 AM	11,338,100	t_ndp_nin_nchr_w1_r1
09/04/2009	08:32 AM	11,358,660	t_ndp_nin_nchr_w2_r1
09/04/2009	08:32 AM	20,101,398	t_ndp_nin_nd_ccid_r1
09/04/2009	08:32 AM	7,349,975	t_ndp_nin_vb_r1
09/04/2009	08:32 AM	6,113,250	t_nin_byp_r1
09/04/2009	08:33 AM	8,928,335	t_nin_cciw_r1
09/04/2009	08:33 AM	8,164,150	t_nin_nd_ccid_r1
09/04/2009	08:33 AM	6,476,586	t_nin_nd_eve_r1
09/04/2009	08:33 AM	8,257,042	t_nin_vb_r1

37 File(s) 149,137,872 bytes
0 Dir(s) 0 bytes free

Directory of D:\MACCS2\MET

09/04/2009	09:01 AM	36,049	2001 Climate Summary for Detroit.dat ***
09/04/2009	09:01 AM	535,670	2001.csv
09/04/2009	09:01 AM	590,236	2002.csv
09/04/2009	09:01 AM	549,403	2003.csv
09/04/2009	09:01 AM	40,689	2004 Climate Summary for Detroit.dat ***
09/04/2009	09:01 AM	541,892	2004.csv
09/04/2009	09:01 AM	38,990	2005 Climate Summary for Detroit.dat ***
09/04/2009	09:01 AM	539,041	2005.csv
09/04/2009	09:01 AM	540,439	2006.csv
09/04/2009	09:01 AM	538,391	2007.csv
09/04/2009	09:01 AM	2,422,272	BV-2008-0044A01.xls
09/04/2009	09:01 AM	1,227,264	BV-2008-0044A02.xls
09/04/2009	09:01 AM	2,560,512	BV-2008-0044A03.xls

* DAT extension added
** TXT extension changed to CMD extension for indication of function
*** TXT extension changed to DAT extension for indication of function

09/04/2009	09:01 AM	2,278,912	BV-2008-0044A04.xls
09/04/2009	09:01 AM	2,335,744	BV-2008-0044A05.xls
09/04/2009	09:01 AM	2,309,120	BV-2008-0044A06.xls
09/04/2009	09:01 AM	4,135,424	BV-2008-0044A07.xls
09/04/2009	09:01 AM	540,952	EDITMET
09/04/2009	09:01 AM	14,473	EDITMET (1)
09/04/2009	09:01 AM	29	EDITMET (2)
09/04/2009	09:01 AM	12,844	EDITMET.out
09/04/2009	09:01 AM	166,642	FERM2001
09/04/2009	09:01 AM	166,642	FERM2002
09/04/2009	09:01 AM	166,642	FERM2003
09/04/2009	09:01 AM	166,642	FERM2004
09/04/2009	09:01 AM	166,642	FERM2005
09/04/2009	09:01 AM	166,642	FERM2006
09/04/2009	09:01 AM	166,642	FERM2007
09/04/2009	09:01 AM	2,240	SUSPECT.dat ***

29 File(s) 22,957,080 bytes
0 Dir(s) 0 bytes free

Directory of D:\MACCS2\OUTPUT

09/04/2009	09:01 AM	8,684,641	01MWRELH.out
09/04/2009	09:01 AM	8,684,641	10MWRELH.out
09/04/2009	09:01 AM	8,684,641	2XPR2002.out
09/04/2009	09:01 AM	8,684,641	DUBLDELY.out
09/04/2009	09:01 AM	8,684,641	DUBLEVAC.out
09/04/2009	09:01 AM	8,684,641	FERM2001.out
09/04/2009	09:01 AM	8,684,641	FERM2002.out
09/04/2009	09:01 AM	8,684,641	FERM2003.out
09/04/2009	09:01 AM	8,684,641	FERM2004.out
09/04/2009	09:01 AM	8,684,641	FERM2005.out
09/04/2009	09:01 AM	8,684,641	FERM2006.out
09/04/2009	09:01 AM	8,684,641	FERM2007.out
09/04/2009	09:01 AM	17,920	FERMI EBWR RISKS (MET YEAR AND SENSITIVITY)-rev2.xls
09/04/2009	09:01 AM	16,896	FERMI-3 EARLY VS LATE POP-DOSE RISK-rev2.xls
09/04/2009	09:01 AM	8,684,641	HALFDELY.out
09/04/2009	09:01 AM	8,684,641	HALFEVAC.out
09/04/2009	09:01 AM	8,684,641	HFPR2002.out
09/04/2009	09:01 AM	8,684,641	MIDOFCNT.out
09/04/2009	09:01 AM	8,684,641	NORN4050.out
09/04/2009	09:01 AM	8,986	READOUT
09/04/2009	09:01 AM	191	READOUT (1)

* DAT extension added
** TXT extension changed to CMD extension for indication of function
*** TXT extension changed to DAT extension for indication of function

09/04/2009	09:01 AM	183,883	READOUT (2)
09/04/2009	09:01 AM	38,880	READOUT (3)
09/04/2009	09:01 AM	36,864	SAMDA (Fermi 3)-rev2.xls
09/04/2009	09:01 AM	8,684,641	TOPOFCNT.out

25 File(s) 156,627,158 bytes
0 Dir(s) 0 bytes free

Directory of D:\MACCS2\POP

09/04/2009	09:02 AM	370,323	COUNTY97
09/04/2009	09:02 AM	1,664	FERM2000
09/04/2009	09:02 AM	1,664	FERM2008
09/04/2009	09:02 AM	1,664	FERM2013
09/04/2009	09:02 AM	1,664	FERM2018
09/04/2009	09:02 AM	1,664	FERM2020
09/04/2009	09:02 AM	1,664	FERM2030
09/04/2009	09:02 AM	1,664	FERM2040
09/04/2009	09:02 AM	1,664	FERM2050
09/04/2009	09:02 AM	10,459	FERM2060
09/04/2009	09:02 AM	1,664	FERM2060 (1)
09/04/2009	09:02 AM	10,442	FERMSECP
09/04/2009	09:02 AM	9,254	FSARPOP.dat ***
09/04/2009	09:02 AM	32,690	TXT2POP
09/04/2009	09:02 AM	1,775	TXT2POP (2)

15 File(s) 449,919 bytes
0 Dir(s) 0 bytes free

Total Files Listed:
108 File(s) 329,198,796 bytes

* DAT extension added
** TXT extension changed to CMD extension for indication of function
*** TXT extension changed to DAT extension for indication of function

Directory of PAVAN/XOQDOQ/SACTI Requested Files (Attachment 4 – RAI AQ2.7-4)

Directory of D:\

09/23/2009 08:07 AM	<DIR>	PAVAN	
09/23/2009 08:07 AM	<DIR>	SACTI	
09/23/2009 08:07 AM	<DIR>	XOQDOQ	
0 File(s)	0 bytes		
3 Dir(s)	0 bytes free		

Directory of D:\PAVAN

08/14/2009 04:00 PM	6,091	fermiinput-R4.dat
08/14/2009 04:00 PM	484,632	fermiouput-R4.dat
2 File(s)	490,723 bytes	
0 Dir(s)	0 bytes free	

Directory of D:\SACTI

09/23/2009 08:07 AM	<DIR>	INPUT
09/23/2009 08:07 AM	<DIR>	OUTPUT
0 File(s)	0 bytes	
2 Dir(s)	0 bytes free	

Directory of D:\SACTI\INPUT

07/08/2009 04:02 PM	3,549,744	DTE60M.144
07/08/2009 03:51 PM	498	NDCT_MULT.usr
07/08/2009 03:51 PM	335	NDCT_PREP.usr
07/08/2009 03:51 PM	428	PAGE.usr
07/08/2009 03:50 PM	272	Seasonal_TABLES.usr
07/08/2009 03:50 PM	54,780	WhtLake.mix
6 File(s)	3,606,057 bytes	
0 Dir(s)	0 bytes free	

Directory of D:\SACTI\OUTPUT

07/08/2009 03:51 PM	90,970	MULT.out
07/08/2009 03:51 PM	59,686	PAGE.out
07/08/2009 03:51 PM	6,085,672	PREP.out
07/08/2009 03:49 PM	497,214	TABLES.out
4 File(s)	6,733,542 bytes	
0 Dir(s)	0 bytes free	

* DAT extension added
** TXT extension changed to CMD extension for indication of function
*** TXT extension changed to DAT extension for indication of function

Directory of D:\XOQDOQ

08/14/2009	04:00 PM	15,129	Fermi_a.xnp
08/14/2009	04:00 PM	15,129	Fermi_b.xnp
08/14/2009	04:00 PM	21,492	GAS_XOQ_Fermi.DAT
08/14/2009	04:00 PM	7,019	XOQ_INP_Fermi_a.DAT
08/14/2009	04:00 PM	6,644	XOQ_INP_Fermi_b.DAT
08/14/2009	04:00 PM	137,012	XOQ_OUT_Fermi_a.DAT
08/14/2009	04:00 PM	129,711	XOQ_OUT_Fermi_b.DAT

7 File(s) 332,136 bytes
0 Dir(s) 0 bytes free

Total Files Listed:
19 File(s) 11,162,458 bytes

* DAT extension added
** TXT extension changed to CMD extension for indication of function
*** TXT extension changed to DAT extension for indication of function

Directory of CORMIX Requested Files (Attachment 14 – RAI HY5.3.2-2)

Directory of D:\

09/04/2009	01:34 PM	<DIR>	CORMIX
	0 File(s)	0 bytes	
	1 Dir(s)	0 bytes free	

Directory of D:\CORMIX

09/04/2009	01:32 PM	<DIR>	DepthSensAnalysis
09/04/2009	01:32 PM	<DIR>	ExtremeWestFlow
09/04/2009	01:32 PM	<DIR>	MonthlyRuns
	0 File(s)	0 bytes	
	3 Dir(s)	0 bytes free	

Directory of D:\CORMIX\DepthSensAnalysis

08/26/2009	10:01 AM	5,991	MayMaxDELTAHighVelSA2_12.cmx
08/26/2009	10:01 AM	24,088	MayMaxDELTAHighVelSA2_12.prd
08/26/2009	10:01 AM	9,764	MayMaxDELTAHighVelSA2_12.ses
08/26/2009	10:01 AM	5,989	MayMaxDELTAHighVelSA2_32.cmx
08/26/2009	10:01 AM	24,088	MayMaxDELTAHighVelSA2_32.prd
08/26/2009	10:01 AM	9,760	MayMaxDELTAHighVelSA2_32.ses
08/26/2009	10:01 AM	5,989	MayMaxDELTAHighVelSA2_44.cmx
08/26/2009	10:01 AM	24,088	MayMaxDELTAHighVelSA2_44.prd
08/26/2009	10:01 AM	9,763	MayMaxDELTAHighVelSA2_44.ses
	9 File(s)	119,520 bytes	
	0 Dir(s)	0 bytes free	

Directory of D:\CORMIX\ExtremeWestFlow

08/26/2009	10:02 AM	5,985	MayMaxDELTAExtremeWest.cmx
08/26/2009	10:02 AM	25,413	MayMaxDETLAExtremeWest.prd
08/26/2009	10:02 AM	7,926	MayMaxDELTAExtremeWest.ses
	3 File(s)	39,324 bytes	
	0 Dir(s)	0 bytes free	

Directory of D:\CORMIX\MonthlyRuns

09/04/2009	01:32 AM	<DIR>	01January
09/04/2009	01:32 AM	<DIR>	02February
09/04/2009	01:32 AM	<DIR>	03March
09/04/2009	01:32 AM	<DIR>	04April

* DAT extension added
** TXT extension changed to CMD extension for indication of function
*** TXT extension changed to DAT extension for indication of function

09/04/2009	01:32 AM	<DIR>		05May
09/04/2009	01:32 AM	<DIR>		06June
09/04/2009	01:32 AM	<DIR>		07July
09/04/2009	01:32 AM	<DIR>		08August
09/04/2009	01:32 AM	<DIR>		09September
09/04/2009	01:32 AM	<DIR>		10October
09/04/2009	01:32 AM	<DIR>		11November
09/04/2009	01:32 AM	<DIR>		12December
	0 File(s)	0 bytes		
	12 Dir(s)	0 bytes free		

Directory of D:\CORMIX\MonthlyRuns\01January

08/26/2009	10:03 AM	5,986	JanuaryMaxDELTAHighVel.cmx
08/26/2009	10:03 AM	13,588	JanuaryMaxDELTAHighVel.prd
08/26/2009	10:03 AM	9,736	JanuaryMaxDELTAHighVel.ses
08/26/2009	10:03 AM	5,985	JanuaryMaxDELTALowVel.cmx
08/26/2009	10:03 AM	17,766	JanuaryMaxDELTALowVel.prd
08/26/2009	10:03 AM	9,768	JanuaryMaxDELTALowVel.ses
08/26/2009	10:03 AM	5,988	JanuaryMaxTEMPHighVel.cmx
08/26/2009	10:03 AM	13,588	JanuaryMaxTEMPHighVel.prd
08/26/2009	10:03 AM	9,734	JanuaryMaxTEMPHighVel.ses
08/26/2009	10:03 AM	5,988	JanuaryMaxTEMPLowVel.cmx
08/26/2009	10:03 AM	17,766	JanuaryMaxTEMPLowVel.prd
08/26/2009	10:03 AM	9,763	JanuaryMaxTEMPLowVel.ses
	12 File(s)	125,656 bytes	
	0 Dir(s)	0 bytes free	

Directory of D:\CORMIX\MonthlyRuns\02February

08/26/2009	10:03 AM	5,986	FebruaryMaxDELTAHighVel.cmx
08/26/2009	10:03 AM	13,588	FebruaryMaxDELTAHighVel.prd
08/26/2009	10:03 AM	9,723	FebruaryMaxDELTAHighVel.ses
08/26/2009	10:03 AM	5,986	FebruaryMaxDELTALowVel.cmx
08/26/2009	10:03 AM	17,734	FebruaryMaxDELTALowVel.prd
08/26/2009	10:03 AM	9,704	FebruaryMaxDELTALowVel.ses
08/26/2009	10:03 AM	5,988	FebruaryMaxTEMPHighVel.cmx
08/26/2009	10:03 AM	13,588	FebruaryMaxTEMPHighVel.prd
08/26/2009	10:03 AM	9,721	FebruaryMaxTEMPHighVel.ses
08/26/2009	10:03 AM	5,988	FebruaryMaxTEMPLowVel.cmx
08/26/2009	10:03 AM	17,734	FebruaryMaxTEMPLowVel.prd
08/26/2009	10:03 AM	9,701	FebruaryMaxTEMPLowVel.ses
	12 File(s)	125,441 bytes	
	0 Dir(s)	0 bytes free	

* DAT extension added
** TXT extension changed to CMD extension for indication of function
*** TXT extension changed to DAT extension for indication of function

Directory of D:\CORMIX\MonthlyRuns\03March

08/26/2009	10:03 AM	5,986	MarchMaxDELTAHighVel.cmx
08/26/2009	10:03 AM	13,588	MarchMaxDELTAHighVel.prd
08/26/2009	10:03 AM	9,732	MarchMaxDELTAHighVel.ses
08/26/2009	10:03 AM	5,987	MarchMaxDELTALowVel.cmx
08/26/2009	10:03 AM	17,766	MarchMaxDELTALowVel.prd
08/26/2009	10:03 AM	9,764	MarchMaxDELTALowVel.ses
08/26/2009	10:03 AM	5,988	MarchMaxTEMPHighVel.cmx
08/26/2009	10:03 AM	13,588	MarchMaxTEMPHighVel.prd
08/26/2009	10:03 AM	9,730	MarchMaxTEMPHighVel.ses
08/26/2009	10:03 AM	5,988	MarchMaxTEMPLowVel.cmx
08/26/2009	10:03 AM	17,766	MarchMaxTEMPLowVel.prd
08/26/2009	10:03 AM	9,759	MarchMaxTEMPLowVel.ses

12 File(s) 125,642 bytes
0 Dir(s) 0 bytes free

Directory of D:\CORMIX\MonthlyRuns\04April

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08/26/2009	10:03 AM	5,987	AprilMaxDELTALowVel.cmx
08/26/2009	10:03 AM	17,766	AprilMaxDELTALowVel.prd
08/26/2009	10:03 AM	9,759	AprilMaxDELTALowVel.ses
08/26/2009	10:03 AM	5,988	AprilMaxTEMPHighVel.cmx
08/26/2009	10:03 AM	13,588	AprilMaxTEMPHighVel.prd
08/26/2009	10:03 AM	9,733	AprilMaxTEMPHighVel.ses
08/26/2009	10:03 AM	5,988	AprilMaxTEMPLowVel.cmx
08/26/2009	10:03 AM	17,666	AprilMaxTEMPLowVel.prd
08/26/2009	10:03 AM	9,761	AprilMaxTEMPLowVel.ses

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08/26/2009	10:03 AM	17,766	MayMaxDELTALowVel.prd
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08/26/2009	10:04 AM	9,823	JuneMaxTEMPHighVel.prd
08/26/2009	10:04 AM	9,204	JuneMaxTEMPHighVel.ses
08/26/2009	10:04 AM	5,988	JuneMaxTEMPLowVel.cmx
08/26/2009	10:04 AM	17,766	JuneMaxTEMPLowVel.prd
08/26/2009	10:04 AM	9,761	JuneMaxTEMPLowVel.ses

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Directory of D:\CORMIX\MonthlyRuns\07July

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08/26/2009	10:04 AM	5,987	JulyMaxDELTALowVel.cmx
08/26/2009	10:04 AM	17,766	JulyMaxDELTALowVel.prd
08/26/2009	10:04 AM	9,769	JulyMaxDELTALowVel.ses
08/26/2009	10:04 AM	5,988	JulyMaxTEMPHighVel.cmx
08/26/2009	10:04 AM	9,823	JulyMaxTEMPHighVel.prd
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08/26/2009  10:04 AM        9,765      AugustMaxDELTALowVel.ses
08/26/2009  10:04 AM        5,988      AugustMaxTEMPHighVel.cmx
08/26/2009  10:04 AM        9,905      AugustMaxTEMPHighVel.prd
08/26/2009  10:04 AM        9,524      AugustMaxTEMPHighVel.ses
08/26/2009  10:04 AM        5,988      AugustMaxTEMPLowVel.cmx
08/26/2009  10:04 AM       17,848      AugustMaxTEMPLowVel.prd
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08/26/2009  10:04 AM       17,766      SeptemberMaxDELTALowVel.prd
08/26/2009  10:04 AM        9,771      SeptemberMaxDELTALowVel.ses
08/26/2009  10:04 AM        5,988      SeptemberMaxTEMPHighVel.cmx
08/26/2009  10:04 AM       13,670      SeptemberMaxTEMPHighVel.prd
08/26/2009  10:04 AM       10,058      SeptemberMaxTEMPHighVel.ses
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Directory of D:\CORMIX\MonthlyRuns\10October

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08/26/2009  10:04 AM        9,743      OctoberMaxDELTAHighVel.ses
08/26/2009  10:04 AM        5,986      OctoberMaxDELTALowVel.cmx
08/26/2009  10:04 AM       17,766      OctoberMaxDELTALowVel.prd
08/26/2009  10:04 AM        9,778      OctoberMaxDELTALowVel.ses
08/26/2009  10:04 AM        5,987      OctoberMaxTEMPHighVel.cmx
08/26/2009  10:04 AM       13,290      OctoberMaxTEMPHighVel.prd
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08/26/2009	10:04 AM	13,588	NovemberMaxDELTAHighVel.prd
08/26/2009	10:04 AM	9,744	NovemberMaxDELTAHighVel.ses
08/26/2009	10:04 AM	5,986	NovemberMaxDELTALowVel.cmx
08/26/2009	10:04 AM	17,766	NovemberMaxDELTALowVel.prd
08/26/2009	10:04 AM	9,779	NovemberMaxDELTALowVel.ses
08/26/2009	10:04 AM	5,987	NovemberMaxTEMPHighVel.cmx
08/26/2009	10:04 AM	13,670	NovemberMaxTEMPHighVel.prd
08/26/2009	10:05 AM	10,056	NovemberMaxTEMPHighVel.ses
08/26/2009	10:05 AM	5,987	NovemberMaxTEMPLowVel.cmx
08/26/2009	10:05 AM	17,848	NovemberMaxTEMPLowVel.prd
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Directory of D:\CORMIX\MonthlyRuns\12December

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08/26/2009	10:05 AM	13,588	DecemberMaxDELTAHighVel.prd
08/26/2009	10:05 AM	9,738	DecemberMaxDELTAHighVel.ses
08/26/2009	10:05 AM	5,986	DecemberMaxDELTALowVel.cmx
08/26/2009	10:05 AM	17,766	DecemberMaxDELTALowVel.prd
08/26/2009	10:05 AM	9,769	DecemberMaxDELTALowVel.ses
08/26/2009	10:05 AM	5,988	DecemberMaxTEMPHighVel.cmx
08/26/2009	10:05 AM	13,588	DecemberMaxTEMPHighVel.prd
08/26/2009	10:05 AM	9,740	DecemberMaxTEMPHighVel.ses
08/26/2009	10:05 AM	5,988	DecemberMaxTEMPLowVel.cmx
08/26/2009	10:05 AM	17,766	DecemberMaxTEMPLowVel.prd
08/26/2009	10:05 AM	9,771	DecemberMaxTEMPLowVel.ses
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Total Files Listed:
156 File(s) 1,629,182 bytes

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Attachment 1
NRC3-09-0014

Response to RAI letter related to Fermi 3 ER

RAI Question AC7.1-1

NRC RAI AC7.1-1

Provide a reevaluation of the Design Basis Accidents (DBA) doses using the ESBWR Design Control Document (DCD) Revision 5 source terms and site-specific X/Q values for the Exclusion Area Boundary (EAB) and Low Population Zone (LPZ).

Supporting Information

During the site audit, Detroit Edison presented new DBA doses using DCD Revision 5. The NRC staff will use the X/Q values and calculate the EAB and LPZ doses for the DBAs, and compare the results of its calculations with the results of Detroit Edison's calculations.

Response

The Design Basis Accident dose evaluation for Fermi 3 has been calculated based on the ESBWR Design Control Document (DCD) Revision 5 and updated 50^{th} percentile X/Q values. The updated 50^{th} percentile X/Q values are determined as described in the response to RAI AQ2.7-5 (see Detroit Edison letter NRC3-09-0013, dated August 25, 2009). The analysis continues to support the conclusions of Environmental Report (ER) Section 7.1.4 with respect to SMALL potential environmental impacts of DBAs.

The updated Design Basis Accidents (DBA) doses using the ESBWR Design Control Document (DCD) Revision 5 source terms and site-specific 50^{th} percentile X/Q values for the Exclusion Area Boundary (EAB) and Low Population Zone (LPZ) are presented in the following markups.

Proposed COLA Revision

Fermi 3 COLA Part 3, ER Section 7.1 will be revised to include the updated analysis as reflected in the attached markup.

Markup of Detroit Edison COLA
(following 16 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be different than presented here.

Chapter 7 Environmental Impacts of Postulated Accidents Involving Radioactive Materials

This chapter assesses the environmental impacts of postulated accidents involving radioactive materials at Fermi 3. The chapter is divided into the following four sections that address design basis accidents, severe accidents, severe accident mitigation design alternatives, and transportation accidents:

- Design Basis Accidents (Section 7.1)
- Severe Accidents (Section 7.2)
- Severe Accident Mitigation Alternatives (Section 7.3)
- Transportation Accidents (Section 7.4)

7.1 Design Basis Accidents

The purpose of this section is to assess the environmental risks of accidents involving radioactive material. The scope of this section is limited to a comparison of the offsite dose consequences and resulting health effects for design basis accidents (DBAs) as calculated by Detroit Edison and those contained in DCD Chapter 15 (Reference 7.1-1).

7.1.1 Selection of Accidents

The radiological consequences of accidents are assessed to demonstrate that a new unit could be constructed and operated at the Fermi site without undue risk to the health and safety of the public. The assessment uses site-specific accident meteorology with radiological analyses in DCD Chapter 15 (Reference 7.1-1). The DBAs include a spectrum of events, including those of relatively greater probability of occurrence as well as those that are less probable but have greater severity.

The set of accidents selected focuses on the ESBWR design. From Reference 7.1-1, the following DBAs are evaluated for the ESBWR:

- Feedwater Line Break Accident
- Failure of Small Line Carrying Primary Coolant Outside Containment
- Main Steamline Break Accident (MSLBA)
- Loss-of-Coolant Accident (LOCA)
- Fuel Handling Accident
- RWCU/SDC Line Break Accident
- Control Rod Drop Accident
- Spent Fuel Cask Drop Accident

As discussed in DCD Sections 15.4.6 and 15.4.10, radiological consequence analyses are not required for the control rod drop accident and the spent fuel cask drop accident.

7.1.2 Evaluation Methodology

Doses for the representative DBAs are evaluated at the Exclusion Area Boundary (EAB) and the Low Population Zone (LPZ). These doses must meet the site acceptance criteria in 10 CFR 50.34 and 10 CFR 100. Although the analysis of engineered safety features demonstrate that these systems prevent core damage and mitigate releases of radioactivity, the LOCA dose analysis presumes substantial core melt with the release of significant amounts of fission products. The postulated DBA LOCA is expected to more closely approach 10 CFR 50.34 limits than the other DBAs of greater probability of occurrence but lesser magnitude of activity releases. For the accidents evaluated herein, the calculated doses are compared to the acceptance criteria in Regulatory Guide 1.183 and NUREG-0800, to demonstrate that the consequences of the postulated accidents are acceptable.

The evaluations discussed herein use short-term accident atmospheric dispersion factors (X/Q). The X/Qs are calculated using the computer code PAVAN, Version 2.0, following the methodology in Regulatory Guide 1.145 and using site-specific meteorological data. Consistent with NUREG-1555, Section 7.1.III.(2), X/Qs used for this assessment should either be the "50th percentile X/Q value that was based on onsite meteorological data, or 10 percent of the levels given in Regulatory Guide 1.3 or Regulatory Guide 1.4, to represent more realistic dispersion conditions than assumed in the safety evaluation." ~~The analysis provides X/Q values at the EAB and the LPZ for each combination of wind speed, and it calculates atmospheric stability for each of 16 downwind direction sectors. For a given location, the EAB and the LPZ, the 0 – 2 hour X/Q value is the 50th percentile overall value calculated by PAVAN. For the LPZ, the X/Q values for all subsequent times are calculated by logarithmic interpolation between the 50th percentile X/Q value and the annual average X/Q value.~~ For the Fermi site, the 50th percentile X/Qs are provided in Table 7.1-1.

Determination of the 50th percentile X/Q values is discussed in Section 2.7.6.1.

The accident doses are expressed as total effective dose equivalent (TEDE), consistent with 10 CFR 50.34. The TEDE consists of the sum of the committed effective dose equivalent (CEDE) from inhalation and either the deep dose equivalent (DDE) or the effective dose equivalent (EDE) from external exposure. The CEDE is determined using the dose conversion factors in Federal Guidance Report 11 (Reference 7.1-2), while the DDE and the EDE are based on dose conversion factors in Federal Guidance Report 12 (Reference 7.1-3).

7.1.3 Source Terms

Doses are calculated based on the time-dependent activities released to the environment during each DBA. The activities are based on the analyses used to support the DCD safety analyses reports. The DCD source term, methodologies, and assumptions are based on the alternative source term methods outlined in Regulatory Guide 1.183. The activity releases and doses are based on a power level of 4590 MWt, which represents a core thermal power of 4500 MWt multiplied by an uncertainty factor of 1.02. DBA source terms have been updated and are presented as isotopic activity releases to the environment in the unit of megabecquerel (MBq) in DCD Section 15.4, DCD Tables 15.4-3a, 15.4-7, 15.4-12, 15.4-15, ~~15.4-18,~~ and 15.4-22.

15.4-18a, 15.4-18b,

Reference 7.1-1 does not provide time-dependent LPZ doses; thus, the Fermi 3 LPZ dose is determined by multiplying the total dose from Reference 7.1-1 by the maximum X/Q ratio.

7.1.4 Radiological Consequences

The Fermi 3 specific doses are calculated based on the doses in Reference 7.1-1. For each DBA, the Fermi 3 specific dose is calculated by multiplying the DCD dose (provided in DCD Section 15.4) by the ratio of the Fermi 3 site-specific X/Q value to the associated DCD X/Q value from DCD Section 15.4. The Fermi 3 site-specific X/Q values are the time-dependent X/Q values in Table 7.1-1. The resulting X/Q ratios are shown in Table 7.1-2.

-13

Because the Fermi 3 site-specific X/Q values are bounded by the DCD X/Q values, the Fermi 3 site-specific doses are within those calculated in DCD Section 15.4, and, in turn, within regulatory limits. The DBA doses summarized in Table 7.1-3 are based on individual accident doses presented in Table 7.1-4 through Table 7.1-~~11~~. For each DBA, the EAB dose shown is for the two-hour period that yields the maximum dose, in accordance with Regulatory Guide 1.183.

The Fermi 3 specific doses summarized in Table 7.1-3 are within the acceptance criteria of Regulatory Guide 1.183 and NUREG-0800. Thus, the potential environmental impacts of DBAs are SMALL. Refer to Section 5.4 for the impacts to the public from anticipated releases during normal operation.

5, May 2008.

7.1.5 References

7.1-1 GE-Hitachi Nuclear Energy, "ESBWR Design Control Document – Tier 2," Revision ~~4, September 2007.~~

7.1-2 U.S. Environmental Protection Agency, Federal Guidance Report 11, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion and Ingestion," EPA-520/1-88-020, 1988.

7.1-3 U.S. Environmental Protection Agency, Federal Guidance Report 12, "External Exposure to Radionuclides in Air, Water and Soil," EPA-402-R-93-081, 1993.

Insert New Table 7.1-1 through 7.1-13

Table 7.1-1 Maximum 50th percentile X/Q Values

Location		X/Q (sec/m^3)
EAB		5.515E-05
LPZ	0-8 hr	4.078E-06
LPZ	8-24 hr	3.430E-06
LPZ	24-96 hr	2.357E-06
LPZ	96-720 hr	1.375E-06

Table 7.1-2 Determination of X/Q Ratios

Accident	Location		ESBWR DCD X/Q[1]	Fermi 3 50th % X/Q	Ratio (Fermi 3/DCD)
Feedwater Line Break	EAB		1.00E-03	5.515E-05	5.52E-02
	LPZ		1.00E-03	4.078E-06	4.08E-03
Failure of Small Line Carrying Primary Coolant Outside Containment	EAB		2.00E-03	5.515E-05	2.76E-02
	LPZ	0-8 hr	1.90E-04	4.078E-06	2.15E-02
	LPZ	8-24 hr	1.40E-04	3.430E-06	2.45E-02
	LPZ	24-96 hr	7.50E-05	2.357E-06	3.14E-02
	LPZ	96-720 hr	3.00E-05	1.375E-06	4.58E-02
MSLB (Pre-Incident Iodine Spike & Equilibrium Iodine)	EAB		2.00E-03	5.515E-05	2.76E-02
	LPZ		2.00E-03	4.078E-06	2.04E-03
LOCA	EAB		2.00E-03	5.515E-05	2.76E-02
	LPZ	0-8 hr	1.90E-04	4.078E-06	2.15E-02
	LPZ	8-24 hr	1.40E-04	3.430E-06	2.45E-02
	LPZ	24-96 hr	7.50E-05	2.357E-06	3.14E-02
	LPZ	96-720 hr	3.00E-05	1.375E-06	4.58E-02
Fuel Handling	EAB		2.00E-03	5.515E-05	2.76E-02
	LPZ		1.90E-04	4.078E-06	2.15E-02
RWCU/SDC (Coincident Iodine Spike & Pre-Incident Iodine Spike)	EAB		2.00E-03	5.515E-05	2.76E-02
	LPZ		1.90E-04	4.078E-06	2.15E-02

1. DCD X/Q values are taken from Reference 7.1-1, Section 15.4.

Table 7.1-3 Summary of Design Bases Accident Doses

Accident	Location	TEDE (rem)	Limit (rem)[1]
Feedwater Line Break	EAB	9.38E-06	2.5
	LPZ	6.93E-07	2.5
Failure of Small Line Carrying Primary Coolant Outside Containment	EAB	4.14E-03	2.5
	LPZ	5.95E-03	2.5
MSLB - Pre-Incident Iodine Spike	EAB	3.47E-01	25
	LPZ	2.57E-02	25
MSLB - Equilibrium Iodine	EAB	1.93E-02	2.5
	LPZ	1.43E-03	2.5
LOCA	EAB	3.58E-01	25
	LPZ	6.01E-01	25
Fuel Handling Accident	EAB	1.14E-01	6.3
	LPZ	8.37E-03	6.3
RWCU/SDC - Coincident Iodine Spike	EAB	1.35E-02	2.5
	LPZ	1.01E-03	2.5
RWCU/SDC - Pre-Incident Iodine Spike	EAB	2.70E-01	25
	LPZ	2.00E-02	25
Control Rod Drop		Evaluation of radiological consequences not required	
Spent Fuel Cask Drop		Evaluation of radiological consequences not required	

1. Radiological limits are taken from Regulatory Guide 1.183 and NUREG-0800.

Table 7.1-4 Feedwater Line Break (DCD Doses are from DCD Table 15.4-16)

	DCD TEDE (rem)	X/Q Ratio	Fermi 3 TEDE (rem)
EAB	1.70E-04	5.52E-02	9.38E-06
LPZ	1.70E-04	4.08E-03	6.93E-07
Limit	2.5		2.5

Table 7.1-5 Failure of Small Line Carrying Primary Coolant Outside Containment (DCD Doses are from DCD Table 15.4-19)

		DCD TEDE (rem)			Fermi 3 TEDE (rem)	
		EAB	LPZ	X/Q Ratio	EAB	LPZ
EAB		0.15		2.76E-02	4.14E-03	
LPZ	0-8 hr		0.04	2.15E-02		8.59E-04
LPZ	8-24 hr		0.05	2.45E-02		1.23E-03
LPZ	24-96 hr		0.05	3.14E-02		1.57E-03
LPZ	96-720 hr		0.05	4.58E-02		2.29E-03
Total		0.15	0.19		4.14E-03	5.95E-03
Limit		2.5	2.5		2.5	2.5

Table 7.1-6 Main Steamline Break Pre-Incident Iodine Spike (DCD Doses are from DCD Table 15.4-13)

	DCD TEDE (rem)	X/Q Ratio	Fermi 3 TEDE (rem)
EAB	12.6	2.76E-02	3.47E-01
LPZ	12.6	2.04E-03	2.57E-02
Limit	25		25

Table 7.1-7 Main Steamline Break Equilibrium Iodine (DCD Doses are from DCD Table 15.4-13)

	DCD TEDE (rem)	X/Q Ratio	Fermi 3 TEDE (rem)
EAB	0.7	2.76E-02	1.93E-02
LPZ	0.7	2.04E-03	1.43E-03
Limit	2.5		2.5

Table 7.1-8 Loss-of-Coolant Accident (DCD Doses are from DCD Table 15.4-9)

		DCD TEDE (rem)			Fermi 3 TEDE rem	
		EAB	LPZ	X/Q Ratio	EAB	LPZ
EAB		13.0		2.76E-02	3.58E-01	
LPZ	0-8 hr		3.2	2.15E-02		6.87E-02
LPZ	8-24 hr		2.7	2.45E-02		6.62E-02
LPZ	24-96 hr		5.2	3.14E-02		1.63E-01
LPZ	96-720 hr		6.6	4.58E-02		3.03E-01
Total		13.0	17.7		3.58E-01	6.01E-01
Limit		25	25		25	25

Table 7.1-9 Fuel Handling Accident (Reactor Building or Fuel Building) (DCD Doses are from DCD Table 15.4-4)

	DCD TEDE (rem)	X/Q Ratio	Fermi 3 TEDE (rem)
EAB	4.13	2.76E-02	1.14E-01
LPZ	0.39	2.15E-02	8.37E-03
Limit	6.3		6.3

Table 7.1-10 RWCU/SDC Line Break Coincident Iodine Spike (DCD Doses are from DCD Table 15.4-23)

	DCD TEDE (rem)	X/Q Ratio	Fermi 3 TEDE (rem)
EAB	0.49	2.76E-02	1.35E-02
LPZ	0.047	2.15E-02	1.01E-03
Limit	2.5		2.5

Table 7.1-11 RWCU/SDC Line Break Pre-Incident Iodine Spike (DCD Doses are from DCD Table 15.4-23)

	DCD TEDE (rem)	X/Q Ratio	Fermi 3 TEDE (rem)
EAB	9.8	2.76E-02	2.70E-01
LPZ	0.9	2.15E-02	2.00E-02
Limit	25		25

New Tables 7.1-1 through 7.1-13

Table 7.1-1 Maximum 50th percentile X/Q Values

Location		X/Q (sec/m^3)
EAB		5.779E-05
LPZ	0-8 hr	3.046E-06
LPZ	8-24 hr	2.654E-06
LPZ	24-96 hr	1.969E-06
LPZ	96-720 hr	1.282E-06

Table 7.1-2 Determination of X/Q Ratios

Accident	Location		ESBWR DCD X/Q(1)	Fermi 3 50th % X/Q	Ratio (Fermi 3/DCD)
Feedwater Line Break (Pre-Incident Iodine Spike & Equilibrium Iodine Spike)	EAB		2.00E-03	5.779E-05	2.89E-02
	LPZ		1.90E-04	3.046E-06	1.60E-02
Failure of Small Line Carrying Primary Coolant Outside Containment (Pre-Incident Iodine Spike & Equilibrium Iodine Spike)	EAB		2.00E-03	5.779E-05	2.89E-02
	LPZ	0-8 hr	1.90E-04	3.046E-06	1.60E-02
	LPZ	8-24 hr	1.40E-04	2.654E-06	1.90E-02
	LPZ	24-96 hr	7.50E-05	1.969E-06	2.63E-02
	LPZ	96-720 hr	3.00E-05	1.282E-06	4.27E-02
MSLB (Pre-Incident Iodine Spike & Equilibrium Iodine Spike)	EAB		2.00E-03	5.779E-05	2.89E-02
	LPZ		1.90E-04	3.046E-06	1.60E-02
LOCA	EAB		2.00E-03	5.779E-05	2.89E-02
	LPZ	0-8 hr	1.90E-04	3.046E-06	1.60E-02
	LPZ	8-24 hr	1.40E-04	2.654E-06	1.90E-02
	LPZ	24-96 hr	7.50E-05	1.969E-06	2.63E-02
	LPZ	96-720 hr	3.00E-05	1.282E-06	4.27E-02
Fuel Handling	EAB		2.00E-03	5.779E-05	2.89E-02
	LPZ		1.90E-04	3.046E-06	1.60E-02
RWCU/SDC (Pre-Incident Iodine Spike & Equilibrium Iodine Spike)	EAB		2.00E-03	5.779E-05	2.89E-02
	LPZ		1.90E-04	3.046E-06	1.60E-02

1. DCD X/Q values are taken from Reference 7.1-1, Section 15.4.

Table 7.1-3 Summary of Design Bases Accident Doses

Accident	Location	TEDE (rem)	Limit (rem)[1]
Feedwater Line Break – Pre-Incident Iodine Spike	EAB	1.16E-02	25
	LPZ	1.60E-03	25
Feedwater Line Break – Equilibrium Iodine Spike	EAB	2.89E-03	2.5
	LPZ	1.60E-03	2.5
Failure of Small Line Carrying Primary Coolant Outside Containment – Pre-Incident Iodine Spike	EAB	1.10E-02	25
	LPZ	4.27E-03	25
Failure of Small Line Carrying Primary Coolant Outside Containment – Equilibrium Iodine Spike	EAB	2.89E-03	2.5
	LPZ	4.27E-03	2.5
MSLB - Pre-Incident Iodine Spike	EAB	8.38E-02	25
	LPZ	4.81E-03	25
MSLB - Equilibrium Iodine Spike	EAB	5.78E-03	2.5
	LPZ	1.60E-03	2.5
LOCA	EAB	5.49E-01	25
	LPZ	8.68E-01	25
Fuel Handling Accident	EAB	1.18E-01	6.3
	LPZ	6.41E-03	6.3
RWCU/SDC - Equilibirum Iodine Spike	EAB	1.44E-02	2.5
	LPZ	1.60E-03	2.5
RWCU/SDC - Pre-Incident Iodine Spike	EAB	2.20E-01	25
	LPZ	1.12E-02	25
Control Rod Drop	Evaluation of radiological consequences not required		
Spent Fuel Cask Drop	Evaluation of radiological consequences not required		

1. Radiological limits are taken from Regulatory Guide 1.183 and NUREG-0800.

Table 7.1-4 Feedwater Line Break Pre-Incident Iodine Spike (DCD Doses are from DCD Table 15.4-16)

	DCD TEDE (rem)	X/Q Ratio	Fermi 3 TEDE (rem)
EAB	0.40	2.89E-02	1.16E-02
LPZ	0.10	1.60E-02	1.60E-03
Limit			25

Table 7.1-5 Feedwater Line Break Equilibrium Iodine Spike (DCD Doses are from DCD Table 15.4-16)

	DCD TEDE (rem)	X/Q Ratio	Fermi 3 TEDE (rem)
EAB	0.10	2.89E-02	2.89E-03
LPZ	0.10	1.60E-02	1.60E-03
Limit			2.5

Table 7.1-6 Small Line Carrying Primary Coolant Outside Containment Pre-Incident Iodine Spike (DCD Doses are from DCD Table 15.4-19)

	DCD TEDE (rem)	X/Q Ratio	Fermi 3 TEDE (rem)
EAB	0.38	2.89E-02	1.10E-02
LPZ	0.10	4.27E-02	4.27E-03
Limit			25

Reference 7.1-1 does not provide time-dependent LPZ doses for this incident; thus, the Fermi 3 LPZ dose is determined by multiplying the total DCD dose by the maximum x/Q Ratio.

Table 7.1-7 Small Line Carrying Primary Coolant Outside Containment Equilibrium Iodine Spike (DCD Doses are from DCD Table 15.4-19)

	DCD TEDE (rem)	X/Q Ratio	Fermi 3 TEDE (rem)
EAB	0.10	2.89E-02	2.89E-03
LPZ	0.10	4.27E-02	4.27E-03
Limit			2.5

Reference 7.1-1 does not provide time-dependent LPZ doses for this incident; thus, the Fermi 3 LPZ dose is determined by multiplying the total DCD dose by the maximum x/Q Ratio.

Table 7.1-8 Main Steam Line Break Pre-Incident Iodine Spike (DCD Doses are from DCD Table 15.4-13)

	DCD TEDE (rem)	X/Q Ratio	Fermi 3 TEDE (rem)
EAB	2.9	2.89E-02	8.38E-02
LPZ	0.3	1.60E-02	4.81E-03
Limit			25

Table 7.1-9 Main Steam Line Break Equilibrium Iodine Spike (DCD Doses are from DCD Table 15.4-13)

	DCD TEDE (rem)	X/Q Ratio	Fermi 3 TEDE (rem)
EAB	0.2	2.89E-02	5.78E-03
LPZ	0.1	1.60E-02	1.60E-03
Limit			2.5

Table 7.1-10 Loss of Coolant Accident (DCD Doses are from DCD Table 15.4-9)

	DCD TEDE (rem)	X/Q Ratio	Fermi 3 TEDE (rem)
EAB	19.0	2.89E-02	5.49E-01
LPZ	20.3	4.27E-02	8.68E-01
Limit			25

Reference 7.1-1 does not provide time-dependent LPZ doses for this incident; thus, the Fermi 3 LPZ dose is determined by multiplying the total DCD dose by the maximum x/Q Ratio.

Table 7.1-11 Fuel Handling Accident (Reactor Building or Fuel Building) (DCD Doses are from DCD Table 15.4-4)

	DCD TEDE (rem)	X/Q Ratio	Fermi 3 TEDE (rem)
EAB	4.10	2.89E-02	1.18E-01
LPZ	0.40	1.60E-02	6.41E-03
Limit			6.3

Table 7.1-12 RWCU/SDC Line Break Equilibrium Iodine Spike (DCD Doses are from DCD Table 15.4-23)

	DCD TEDE (rem)	X/Q Ratio	Fermi 3 TEDE (rem)
EAB	0.50	2.89E-02	1.44E-02
LPZ	0.10	1.60E-02	1.60E-03
Limit			2.5

Table 7.1-13 RWCU/SDC Line Break Pre-Incident Iodine Spike (DCD Doses are from DCD Table 15.4-23)

	DCD TEDE (rem)	X/Q Ratio	Fermi 3 TEDE (rem)
EAB	7.6	2.89E-02	2.20E-01
LPZ	0.7	1.60E-02	1.12E-02
Limit			25

Attachment 2
NRC3-09-0014

Response to RAI letter related to Fermi 3 ER

RAI Question AC7.2-1

NRC RAI AC7.2-1

Provide in electronic format the input and output files for the MACCS2 code used to evaluate the consequences of severe accidents in the ER. Include all files required to run the code for the base case calculation as well as sensitivities with respect to the release height, energy, meteorology, and precipitation assumptions.

Supplemental Information

During the site audit, Detroit Edison presented new severe accident consequence and risk estimates using DCD Revision 5, and Probabilistic Risk Assessment (PRA) Revision 3. The NRC staff will run the MACCS2 code and compare the results of its calculations with the results of Detroit Edison's calculations.

Response

Electronic files used for the MACCS2 evaluation of the consequences of severe accidents in the Environmental Report are being provided in this letter as an enclosed CD. An inventory of the files on that CD is provided in Appendix C to this letter.

The input and output files for the MACCS2 code provided in this letter represent the data used to evaluate the consequences of severe accidents using DCD Revision 5 and Probabilistic Risk Assessment (PRA) Revision 3. These data files correspond to the updated severe accident analysis as presented in response to RAI AC7.2-2, which is also provided in this letter.

Proposed COLA Revision

None

Attachment 3
NRC3-09-0014

Response to RAI letter related to Fermi 3 ER

RAI Question AC7.2-2

NRC RAI AC7.2-2

Provide the revised results for accident-specific impacts to population and land from the Fermi 3 severe accident analysis, similar to that provided in Table 7.2-1 in the ER.

Supporting Information

Detroit Edison has revised the values in ER Table 7.2-1 based on new MACCS2 calculations using ESBWR DCD Rev 5 and PRA Rev 3. Therefore, revised values for the ER Table 7.2-1 are needed for review and confirmatory analysis.

Response

The Detroit Edison Fermi 3 COLA, Environmental Report (ER), Revision 0, was based on GEH ESBWR DCD Revision 4. The evaluation for accident-specific impacts to population and land from the Fermi 3 severe accident analysis using GEH ESBWR DCD Rev 5 and PRA Rev 3 has been completed. This analysis utilized population projections to the year 2060 to maintain consistency with ER Section 2.5.1 and the Evacuation Time Estimate (ETE) projections. The data presented in this response represents MACCS2 calculation results submitted in the response to RAI AC7.2-1 in this letter. The correct text for ER Sections 7.2 and 7.3 representing this analysis is reflected in the attached markup.

Proposed COLA Revision

Fermi 3 COLA Part 3, ER Sections 7.2 and 7.3 will be revised to include the updated analysis as reflected in the attached markup.

Markup of Detroit Edison COLA
(following 21 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be different than presented here.

7.2 Severe Accidents

Severe accidents are those involving multiple failures of equipment to function. The likelihood of occurrence is lower for severe accidents than for design basis accidents, but the consequences of such accidents may be higher. Although severe accidents are not part of the design basis for the plant, the Nuclear Regulatory Commission (NRC), in its Policy Statement on Severe Reactor Accidents Regarding Future Designs and Existing Plants (50 FR 32138), requires the completion of a probabilistic risk assessment (PRA) for severe accidents for new reactor designs. This requirement is codified under 10 CFR 52.47.

General Electric (GE) completed a PRA for the ESBWR design (Reference 7.2-3) as part of the application for design certification. The GE analysis used generic, but conservative, meteorology and regional characteristics and determined that severe accident impacts are within the safety goals established by the NRC.

In this section, Detroit Edison presents an update of the generic PRA analysis, which includes Fermi site-specific characteristics. The analysis evaluates the impacts of a severe accident at Fermi 3 to demonstrate that the impacts are bounded in the generic analysis performed for the ESBWR certification and to support performing the severe accident mitigation alternatives analyses in Section 7.3.

7.2.1 GE Methodology

The GE PRA for the ESBWR established a containment event tree which defined the possible end states of the containment following a severe accident. Using EPRI's Modular Accident Analysis Program (MAAP) code, GE determined that 10 release categories with 15 source term categories would represent the entire suite of potential severe accidents. A release frequency was assigned to each of the 15 source term categories (Table 7.2-1).

The 10 release categories and associated source term categories are as follows:

1. Break Outside of Containment (BOC) – Radioactivity is released through an unisolated break outside of containment in the shutdown cooling piping allowing direct communication between the reactor pressure vessel and the environment outside of containment. This is followed by no injection of cooling water into the reactor pressure vessel. Two separate locations of a break in the piping were selected for determining source term categories in this release category, one mid-level in the reactor pressure vessel (BOCa) and the other at the lower-level (BOCb).
2. Containment Bypass (BYP) – Radioactivity is released directly to the atmosphere from containment due to a failure of the containment isolation system to function. Sequences in which the reactor pressure vessel is depressurized generally result in the core being uncovered earlier than those with a failure to depressurize. Both a low pressure sequence (BYPa) and a high pressure sequence (BYPb) were selected for determining the source term categories for this release category.

3. Core-Concrete Interaction Dry (CCID) – This release category applies to sequences in which the containment fails due to interaction between the core and the containment concrete. The deluge function is assumed to fail, and the lower drywell debris bed is uncovered. Sequences in which the containment vessel is not depressurized may result in earlier containment vessel failure. A low pressure sequence (CCIDa) and a high pressure sequence (CCIDb) were selected for determining the source term in this release category.
4. Core-Concrete Interaction Wet (CCIW) – This release category applies to sequences in which the containment fails due to interaction between the core and containment concrete. The deluge function works; however, the basemat internal melt arrest and coolability device is not effective in providing debris bed cooling. Unlike the CCID category, cooling water is present and provides the potential of scrubbing for the radionuclides that evolve from the debris bed, thus reducing the magnitude of the source term. Sequences in which the reactor vessel is not depressurized may result in earlier reactor vessel failure. A low pressure sequence (CCIWa) and a high pressure sequence (CCIWb) were selected for determining the source term categories associated with each sequence in this release category.
5. Ex-Vessel Steam Explosion (EVE) – This release category applies to sequences in which the reactor vessel fails at low pressure and a significant steam explosion occurs. Containment depressurization is assumed to occur when the vessel fails, at which time there is direct communication with the environment. Due to the uncertainties associated with equipment damage and water availability, no credit is taken for lower drywell water to reduce the source term.
6. Filtered Release (FR) – Radioactivity is released by manually venting the containment from the suppression chamber air space. This action may be implemented to limit the containment pressure increase if containment heat removal fails or the containment is over pressurized. Venting the suppression chamber forces the radionuclides through the suppression pool, which reduces the magnitude of the source term.
7. Overpressure-Vacuum Breaker (OPVB) – This release category applies to sequences in which the vacuum breaker failure has occurred (either by failing to close or by remaining open in a pre-existing condition), resulting in failure of the containment pressure function, which in turn causes failure in containment heat removal. Two sequences are associated with this release category, both high (OPVBa) and low pressure sequences (OPVBb) were selected for source term categories.
8. Overpressure - Early Containment Heat Removal Loss (OPW1) – This release category applies to sequences in which containment heat removal fails within 24 hours after event initiation. A sequence with the reactor pressure vessel failure at high pressure was selected because it has an earlier failure and higher probability of the loss of containment heat removal. Containment heat removal is assumed to be unavailable for the duration of the sequence.

9. Overpressure - Late Containment Heat Removal Loss (OPW2) – This release category applies to sequences in which containment heat removal fails in the period after that addressed by OPW1, above, until 72 hours after onset of core damage. The passive containment cooling system is assumed to be unavailable 24 hours after event initiation, and the availability of the fuel and auxiliary pool cooling system is determined. A sequence with the reactor pressure vessel failure at high pressure was selected because it has an earlier failure and higher probability of the loss of containment heat removal. Containment heat removal is terminated 24 hours after the event initiation.

10. Technical Specification Leakage (TSL) – This category applies to sequences in which the containment is intact and the only release is due to the maximum leak rate allowed by Technical Specifications. For additional conservatism, the area of containment leakage corresponding to the maximum allowable Technical Specification leak rate was doubled to produce the representative source term used for this release category.

studied

In addition a direct containment heating (DCH) category was evaluated. The DCH category applies to sequences in which the reactor fails at high pressure and a significant DCH event occurs. GE subsequently determined that catastrophic containment failure due to DCH is physically unreasonable and ~~studies~~ local damage to the liner in the lower drywell as a sensitivity case. Thus, no DCH sequence was evaluated for the baseline case.

GE then used the MACCS2 (MELCOR Accident Consequence Code System) (Reference 7.2-9) to model the environmental consequences of severe accidents, using generic, but conservative, meteorological and population parameters to represent a generic ESBWR site. The analysis focused on the 24-hour period following core damage, as a measure of the consequences from a large release and, therefore, did not address the long-term exposure pathways such as ingestion, inhalation of re-suspended material, or groundshine subsequent to plume passage. GE also considered the releases for the first 72 hours after core damage. Additional details of analysis are found in the ESBWR PRA (Reference 7.2-3) and are reported in the ESBWR Design Control Document (Reference 7.2-4).

7.2.2 Site Specific Methodology

For Fermi 3, the MACCS2 computer code was used to evaluate offsite risks and consequences of severe accidents, using Fermi site-specific information. MACCS2 simulates the impact of severe accidents at nuclear power plants on the surrounding environment. The principal phenomena considered in MACCS2 include atmospheric transport, mitigation actions based on dose projection, dose accumulation by a number of pathways including food and water ingestion, early and latent human health effects, and economic costs. The specific pathways modeled include external exposure to the passing plume, external exposure to material deposited on the ground, inhalation of material in the passing plume or re-suspended from the ground, and ingestion of contaminated food and surface-water. The MACCS2 code primarily addresses dose from the air pathway, but also calculates dose from surface runoff and deposition on surface-water. The MACCS2 code also evaluates the extent of land contamination. For Fermi 3, the analysis used site-specific meteorology and population data (Subsection 2.5.1) and extended the analysis to include long-term

water ingestion

exposure pathways, such as ingestion, over the life cycle of the accident. Ingestion exposure was determined using the COMIDA2 food model option of MACCS2.

To assess human health impacts, the analysis determined the collective dose to the 50-mi region population, number of latent cancer fatalities, and number of early fatalities associated with a severe accident. Economic costs were also determined, including the costs associated with short-term relocation of people, decontamination of property and equipment, interdiction of food supplies, and indirect costs resulting from loss of use of the property and incomes derived as a result of the accident.

Five files provide input to a MACCS2 analysis: ATMOS, EARLY, CHRONC, MET, and SITE.

ATMOS provides data to calculate the amount of material released to the atmosphere that is dispersed and deposited. The calculation uses a Gaussian plume model. Important inputs in this file include the core inventory, release fractions, and geometry of the reactor and associated buildings. This input data is taken from GE's generic PRA.

The second file, EARLY, provides inputs to calculations regarding exposure in the time period immediately following the release, including parameters describing breathing rates and sheltering. Important site-specific information includes emergency response information such as evacuation time. Insert 1

The third input file, CHRONC, provides data for calculating long-term impacts and economic costs and includes region-specific data on agriculture and economic factors. These files access a meteorological file that uses actual Fermi meteorological monitoring data and a site characteristics file which is built using SECPOP2000 (Reference 7.2-5).

Seven years of site specific meteorological data (2001 through 2007) were evaluated. MACCS2 requires a calendar year of meteorological data for the MET file. The year 2002 meteorological data was selected for subsequent analysis because it resulted in the greatest cost risk, resulted in 99.9 ~~99.7~~ percent of the maximum population dose risk, and also was the most complete yearly data set. In addition, sensitivities were performed for the other six years of meteorological data.

The SITE file requires the 50-mi population distribution as well as agricultural-economic data. SECPOP2000 (Reference 7.2-5) incorporates 2000 population census data for the 50-mi region around the Fermi site. For this analysis, Insert 2 ~~the census data were projected to the year 2077, using county specific growth rates~~. MACCS2 also requires the spatial distribution of certain agriculture and economic data (fraction of land devoted to farming, annual farm sales, fraction of farm sales resulting from dairy production, and property value of farm and non-farm land) in the same manner as the population. This was done by applying the SECPOP2000 program, changing the regional economic data format to comply with MACCS2 input requirements. In this case, SECPOP2000 was used to access data from the 1997 National Census of Agriculture. The program's specification of crop production parameters for the 50-mi region (e.g., fraction of farmland devoted to grains, vegetables, etc.) was also applied.

Insert 1

The exposure model assumed that 95% of the 0-10 mile residents would evacuate. The evacuation time for 2060 was estimated in two parts.

- An 80-minute delay was assumed before evacuation begins after declaration of a General Emergency.

- The evacuation rate was estimated by escalating the 2008 population and reducing the evacuation speed proportionally. This is conservative because it assumes that the existing evacuation routes are saturated in the 2008 evacuation time estimate, and any increases in population growth will result in reduced evacuation speeds. This resulted in an estimated outward speed of 1.12 meters per second.

Exposures to the plume were assumed to terminate when the population were 10 miles from the release point.

Insert 2

the 50-mile population projected to the year 2060, as described in Subsection 2.5.1, was used.

The analysis used the resulting MACCS2 calculations and release frequency information to determine risk. The sum of the accident frequencies is known as the core damage frequency and includes only internally initiated events during reactor operation. Risk is the product of frequency of an accident times the consequences of the accident. The consequence can be any measure of release impacts such as radiation dose and economic cost. Dose-risk is the product of the collective dose times the release frequency. Because the ESBWR's severe accident analysis addressed a suite of accidents, the individual risks were summed to provide a total risk. The same process was applied to estimating cost-risk. Risk from these consequences can be reported as person-rem per reactor year or dollars per reactor year.

~~The analysis assumed a ground level release height and no release heat for each accident release hypothesized, consistent with the GE analysis. A sensitivity analysis was performed for each of these assumptions. A middle of containment and a top of containment release was compared to the ground level release and the dose-risk increased by 1.6 percent and 4 percent respectively. The cost-risk for the middle of containment and top of containment release had a similar increase of 0.98 percent and 4.7 percent respectively. A release heat of 1 MW and 10 MW was compared to the base case of no release heat and the dose-risk increased by 0.64 percent and 3.4 percent respectively, while the cost-risk increased by 0.87 percent and 5.3 percent respectively. A sensitivity analysis was performed on the precipitation input where the site specific precipitation rate was doubled and halved. The doubled precipitation resulted in a decrease in both the dose-risk and cost-risk of 0.64 percent and 0.78 percent respectively. The halved precipitation resulted in an increase in the dose-risk of 0.64 percent and no change in the cost-risk. In addition, a sensitivity analysis was performed on the conservative assumption that the final 40- to 50-mi ring has constant meteorology, including constant precipitation. This assumption forces the deposition of the remaining airborne radioactivity within 50 mi of the site. The precipitation in the 40- to 50-mi ring was set equal to the site specific precipitation and resulted in a reduction in the dose-risk of 27 percent and a reduction in the cost-risk of 35 percent when compared to the base case.~~

Insert 3

7.2.3 Consequences to Population Groups

The pathway consequences to population groups including air pathways, surface-water, and groundwater pathways are discussed in the following sections. The presence of threatened and endangered species and federally designated critical habitat are discussed in Subsection 2.4.1 and Subsection 2.4.2. As necessary, the impacts on threatened and endangered species due to the previously calculated radiation exposure levels are discussed in Subsection 5.4.4.

7.2.3.1 Air Pathways

Each of the accident categories was analyzed with MACCS2 to estimate population dose, number of early and latent fatalities, cost, and farm land requiring decontamination. The analysis conservatively assumed that evacuation occurs during adverse weather conditions following declaration of a General Emergency. It was also conservatively assumed that the evacuation routes were already at full capacity. Therefore, the increased population expected in the year ~~2077~~ 2060 would take longer to evacuate. For each accident category, the risk for each analytical endpoint was calculated by multiplying the analytical endpoint by the accident category frequency and adding across all accident categories. The results are provided in Table 7.2-1.

at the time of the evacuation study.

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The analysis assumed a ground level release height and no release heat for each accident release hypothesized, consistent with the GE analysis. A sensitivity analysis was performed for each of these assumptions. A middle of containment and a top of containment release was compared to the ground level release and the dose-risk increased by ~~1.6~~ 2 percent and ~~4~~ 4.1 percent respectively. The cost-risk for the middle of containment and top of containment release had a similar increase of ~~0.98~~ 1.7 percent and ~~4.7~~ 5.2 percent respectively. A release heat of 1 MW and 10 MW was compared to the base case of no release heat and the dose-risk increased by ~~0.64~~ 0.59 percent and ~~3.4~~ 3.5 percent respectively, while the cost-risk increased by ~~0.87~~ 0.90 percent and ~~5.3~~ 6.0 percent respectively. A sensitivity analysis was performed on the precipitation input where the site specific precipitation rate was doubled and halved. The doubled precipitation resulted in a decrease in both the dose-risk and cost-risk of ~~0.64~~ 0.66 percent and ~~0.78~~ 0.17 percent respectively. The halved precipitation resulted in an increase in the dose-risk of ~~0.64~~ 0.31 percent and no change in the cost-risk. In addition, a sensitivity analysis was performed on the conservative assumption that the final 40- to 50-mi ring has constant meteorology, including constant precipitation. This assumption forces the deposition of the remaining airborne radioactivity within 50-mi of the site. The precipitation in the 40- to 50-mi ring was set equal to the time varying site-specific precipitation and resulted in a reduction in the dose-risk of ~~27~~ 25 percent and a reduction in the cost-risk of ~~35~~ 33 percent when compared to the base case."

7.2.3.2 Surface-Water Pathways

People can be exposed to radiation when airborne radioactivity is deposited onto the ground and runs off into surface-water or is deposited directly onto surface-water. The exposure pathway can be from drinking the water, submersion in the water (swimming), undertaking activities near the shoreline (fishing and boating), or ingestion of fish or shellfish. For the surface-water pathway, MACCS2 only calculates the dose from drinking the water. It is conservatively assumed that all water within 50 mi of the site is drinkable. The ~~maximum~~ MACCS2 code severe accident dose-risk to the 50-mi population from drinking the water is ~~0.0~~ $\times 10^{-4}$ person-rem per year of ESBWR operation. As shown in Table 7.2-1, this value is the sum of all accident category risks. 8.1

Surface-water bodies within the 50-mi region of the Fermi site that are accessible to the public include Lake Erie, River Raisin, Huron River, Maumee River, Lake St. Clair, Detroit River, and other smaller water bodies. In NUREG-1437, the NRC evaluated doses from the aquatic food pathway (fishing) for the current nuclear fleet of reactors, including Fermi 2 (Reference 7.2-8). The aquatic food pathway dose for Fermi 2 was 1400 person-rem. Actual dose-risk values would be expected to be much less (by a factor of 2 to 10) due to interdiction of contaminated foods (Reference 7.2-8). Examination of the atmospheric dose-risk from severe accidents to the population within 50 mi of operating nuclear plants resulted in dose-risks ranging from 0.55 to 68 person-rem per reactor year 0.028 for nuclear plants undergoing license renewal. The Fermi 3 atmospheric pathway dose of ~~0.031~~ person-rem per reactor year is significantly lower. Given the dependency of surface-water doses on airborne releases, it is reasonable to conclude that the doses from surface-water sources would be consistently lower than that reported above for the Fermi 2 surface-water pathway.

Doses associated with submersion in the water and undertaking activities near the shoreline are not modeled by MACCS2, and NUREG-1437 does not provide specific data on submersion and shoreline activities. However, it does indicate that these contributors to dose are much less than for drinking water and consuming aquatic foods.

7.2.3.3 Groundwater Pathways

People can also receive dose from groundwater pathways. Radioactivity released during a severe accident can enter groundwater and may move through an aquifer and eventually be discharged to surface-water.

NUREG-1437 evaluated the groundwater pathway dose, based on the analysis in NUREG-0440, the Liquid Pathway Generic Study (LPGS) (Reference 7.2-6). NUREG-0440 analyzed a core meltdown that contaminated groundwater, which subsequently contaminated surface-water. NUREG-0440 did not analyze direct consumption of groundwater because it assumed a limited number of potable groundwater wells and limited accessibility.

The LPGS results provide conservative, uninterdicted population dose estimates for six generic categories of plants. These dose estimates were one or more orders of magnitude less than those attributed to the atmospheric pathway. Therefore, although the Fermi site was not one of the reactors analyzed, the doses from the Fermi 3 site groundwater pathway would be expected to be much less than the doses from the atmospheric pathway, given that all categories of plant locations showed the same trend. It is noted that, as discussed in Subsection 2.3.1, the Fermi site is not over or near a sole source aquifer.

7.2.4 **Comparison to U.S. NRC Safety Goals**

The ESBWR PRA evaluates performance of the ESBWR under generic conditions to three safety goals: (1) individual risk goal, (2) societal risk goal, and (3) radiation risk goal (Reference 7.2-3). These goals are defined in the following subsections. Table 7.2-2 provides the quantitative evaluation of these three safety goals and the Fermi site-specific calculation of these risk values.

7.2.4.1 **Individual Risk Goal**

The risk to an average individual in the vicinity of a nuclear power plant of experiencing a prompt fatality resulting from a severe reactor accident should not exceed one-tenth of one percent (0.1 percent) of the sum of "prompt fatality risks" resulting from other accidents to which members of the U.S. population are generally exposed. As defined in the Safety Goals Policy statement (51 FR 30028), "vicinity" is the area within one mile of the plant site boundary. "Prompt Fatality Risks" are defined as the sum of risks which the average individual residing in the vicinity of the plant is exposed to as a result of normal daily activities (driving, household chores, occupational activities, etc). For this evaluation, the sum of prompt fatality risks was taken as the U.S. accidental death risk value of 37.7 deaths per 100,000 people per year (Reference 7.2-2).

7.2.4.2 **Societal Risk Goal**

The risk to the population in the area near a nuclear power plant of cancer fatalities that might result from its operation should not exceed one-tenth of one percent (0.1 percent) of the sum of the cancer fatality risks resulting from all other causes. As defined in the Safety Goal Policy Statement (51 FR 30028), "near" is within 10 miles of the plant. The cancer fatality risk was taken as 191.4 deaths per 100,000 people per year based upon National Center for Health Statistics data for 2001–2004 (Reference 7.2-2).

7.2.4.3 **Radiation Dose Goal**

The probability of an individual exceeding a whole body dose of 25 rem at a distance of 0.5 mile from the reactor shall be less than one in a million per reactor year.

7.2.5 **Conclusions**

0.029

The total calculated dose-risk to the 50-mi population from airborne releases from an ESBWR reactor at the Fermi site would be ~~0.031~~ person-rem per reactor year (Table 7.2-1). This value is less than the population risk for all current reactors that have undergone license renewal, and less than that for the five reactors analyzed in NUREG-1150 (Reference 7.2-7).

Comparisons with the existing nuclear reactor fleet (Subsection 7.2.3.2) indicate that risk from the surface-water pathway is SMALL. Under the severe accident scenarios, surface-water is primarily contaminated by atmospheric deposition. The ESBWR atmospheric pathway doses are significantly lower than those of the current nuclear fleet. Therefore, it is reasonable to conclude

(new paragraph) Seventy-five percent of the Fermi 3 dose-risk is from late phase pathway exposures, especially groundshine and ingestion. The Fermi 3 early phase dose-risk, 0.0071 person-rem per reactor year, can be compared with the GEH generic calculation of 24-hour dose-risk (which does not include late phase exposure) of 0.017 person-rem per reactor year; GEH did not calculate late phase consequences.

that the doses from the surface-water pathway at the Fermi site would be consistently lower than those reported in Subsection 7.2.3.2 for the current fleet.

The risks of groundwater contamination from a severe ESBWR accident (see Subsection 7.2.3.3) would be much less than the risk from currently licensed reactors. Additionally, interdiction could substantially reduce the groundwater pathway risks.

~~For comparison, as reported in Subsection 5.4.3, the total body dose from the Fermi site normal airborne releases is predicted to be 4.5 person-rem annually. As previously described, dose-risk is dose times frequency. Normal operations have a frequency of one. Therefore, the dose-risk for normal operations is 4.5 person-rem per reactor-year. Comparing this value to the severe accident dose-risk of 0.031 person-rem per reactor-year indicates that the dose-risk from severe accidents is approximately 0.7 percent of the dose-risk from normal operations.~~

~~The probability-weighted risk of cancer fatalities (early and late) from a severe accident for the Fermi site is reported in Table 7.2-1 as 2.0 × 10^-5 fatalities per reactor-year. The probability of an individual dying from any cancer from any cause is approximately 0.23 for men and 0.20 for women over a lifetime (Reference 7.2-1). Comparing this value to the 2.0 × 10^-5 fatalities per reactor-year indicates that individual risk is at least 0.01 percent of the background risk, which is less than the societal risk goal of 0.1 percent of the background risk.~~ Insert 4

The results from the analysis discussed in this section are used in Section 7.3 to determine if there are any cost-beneficial design alternatives that should be considered to mitigate the impacts described herein.

7.2.6 References

7.2-1 American Cancer Society, "Lifetime Probability of Developing or Dying from Cancer," http://www.cancer.org/docroot/CRI/content/CRI_2_6x_Lifetime_Probability_of_Developing_or_Dying_From_Cancer.asp, accessed 1 May 2008.

7.2-2 Centers for Disease Control, "Deaths: Final Data for 2004," National Vital Statistics Reports, Volume 55 Number 19, August 21, 2007.

7.2-3 GE Energy, "ESBWR Probabilistic Risk Assessment," NEDO-33201, ~~Revision 2, September 2007.~~ Revision 3, May 2008.

7.2-4 GE-Hitachi Nuclear Energy, "ESBWR Design Control Document - Tier 2," ~~Revision 4, September 2007.~~ Revision 5, May 2008.

7.2-5 U.S. Nuclear Regulatory Commission, "SECPOP 2000: Sector Population Land Fraction, and Economic Estimation Program," NUREG/CR-6525, August 2003.

7.2-6 U.S. Nuclear Regulatory Commission, "Liquid Pathway Generic Study: Impacts of Accidental Radioactive Releases to the Hydrosphere from Floating and Land-Based Nuclear Power Plants," NUREG-0440, February 1978.

Insert 4

For comparison, as reported in Subsection 5.4.3, the whole body dose from the Fermi site normal airborne releases is predicted to be 22.2 person-rem annually. As previously described, dose-risk is dose times frequency. Normal operations have a frequency of one. Therefore, the dose-risk for normal operations is 22.5 person-rem per reactor year. Comparing this value to the severe accident dose-risk of 0.028 person-rem per reactor year indicates that the dose risk from severe accidents is approximately 0.1 percent of the dose-risk from normal operations.

The probability-weighted risk of early and late cancer fatalities from a severe accident at the Fermi site in the surrounding 50-mile population projected for 2060 of 7.7 million is reported as 1.8 x 10 -5 fatalities per reactor year in Table 7.2-1. For a 60-year reactor operating life, this population cancer fatality risk becomes 1.1 x 10-3.

The probability of an individual dying from any cancer from any cause is approximately 0.23 for men and 0.20 for women over a lifetime (Reference 7.2-1). This implies that more than 1.5 x 106 members of the 50- mile population will die of cancer.

The cancer fatality risk from a severe accident at Fermi 3 to the 50-mile population is then less than 10-7 percent of the background risk, which is much less than the societal risk goal of 0.1 percent of the background risk.

7.2-7 U.S. Nuclear Regulatory Commission, “Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants,” NUREG-1150, June 1989.

7.2-8 U.S. Nuclear Regulatory Commission, “Generic Environmental Impact Statement for License Renewal of Nuclear Plants,” NUREG-1437, Volumes 1 and 2, May 1996.

7.2-9 Chanin, D.I., and M.L. Young, “Code Manual for MACCS 2: User's Guide,” NUREG/CR-6613, SAND97-0594, Volume 1, Sandia National Laboratories, Albuquerque, New Mexico, May 1998.

Table 7.2-1 Impacts to the Population and Land from Fermi 3 Severe Accidents Analysis

Replace the numbers of this table with the numbers represented by Insert 5.

Accident Category[1]	Release Frequency (per reactor year)[2]	Population Dose-Risk (person-rem per reactor year)	Number of Fatalities (per reactor year)		Cost-Risk (dollars per reactor year)	Water Ingestion Dose (person-rem per reactor year)	Land Requiring Decontamination (acres per reactor year)
			Early	Late			
BOCa	7.4×10^{-11}	3.2×10^{-3}	2.3×10^{-8}	2.4×10^{-6}	8.1	1.3×10^{-4}	1.5×10^{-5}
BOCb	7.4×10^{-11}	1.5×10^{-3}	4.7×10^{-10}	9.3×10^{-7}	3.1	1.4×10^{-5}	1.3×10^{-5}
BYPa	1.5×10^{-12}	4.6×10^{-5}	8.6×10^{-11}	3.0×10^{-8}	0.12	8.9×10^{-7}	3.8×10^{-7}
BYPb	5.5×10^{-11}	1.9×10^{-3}	3.5×10^{-10}	1.6×10^{-6}	3.6	1.8×10^{-5}	1.0×10^{-5}
CCIDa	1.0×10^{-12}	2.5×10^{-5}	9.5×10^{-18}	1.5×10^{-8}	8.0×10^{-2}	5.9×10^{-7}	2.8×10^{-7}
CCIDb	1.0×10^{-12}	2.4×10^{-5}	7.8×10^{-14}	1.5×10^{-8}	6.1×10^{-2}	3.6×10^{-7}	2.4×10^{-7}
CCIWa	5.3×10^{-11}	4.3×10^{-6}	0.0	2.6×10^{-9}	1.8×10^{-4}	6.5×10^{-9}	3.9×10^{-9}
CCIWb	4.6×10^{-11}	4.4×10^{-4}	0.0	2.6×10^{-7}	1.2	5.4×10^{-6}	4.8×10^{-6}
EVE	6.1×10^{-10}	2.2×10^{-2}	2.4×10^{-11}	1.3×10^{-5}	74	6.2×10^{-4}	2.4×10^{-4}
FR	1.0×10^{-12}	5.2×10^{-6}	0.0	3.1×10^{-9}	4.2×10^{-3}	1.8×10^{-8}	2.6×10^{-8}
OPVBa	3.0×10^{-13}	3.0×10^{-6}	0.0	1.8×10^{-9}	3.6×10^{-3}	1.4×10^{-8}	2.1×10^{-8}
OPVBb	5.7×10^{-12}	4.7×10^{-5}	1.3×10^{-16}	2.8×10^{-8}	4.6×10^{-2}	1.9×10^{-7}	2.8×10^{-7}
OPW1	1.0×10^{-12}	8.7×10^{-6}	0.0	5.2×10^{-9}	9.3×10^{-3}	3.7×10^{-8}	5.7×10^{-8}
OPW2	1.0×10^{-12}	1.2×10^{-6}	0.0	7.2×10^{-10}	2.1×10^{-4}	3.2×10^{-9}	1.6×10^{-9}
TSL	1.1×10^{-8}	2.0×10^{-3}	0.0	1.2×10^{-6}	0.37	3.8×10^{-6}	3.2×10^{-6}
Total	1.2×10^{-8}	3.1×10^{-2}	2.4×10^{-8}	2.0×10^{-5}	91	8.0×10^{-4}	2.8×10^{-4}

Notes:

1. Reference 7.2-3, Table 9-1
2. Reference 7.2-3, Table 10.3-3a

Insert 5

Accident Category[1]	Release Frequency (per reactor year)[2]	Population Dose-Risk (person-rem per reactor year)	Number of Fatalities (per reactor year)		Cost-Risk (dollars per reactor year)	Water Ingestion Dose (person-rem per reactor year)	Land Requiring Decontamination (acres per reactor year)
			Early	Late			
BOC a	$7.4x10^{-11}$	$2.9x10^{-3}$	$1.6x10^{-8}$	$2.1x10^{-6}$	7.4	$1.3x10^{-4}$	$1.5x10^{-5}$
BOC b	$7.4x10^{-11}$	$1.3x10^{-3}$	$6.0x10^{-10}$	$8.2x10^{-7}$	2.8	$1.4x10^{-5}$	$1.3x10^{-5}$
BYP a	$1.5x10^{-12}$	$4.1x10^{-5}$	$5.3x10^{-11}$	$2.6x10^{-8}$	0.11	$9.1x10^{-7}$	$3.8x10^{-7}$
BYP b	$5.5x10^{-11}$	$1.8x10^{-3}$	$4.8x10^{-10}$	$1.5x10^{-6}$	3.3	$1.8x10^{-5}$	$1.0x10^{-5}$
CClDa	$1.0x10^{-12}$	$2.3x10^{-5}$	$5.6x10^{-15}$	$1.4x10^{-8}$	$7.3x10^{-2}$	$6.0x10^{-7}$	$2.8x10^{-7}$
CClDb	$1.0x10^{-12}$	$2.3x10^{-5}$	$5.9x10^{-13}$	$1.4x10^{-8}$	$5.6x10^{-2}$	$3.7x10^{-7}$	$2.4x10^{-7}$
CClWa	$5.3x10^{-11}$	$4.0x10^{-6}$	0.0	$2.4x10^{-9}$	$3.1x10^{-4}$	$6.6x10^{-9}$	$4.0x10^{-9}$
CClWb	$4.6x10^{-11}$	$4.1x10^{-4}$	0.0	$2.5x10^{-7}$	1.0	$5.5x10^{-6}$	$4.8x10^{-6}$
EVE	$6.1x10^{-10}$	$2.1x10^{-2}$	$2.5x10^{-10}$	$1.2x10^{-5}$	68	$6.3x10^{-4}$	$2.4x10^{-4}$
FR	$1.0x10^{-12}$	$4.7x10^{-6}$	0.0	$2.8x10^{-9}$	$3.8x10^{-3}$	$1.9x10^{-8}$	$2.7x10^{-8}$
OPVBa	$3.0x10^{-13}$	$2.7x10^{-6}$	0.0	$1.6x10^{-9}$	$3.2x10^{-3}$	$1.4x10^{-8}$	$2.1x10^{-8}$
OPVBb	$5.7x10^{-12}$	$4.4x10^{-5}$	$3.4x10^{-15}$	$2.6x10^{-8}$	$4.2x10^{-2}$	$2.0x10^{-7}$	$2.8x10^{-7}$
OPW1	$1.0x10^{-12}$	$8.0x10^{-6}$	0.0	$4.8x10^{-9}$	$8.3x10^{-3}$	$3.8x10^{-8}$	$5.8x10^{-8}$
OPW2	$1.0x10^{-12}$	$1.1x10^{5}$	0.0	$6.5x10^{-10}$	$2.0x10^{-4}$	$3.3x10^{-9}$	$1.7x10^{-9}$
TSL	$1.1x10^{-8}$	$1.8x10^{-3}$	0.0	$1.1x10^{-6}$	0.39	$3.9x10^{-6}$	$3.3x10^{-6}$
Total	$1.2x10^{-8}$	$2.9x10^{-2}$	$1.8x10^{-8}$	$1.8x10^{-5}$	83	$8.1x10^{-4}$	$2.8x10^{-4}$

Table 7.2-2 Comparison of Fermi 3 Results to U.S. NRC Safety Goals

Replace the numbers of this table with the numbers represented by Insert 6.

Year of Fermi Site Meteorological Data	Safety Risk: Prompt Fatality Risk (Individual 0-1 mi) (deaths per reactor year)	Safety Risk: Cancer Fatality Risk (0-10 mi cancers) (deaths per year per reactor year)	Probability of Exceeding 0.25 Sv (25 rem) at 0.5 mi (per reactor-year)
2001	9.04×10^{-12}	8.52×10^{-14}	2.42×10^{-9}
2002	8.32×10^{-12}	8.40×10^{-14}	2.35×10^{-9}
2003	9.31×10^{-12}	9.95×10^{-14}	2.88×10^{-9}
2004	8.15×10^{-12}	8.45×10^{-14}	2.43×10^{-9}
2005	8.31×10^{-12}	9.29×10^{-14}	2.53×10^{-9}
2006	8.45×10^{-12}	8.74×10^{-14}	2.48×10^{-9}
2007	8.37×10^{-12}	8.83×10^{-14}	2.79×10^{-9}
Safety Goal	3.77×10^{-7} (2)	1.91×10^{-6} (2)	$< 10^{-6}$ (1)
Generic ESBWR Analysis [1]	8.2×10^{-11}	1.1×10^{-11}	2.10×10^{-9}

Notes:

1. Reference 7.2-3
2. Reference 7.2-2

Insert 6

Year of Fermi Site Meteorological Data	**Prompt Fatality Risk (Individual 0-1 mi) (deaths per reactor year)**	**Cancer Fatality Risk (0-10 mi cancers) (deaths per year per reactor year)**	**Probability of Exceeding 0.25 Sv (25 rem) at 0.5 mi (per reactor-year)**
2001	5.29×10^{-12}	8.21×10^{-14}	1.48×10^{-9}
2002	4.86×10^{-12}	8.14×10^{-14}	1.46×10^{-9}
2003	5.50×10^{-12}	9.17×10^{-14}	1.74×10^{-9}
2004	4.82×10^{-12}	8.16×10^{-14}	1.53×10^{-9}
2005	4.92×10^{-12}	8.65×10^{-14}	1.49×10^{-9}
2006	4.93×10^{-12}	8.31×10^{-14}	1.46×10^{-9}
2007	4.93×10^{-12}	8.44×10^{-14}	1.72×10^{-9}
Safety Goal	3.77×10^{-7} (2)	1.91×10^{-6} (2)	$< 10^{-6}$ (1)
Generic ESBWR Analysis 1	8.2×10^{-11}	1.1×10^{-11}	2.10×10^{-9}

7.3 Severe Accident Mitigation Alternatives

U.S. Environmental Protection Agency regulations require that a discussion on environmental consequences include mitigation measures (40 CFR 1502.16(h)). Mitigation measures should be considered even for impacts that would not be significant by themselves, if the overall proposed action could have significant impacts.

As described in Section 7.2, General Electric (GE) performed a probabilistic risk analysis (PRA) for the ESBWR as part of the design certification process (Reference 7.3-1). This analysis determined that severe accident impacts are within the safety goals established by the NRC. Detroit Edison extended the GE generic PRA to examine Detroit Edison's proposed ESBWR unit at the Fermi site and concluded that the generic analysis remains valid for the site. The analysis discussed in this section provides assurance that there are no cost-beneficial design alternatives that would need to be implemented at Fermi 3 to mitigate the small impacts described in Section 7.2.

7.3.1 The SAMA Analysis Process

Design or procedural modifications that could mitigate the consequences of a severe accident are known as severe accident mitigation alternatives (SAMAs). In the past, SAMAs were known as SAMDAs, severe accident mitigation design alternatives, which primarily focused on design changes and did not consider procedural modifications. For an existing plant with a well-defined design and established procedural controls, the normal evaluation process for identifying potential SAMAs includes four steps:

1. Define the base case – The base case is defined by the dose-risk and cost-risk of a severe accident before implementation of any SAMAs. A plant's PRA is the primary source of data in calculating the base case. The base case risks are converted to a monetary value for subsequent use in screening SAMAs. Section 7.2 presents the base case dose- and cost-risk for a single ESBWR at the Fermi site.
2. Identify and screen potential SAMAs – Potential SAMAs can be identified from the plant's Individual Plant Examination, the plant's probabilistic risk assessment, and the results of other plants' SAMA analyses. Each potential SAMA in the list is assigned a conservatively low implementation cost based on historical costs for similar design changes and/or engineering judgment, and is then compared to the base case value from Step 1, above. SAMAs with higher implementation cost than the base case value are not evaluated further. SAMAs with a lower implementation cost than the base case screening value go to Step 3.
3. Determine the cost and net value of each SAMA – Each SAMA remaining after Step 2 receives a detailed engineering cost evaluation, developed using current plant engineering processes. If the SAMA continues to pass the screening value, Step 4 is performed.
4. Determine the benefit associated with each screened SAMA – Each SAMA that passes the screening in Step 3 is evaluated using the PRA model to determine the reduction in risk associated with implementation of the proposed SAMA. The reduction-in-risk

benefit is converted to a monetary value and is then compared to the detailed cost estimate. Those SAMAs with reasonable cost-benefit ratios are considered for implementation.

In the absence of a completed plant with established procedural controls, the analysis process is limited to demonstrating that the severe accident analysis using Fermi-specific parameters is bounded by the GE severe accident analysis and to determining what magnitude of plant-specific design or procedural modification would be cost-effective. Determining the magnitude of cost-effective design or procedural modifications is the same as defining the base case (Step 1) for existing nuclear units. The base case benefit value is calculated by assuming the current dose-risk of the unit could be reduced to zero and assigning a defined dollar value for this change in risk. Any design or procedural change cost that exceeded the benefit value would not be considered cost-effective.

The dose-risk and cost-risk results (Section 7.2 analyses) are converted to a monetary value in accordance with methods established in NUREG/BR-0184 (Reference 7.3-3). NUREG/BR-0184 presents methods for determining the value of decreases in risk using four types of attributes: public health, occupational health, offsite property, and onsite property. Any SAMAs in which the conservatively low implementation cost exceeds the base case valuation would not be expected to pass the screening in Step 2. If the baseline analysis produces a value that is below that expected for implementation of any reasonable SAMA, no matter how inexpensive, then the remaining two steps of the SAMA process are not necessary.

7.3.2 The GE-Hitachi ESBWR SAMDA Analysis

The GE-Hitachi (GEH) SAMDA analysis was provided to the NRC in Reference 7.3-2. GEH compiled a list of potential SAMDAs based on the Advanced Boiling Water Reactor SAMA study and license renewal environmental reports. Some SAMDAs were then screened out based on their inapplicability to the ESBWR design or because they were already included in the ESBWR design. SAMDAs with implementation costs that far exceeded any reasonable benefit or had very low benefits were also excluded. None of the SAMDAs passed the screening process.

GEH compared the implementation costs for each SAMDA to the maximum severe accident risk reduction value possible and found that none of the SAMDAs would be cost-effective.

7.3.3 Monetary Valuation of the Fermi 3 Base Case

The principal inputs to the calculations are: core damage frequency, dose-risk and cost-risk, dollars per person-rem, licensing period, and economic discount rate.

- The core damage frequency, including both internal and external events, is 6.61 x 10^{-8} per year (Reference 7.3-1).
- The dose-risk and cost-risk are reported in Table 7.2-1.
- The calculations use $2000 per person-rem, provided in NUREG/BR–0184.
- The licensing period is assumed to be 60 years for the calculations, rather than the 40-year period in the Combined License (COL) application, to be consistent with the GEH analysis.

- The economic discount rate is assumed to be 7 percent, consistent with the GEH analysis. In addition, a sensitivity analysis is included using 3 percent. The NRC recommends using a 7 percent discount rate and performing a sensitivity analysis using 3 percent (Reference 7.3-3).

Using these inputs, the maximum monetary value associated with complete risk reduction is presented in Table 7.3-1. The monetary value (the maximum averted cost-risk) is conservative because no SAMA can reduce the core damage frequency to zero.

The maximum averted cost-risk of ~~$15,384~~ $14,410 for a single ESBWR at the Fermi site is sufficiently small that no design changes would be cost-effective to implement. This is consistent with the GEH analysis that demonstrates that cost-effective designs to mitigate severe accidents have already been incorporated into the design submitted for certification. Even with a conservative 3 percent discount rate, the valuation of the averted risk is only ~~$32,957~~ $31,038. These values compare closely to the GEH generic analysis result of $4628 for the best estimate and $41,383 for the upper bound estimate. GEH concluded (Reference 7.3-2) that, even for their upper bound estimate, none of the SAMDA candidates were cost beneficial.

A review was performed of the compilation of SAMAs in NEDO-33206 to identify procedural and administrative measures that were not considered design alternatives (Reference 7.3-2). Most of these items related to PWRs and have no relevance to the ESBWR. Those administrative and procedural measures applicable to the ESBWR will be considered for implementation when procedures are developed prior to fuel load, as long as their cost does not exceed the maximum value associated with averting all risk of severe accidents.

Accordingly, no cost-beneficial SAMDAs have been identified. Further, pursuant to 10 CFR 51.30(d), the NRC will, as part of its design certification rulemaking, prepare an environmental assessment evaluating the costs and benefits of SAMDAs for the ESBWR. Pursuant to 10 CFR 51.50(c)(2) and 51.75(c)(2), this environmental assessment may be incorporated by reference into the ER upon completion.

7.3.4 References

7.3-1 GE Energy, "ESBWR Probabilistic Risk Assessment," NEDO-33201, ~~Revision 2, September 2007.~~ Revision 3, May 2008.

7.3-2 GE-Hitachi Nuclear Energy Americas LLC, "ESBWR Severe Accident Mitigation Design Alternatives," NEDO-33306, Revision 1, August 2007.

7.3-3 U.S. Nuclear Regulatory Commission, "Regulatory Analysis Technical Evaluation Handbook," NUREG/BR-0184, January 1997.

~~Table 7.3-1 Valuation of the Detroit Edison ESBWR Base Case~~

Replace the numbers of this table with the numbers represented by Insert 7.

	7% Discount Rate	3% Discount Rate
Offsite exposure cost	$4,789	$9,469
Offsite economic cost	$6,984	$13,809
Onsite exposure cost	$33	$76
Onsite cleanup cost	$1,004	$2,384
Replacement power cost	$2,571	$7,219
Total	$15,381	$32,957

Insert 7

	7% Discount Rate	3% Discount Rate
Offsite exposure cost	$4,434	$8,768
Offsite economic cost	$6,368	$12,591
Onsite exposure cost	$33	$76
Onsite cleanup cost	$1,004	$2,384
Replacement power cost	$2,571	$7,219
Total	$14,410	$31,038

Attachment 4
NRC3-09-0014

Response to RAI letter related to Fermi 3 ER

RAI Question AQ2.7-4

NRC RAI AQ2.7-4

Provide in electronic format all input and output files used in modeling, including PAVAN (short-term, accidental releases), XOQDOQ (long-term, routine releases), and SACTI (seasonal/annual cooling tower) models.

Supporting Information

These data are required by the staff to perform independent evaluations and assessments of atmospheric diffusion characteristics and station impacts on the environment.

Response

Electronic files used for atmospheric diffusion modeling: PAVAN (short-term, accidental releases), XOQDOQ (long-term, routine releases), and SACTI (seasonal/annual cooling tower) models are being provided in this letter as an enclosed CD. An inventory of the files on that CD is provided in Appendix C to this letter.

Proposed COLA Revision

None

Attachment 5
NRC3-09-0014

Response to RAI letter related to Fermi 3 ER

RAI Question CR2.5.3-1

NRC RAI CR2.5.3-1

Provide copies of Native American consultations; documentation of meetings with the Wyandotte Nation; and additional correspondence with the Wyandotte regarding the draft Phase I report and the Wyandotte letter of support.

Supporting Information

Information included in this documentation will be used to complete the NEPA analysis and to support compliance with the Section 106 process.

Response

The following are notes from a meeting held on June 16, 2008 in Trenton, MI between representatives of Detroit Edison and the Wyandot of Anderdon Nation regarding the Fermi 3 power plant:

Attendance: Randall Westmoreland, DTE; Molly Lumpert-Coy, DTE; Chief Steve Gronda, Mike Stailey; Tribal Elder

DTE personnel presented a power point presentation providing an overview of the Fermi 3 project and the application process. Topics included the following: Fermi site environmentally sensitive areas; Environmental Report (ER) and NRC application development; proposed construction plan overview; and proposed site arrangements including the cooling tower, the intake structure, and the discharge pipe into Lake Erie.

The Wyandot of Anderdon representatives expressed no significant concerns regarding the project and offered to write a letter of support (Enclosure 1) contingent upon review of the draft Phase 1 Cultural Resource report that was being prepared for the ER and for submittal to the State Historic Preservation Office (SHPO). This report was subsequently provided to Mike Stailey. They did not indicate any specific ties to the Fermi 2 property that they were aware of. They indicated that their people did live in the Newport and Monroe, Michigan area.

The following letters, which were sent out to various Native American nation leaders, are included in this response as Enclosure 2. With the exception of the first letter referenced below, there were no responses to any of the following letters.

Letter from Molly Lumpert-Coy (DTE Energy) to Steve A. Gronda (The Wyandot of Anderdon Nation), dated May 30, 2008

Letter from Molly Lumpert-Coy (DTE Energy) to David K. Sprague (Match-e-be-nash-she-wish Band of Pottawatomi Indians of Michigan), dated May 30, 2008

Letter from Molly Lumpert-Coy (DTE Energy) to Ms. Laura Spurr (Huron Potawatomi, Inc.), dated May 30, 2008

Letter from Molly Lumpert-Coy (DTE Energy) to Ms. Clarice M. Werle (Forest County Potawatomi Community), dated May 30, 2008

Letter from Molly Lumpert-Coy (DTE Energy) to Mr. Harold G. Frank (Forest County Potawatomi Community of Wisconsin), dated May 30, 2008

Letter from Molly Lumpert-Coy (DTE Energy) to Mr. Kenneth Meshiguad (Hannahville Indian Community Council), dated May 30, 2008

Letter from Molly Lumpert-Coy (DTE Energy) to Chief (Saginaw Chippewa Tribal Council), dated May 30, 2008

Proposed COLA Revision

None

NRC3-09-0014
RAI Question CR2.5.3-1

Enclosure 1

Letter of Support from the Wyandot Nation
(following 1 page)

The Wyandot of Anderdon Nation
P.O. 68
Trenton Michigan
48138

Monday, July 14, 2008

TO: Molly L. Coy
Regional Manager
DTE Energy

FROM: Steve Gronda
Grand Chief
Wyandot of Anderdon

Kwe Molly

We, the Wyandot of Anderdon, are honored by the **DTE** Energy offer to partner with the Wyandot people in protecting one of our most precious natural resources, Lake Erie.
The discussion of future technologies for efficient engineering in the generation of electrical power impressed us. We applaud and support **DTE** in their desire to reduce fossil fuel based energy generation.
Upon further review of the documents presented, we are reassured of DTE's high industry standards and safety ratings in operating nuclear power generation. We found the meetings regarding the future construction of an additional nuclear power plant (Fermi 3) very cordial and informative.
We look forward to learning more about these pursuits in the future.

Sincerely,
Steve Gronda,
Grand Chief
Wyandot of Anderdon Nation

Steve A. Gronda

NRC3-09-0014
RAI Question CR2.5.3-1

Enclosure 2

Native American Consultation Letters
(following 14 pages)

The Detroit Edison Company
2000 2nd Ave., Detroit, MI 48226-1279

May 30, 2008

Steve A. Grondia, Chief
Wayandot of Anderdon Nation
2764 W. Jefferson ST. 001
P.O. Box 68
Trenton, MI 48183

Dear Chief Grondia:

Detroit Edison Company intends to submit to the Nuclear Regulatory Commission (NRC) a Combined License Application (COLA) for a potential new nuclear power electrical generating unit at its Fermi 2 facility located in Monroe County, Michigan along the west bank of Lake Erie in Frenchtown Charter Township. At this time Detroit Edison has not made a commitment to build, but is keeping its options open by filing its application this year.

Detroit Edison anticipates submittal of the Fermi Unit 3 COLA later this year. After a projected three-to four-year review of the COLA by the NRC, such a license could be approved by the NRC in 2012. If a decision is made to construct, Detroit Edison could potentially have a new unit built and placed in commercial operation in the 2020 time frame. As part of the application and in compliance with the National Environmental Protection Act, the federal government requires contact with local tribal nations to ensure that important historic cultural properties will not be adversely impacted.

I would like to take this opportunity to make you aware of this potential project and respectfully ask you to advise whether you have any traditional cultural properties in this area or if this is an area that is otherwise sensitive to your Nation. Our historical inventory and inspections of the site to date have not uncovered any findings of archeological significance. To aid in your review enclosed is a reduced composite of U.S. Geological Survey 7.5 minute topographic map of the project site overlaid with the boundaries of the Fermi facility property and the approximate areas that may be impacted by construction activities.

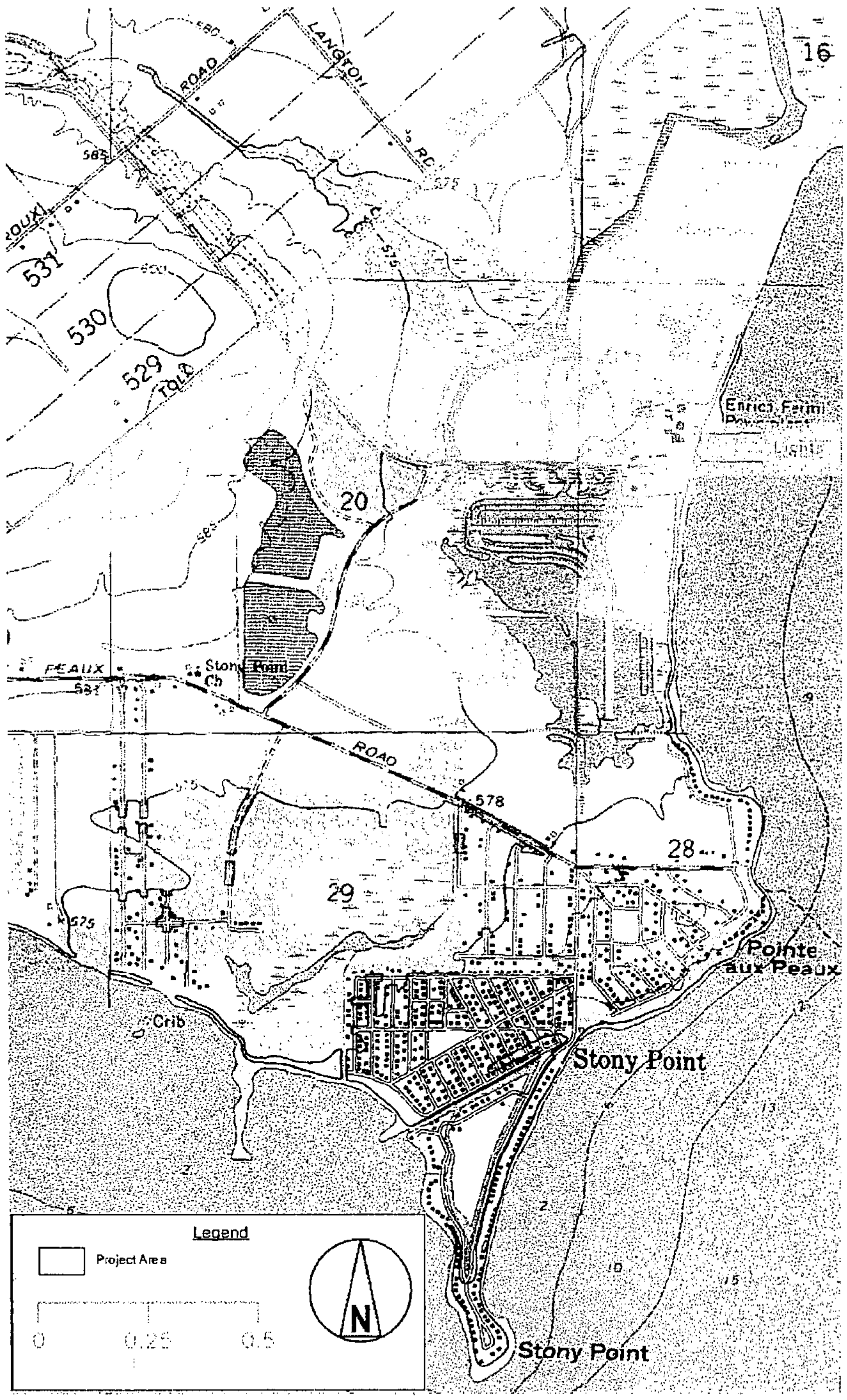
We would appreciate receiving your oral or written response by June 15th, 2008. You can contact me by office phone on 734-332-4034 or cell phone 313-820-3881 or by mail to my attention at 841 Broadway Center/MichCon, Ann Arbor, MI 48105.

If you have any questions, please feel free to contact me on office phone 734-332-4034 or cell phone 313-820-3881.

Sincerely,

Molly Luempert-Coy
Regional Manager
DTE Energy

Enclosure



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The Detroit Edison Company
2000 2nd Ave., Detroit, MI 48226-1279

May 30, 2008

David K. Sprague, Chairperson
Match-e-be-nash-she-wish Band of Pottawatomi Indians of Michigan
1743 142nd Avenue
P.O. Box 218
Door, MI 49323

Dear David Sprague:

Detroit Edison Company intends to submit to the Nuclear Regulatory Commission (NRC) a Combined License Application (COLA) for a potential new nuclear power electrical generating unit at its Fermi 2 facility located in Monroe County, Michigan along the west bank of Lake Erie in Frenchtown Charter Township. At this time Detroit Edison has not made a commitment to build, but is keeping its options open by filing its application this year.

Detroit Edison anticipates submittal of the Fermi Unit 3 COLA later this year. After a projected three-to four-year review of the COLA by the NRC, such a license could be approved by the NRC in 2012. If a decision is made to construct, Detroit Edison could potentially have a new unit built and placed in commercial operation in the 2020 time frame. As part of the application and in compliance with the National Environmental Protection Act, the federal government requires contact with local tribal nations to ensure that important historic cultural properties will not be adversely impacted.

I would like to take this opportunity to make you aware of this potential project and respectfully ask you to advise whether you have any traditional cultural properties in this area or if this is an area that is otherwise sensitive to your Nation. Our historical inventory and inspections of the site to date have not uncovered any findings of archeological significance. To aid in your review enclosed is a reduced composite of U.S. Geological Survey 7.5 minute topographic map of the project site overlaid with the boundaries of the Fermi facility property and the approximate areas that may be impacted by construction activities.

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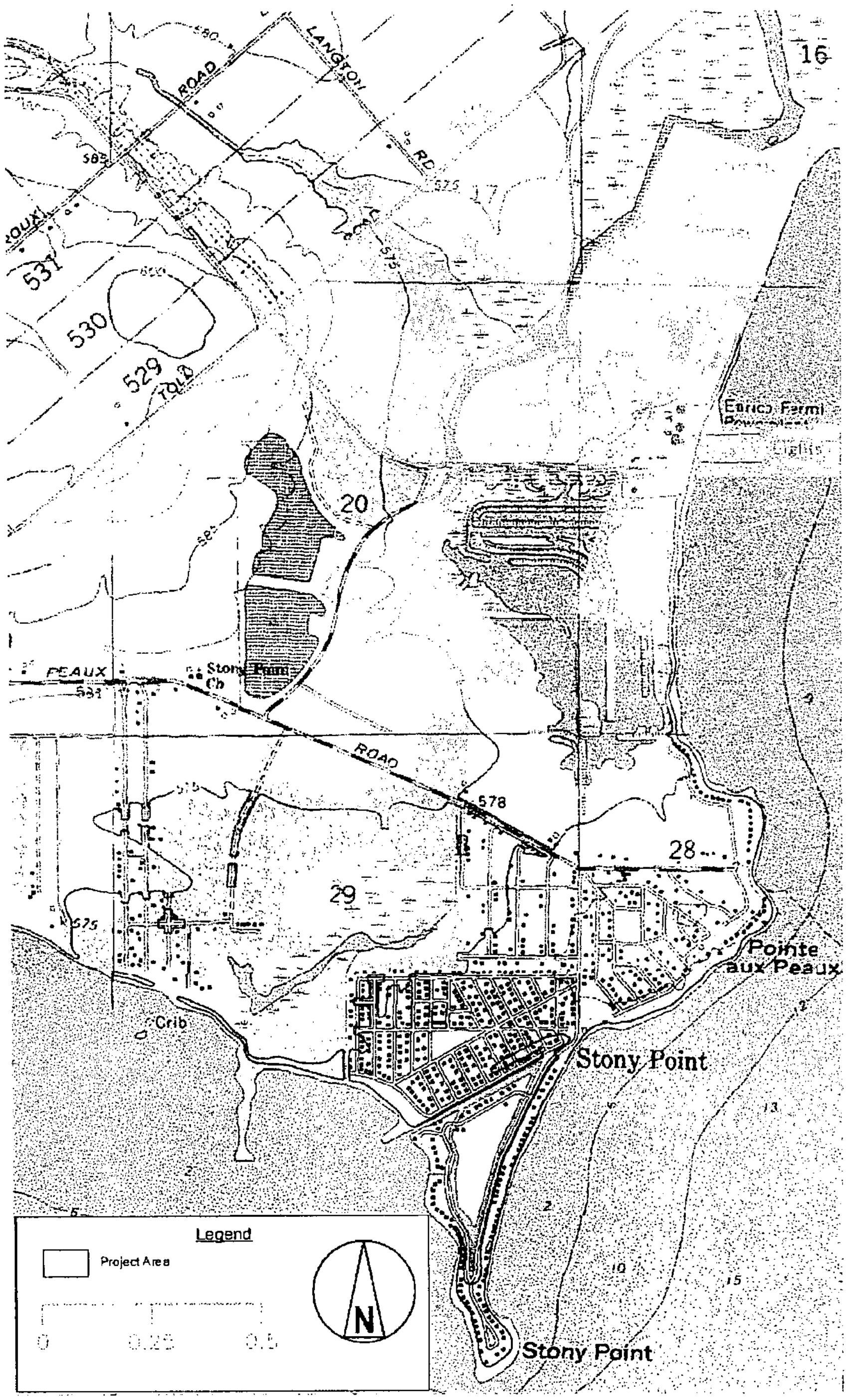
If you have any questions, please feel free to contact me on office phone 734-332-4034 or cell phone 313-820-3881.

Sincerely,

Molly Luempert-Coy
Regional Manager
DTE Energy

Enclosure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The Detroit Edison Company
2000 2nd Ave., Detroit, MI 48226-1279

May 30, 2008

Ms. Laura Spurr
Chairperson, Tribal Council
Huron Potawatomi, Inc.
2221 1 ½ Mile Road
Fulton, MI 49052

Dear Ms. Spurr:

Detroit Edison Company intends to submit to the Nuclear Regulatory Commission (NRC) a Combined License Application (COLA) for a potential new nuclear power electrical generating unit at its Fermi 2 facility located in Monroe County, Michigan along the west bank of Lake Erie in Frenchtown Charter Township. At this time Detroit Edison has not made a commitment to build, but is keeping its options open by filing its application this year.

Detroit Edison anticipates submittal of the Fermi Unit 3 COLA later this year. After a projected three-to four-year review of the COLA by the NRC, such a license could be approved by the NRC in 2012. If a decision is made to construct, Detroit Edison could potentially have a new unit built and placed in commercial operation in the 2020 time frame. As part of the application and in compliance with the National Environmental Protection Act, the federal government requires contact with local tribal nations to ensure that important historic cultural properties will not be adversely impacted.

I would like to take this opportunity to make you aware of this potential project and respectfully ask you to advise whether you have any traditional cultural properties in this area or if this is an area that is otherwise sensitive to your Nation. Our historical inventory and inspections of the site to date have not uncovered any findings of archeological significance. To aid in your review enclosed is a reduced composite of U.S. Geological Survey 7.5 minute topographic map of the project site overlaid with the boundaries of the Fermi facility property and the approximate areas that may be impacted by construction activities.

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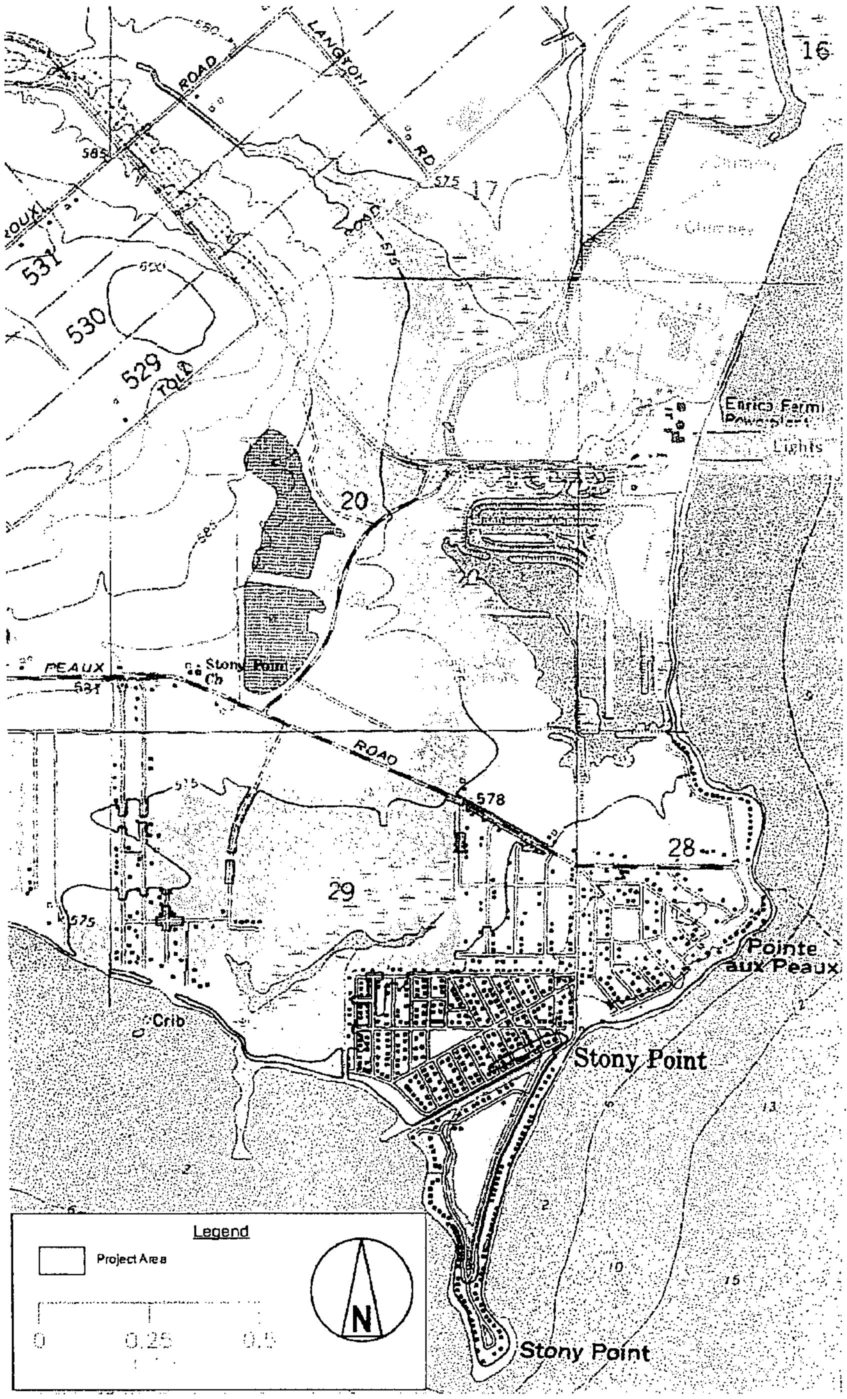
If you have any questions, please feel free to contact me on office phone 734-332-4034 or cell phone 313-820-3881.

Sincerely,

Molly Luempert-Coy
Regional Manager
DTE Energy

Enclosure



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The Detroit Edison Company
2000 2nd Ave., Detroit, MI 48226-1279

May 30, 2008

Ms. Clarice M. Werle
Forest County Potawatomi Community
P.O. Box 340
Crandon, WI 54520

Dear Ms. Clarice Werle:

Detroit Edison Company intends to submit to the Nuclear Regulatory Commission (NRC) a Combined License Application (COLA) for a potential new nuclear power electrical generating unit at its Fermi 2 facility located in Monroe County, Michigan along the west bank of Lake Erie in Frenchtown Charter Township. At this time Detroit Edison has not made a commitment to build, but is keeping its options open by filing its application this year.

Detroit Edison anticipates submittal of the Fermi Unit 3 COLA later this year. After a projected three-to four-year review of the COLA by the NRC, such a license could be approved by the NRC in 2012. If a decision is made to construct, Detroit Edison could potentially have a new unit built and placed in commercial operation in the 2020 time frame. As part of the application and in compliance with the National Environmental Protection Act, the federal government requires contact with local tribal nations to ensure that important historic cultural properties will not be adversely impacted.

I would like to take this opportunity to make you aware of this potential project and respectfully ask you to advise whether you have any traditional cultural properties in this area or if this is an area that is otherwise sensitive to your Nation. Our historical inventory and inspections of the site to date have not uncovered any findings of archeological significance. To aid in your review enclosed is a reduced composite of U.S. Geological Survey 7.5 minute topographic map of the project site overlaid with the boundaries of the Fermi facility property and the approximate areas that may be impacted by construction activities.

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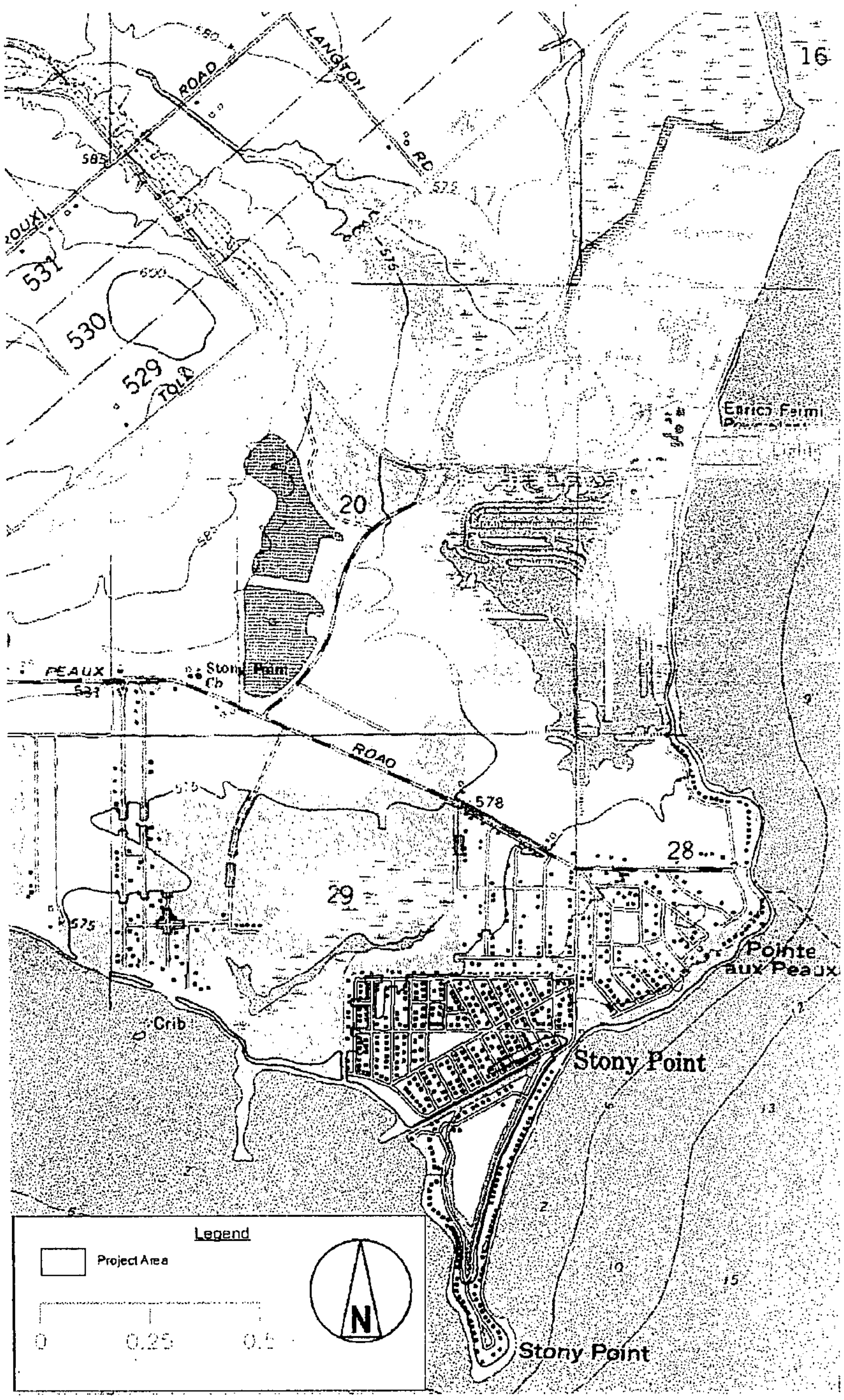
If you have any questions, please feel free to contact me on office phone 734-332-4034 or cell phone 313-820-3881.

Sincerely,

Molly Luempert-Coy
Regional Manager
DTE Energy

Enclosure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The Detroit Edison Company
2000 2nd Ave., Detroit, MI 48226-1279

May 30, 2008

Mr. Harwold G. Frank
Forest County Potawatomi Community of Wisconsin
P.O. Box 340
Crandon, WI 54520

Dear Mr. Frank:

Detroit Edison Company intends to submit to the Nuclear Regulatory Commission (NRC) a Combined License Application (COLA) for a potential new nuclear power electrical generating unit at its Fermi 2 facility located in Monroe County, Michigan along the west bank of Lake Erie in Frenchtown Charter Township. At this time Detroit Edison has not made a commitment to build, but is keeping its options open by filing its application this year.

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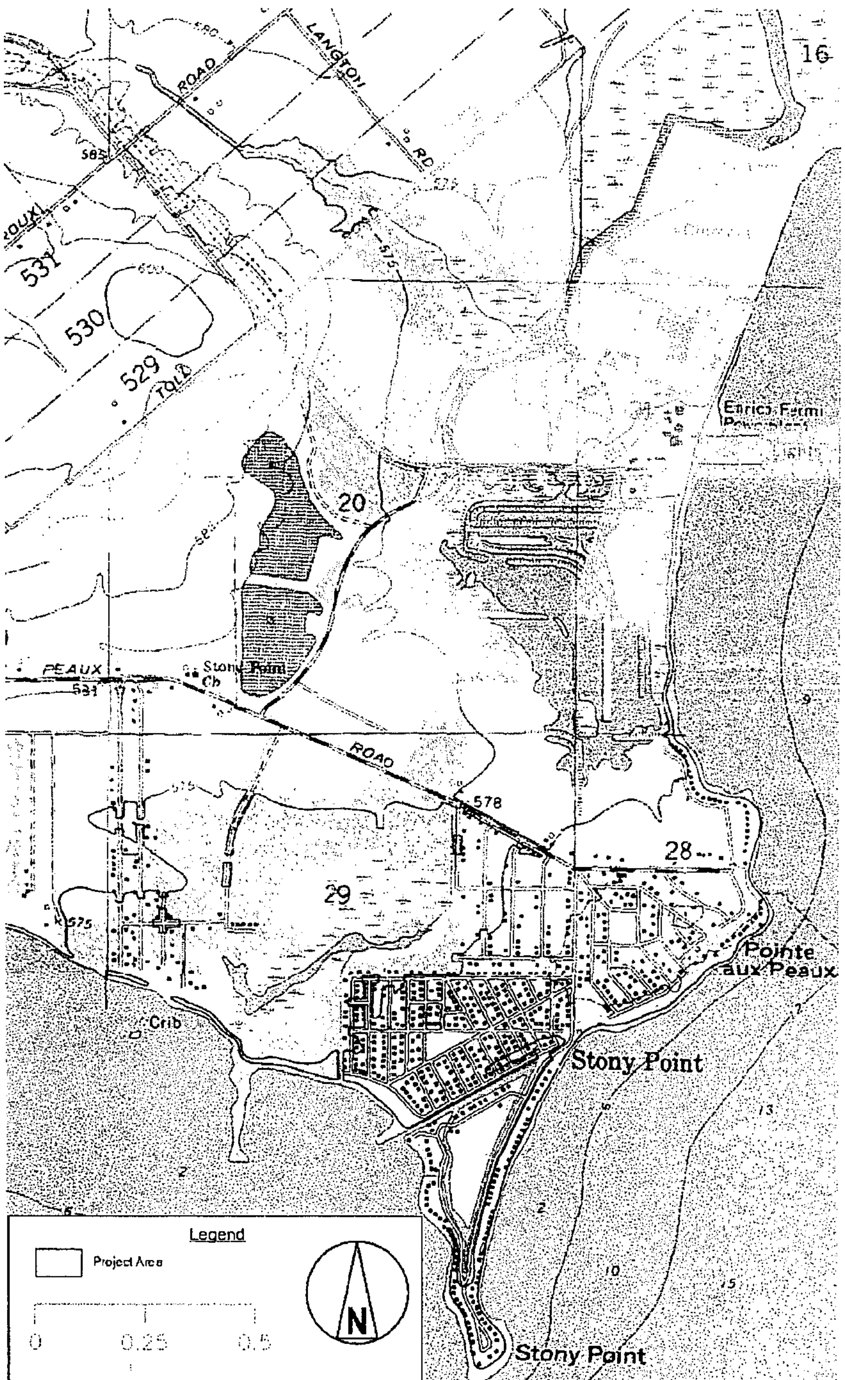
Sincerely,

Molly Luempert-Coy
Regional Manager
DTE Energy

Enclosure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The Detroit Edison Company
2000 2nd Ave., Detroit, MI 48226-1279

May 30, 2008

Mr. Kenneth Meshiguad
Hannahville Indian Community Council
N14911 Hannahville B1 Rd.
Wilson, MI 49896-9728

Dear Mr. Meshiguad:

Detroit Edison Company intends to submit to the Nuclear Regulatory Commission (NRC) a Combined License Application (COLA) for a potential new nuclear power electrical generating unit at its Fermi 2 facility located in Monroe County, Michigan along the west bank of Lake Erie in Frenchtown Charter Township. At this time Detroit Edison has not made a commitment to build, but is keeping its options open by filing its application this year.

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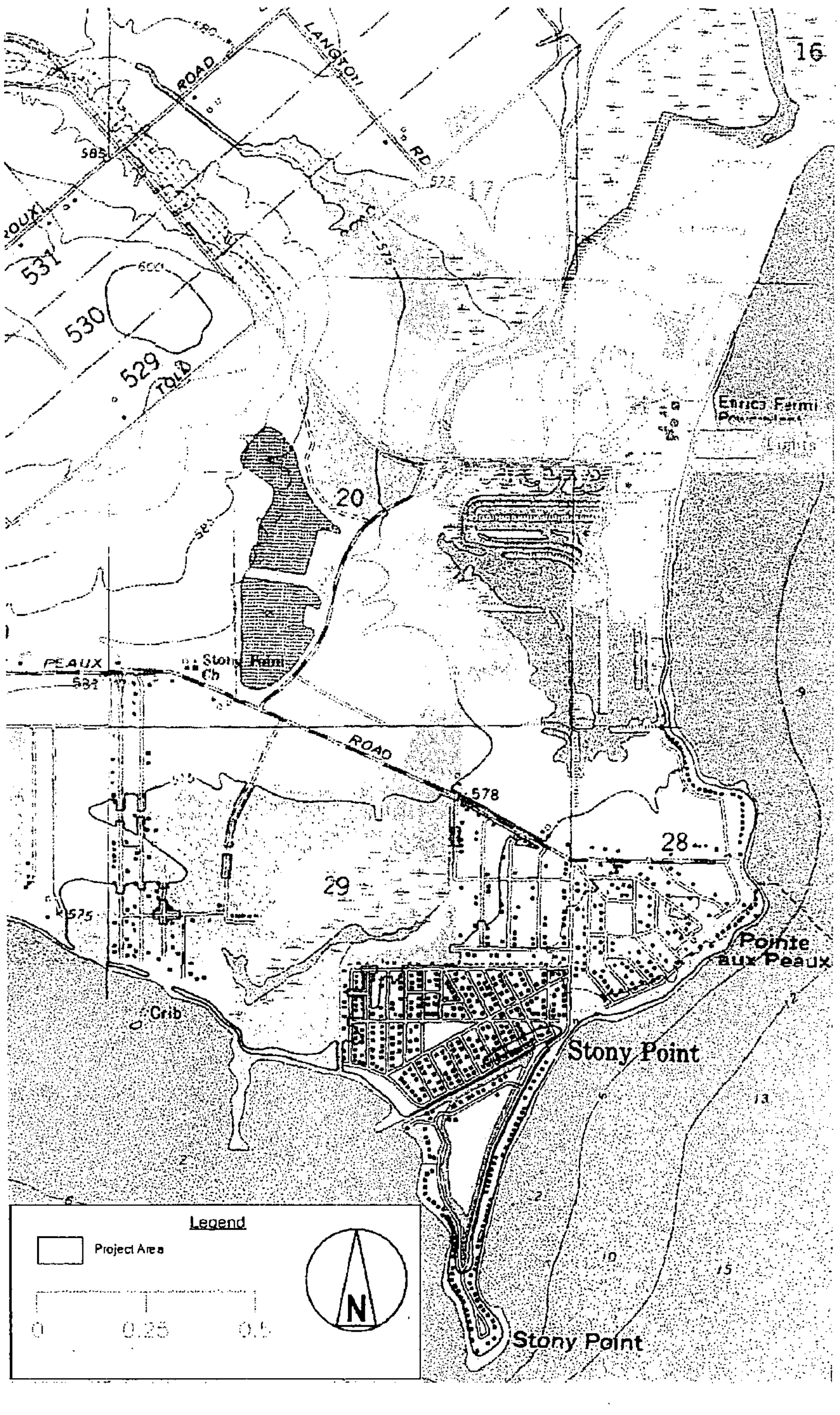
Sincerely,

Molly Luempert-Coy
Regional Manager
DTE Energy

Enclosure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The Detroit Edison Company
2000 2nd Ave., Detroit, MI 48226-1279

May 30, 2008

Chief, Saginaw Chippewa Tribal Council
Saginaw Chippewa Indian Tribe of Michigan
Tribal Office
7070 E. Broadway Road
Mt. Pleasant, MI 48858

Dear Sir:

Detroit Edison Company intends to submit to the Nuclear Regulatory Commission (NRC) a Combined License Application (COLA) for a potential new nuclear power electrical generating unit at its Fermi 2 facility located in Monroe County, Michigan along the west bank of Lake Erie in Frenchtown Charter Township. At this time Detroit Edison has not made a commitment to build, but is keeping its options open by filing its application this year.

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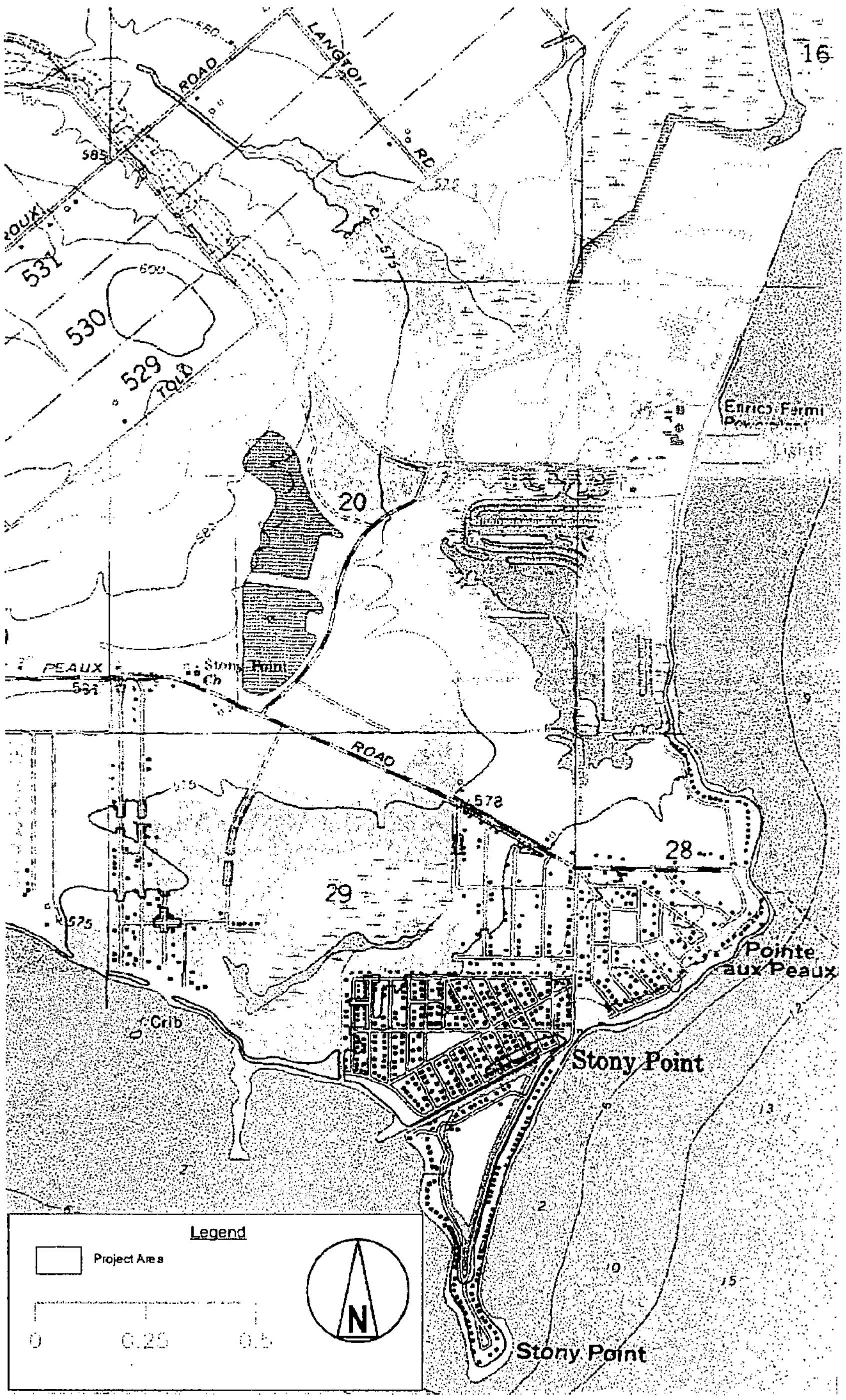
If you have any questions, please feel free to contact me on office phone 734-332-4034 or cell phone 313-820-3881.

Sincerely,

Molly Luempert-Coy
Regional Manager
DTE Energy

Enclosure

cc: William Johnson, Director, Ziibiwing Cultural Society, 7070 E. Broadway, Mt. Pleasant, MI 48858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Attachment 6
NRC3-09-0014

Response to RAI letter related to Fermi 3 ER

RAI Question CR4.1.3-7

NRC RAI CR4.1.3-7

Provide copies of the Fermi 1 Phase I Cultural Resources report when available. Report should be in color, and include all figures, photos, and appendices.

Supporting Information

Information included in this documentation is critical to ensuring a thorough and complete EIS review of project impacts. This information will be used to complete the NEPA analysis and to support compliance with the Section 106 process.

Response

A Phase 1 Cultural Resources study specific to Fermi 1 has not been performed and a report does not exist. A Phase I Cultural Resources study for the entire Fermi site has been performed and the report has been provided in response to RAI CR4.1.3-6 in Detroit Edison letter NRC3-09-0010, dated June 19, 2009. A phone call with the NRC for clarification on this RAI resulted in a request for a report detailing the eligibility of Fermi 1 for NRHP nomination. A study to analyze Fermi 1 for NRHP eligibility was performed and the report documenting the results has been provided to the NRC in response to RAI CR4.1.3-9 in Detroit Edison letter NRC3-09-0013, dated August 25, 2009.

Proposed COLA Revision

None

Attachment 7
NRC3-09-0014

Response to RAI letter related to Fermi 3 ER

RAI Question FC5.7-1

NRC RAI FC5.7-1

Provide corrected information related to uranium fuel cycle impacts.

Supporting Information

The Fermi 3 ER contains errors on pages 5-142 and 5-143. The 1.79 scaling factor should not have been used to adjust the following percentages:

- *Annual uranium fuel cycle discharges of water to air (i.e., consumptive water use) = 2% of model 1000-MW(e) light water reactor (LWR) with cooling tower. The value of 2% should not have been scaled to 3.6%.*
- *Annual uranium fuel cycle discharges of water associated with thermal effluents < 4% of model 1000-MW(e) LWR with once-through cooling. The value of 4% should not have been scaled to 7.2%.*
- *The maximum uranium fuel cycle consumptive water use (assuming that all plants supplying electrical energy to the uranium fuel cycle used cooling towers) would be about 6% of that of the model 1000-MW(e) LWR using cooling towers. The value of 6% should not have been scaled to 10.7%.*

Response

Detroit Edison agrees that the percentage values should not have been scaled. The discussion of the uranium fuel cycle water use percentages in ER Section 5.7.1.2 is not relevant to the evaluation as presented. The discussion of water use within the first paragraph of this section is accurate, as is the data contained in Table 5.7-2, "Summary Table S-3 – Uranium Fuel Cycle Environmental Data". The first paragraph of Section 5.7.1.2 and Table 5.7-2 continue to support the conclusion of uranium fuel cycle impacts on water use contained in ER Section 5.7.1.2. The correct text for ER Section 5.7.1.2 is reflected in the attached markup.

Proposed COLA Revision

Fermi 3 COLA Part 3, ER Section 5.7.1.2 will be revised as reflected in the attached markup.

Markup of Detroit Edison COLA
(following 2 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be different than presented here.

within the widest range of operating conditions. Changes in the UFC and reactor operations have occurred since NRC Table S-3 was promulgated. For example, the estimated quantity of fuel required for a year's operation of a nuclear power plant can now reasonably be calculated assuming a 60 year lifetime (40 years of initial operation plus a 20 year license renewal term). This was done in the GEIS for both BWRs and PWRs, and the highest annual requirement (35 metric tonnes [MT] of uranium made into fuel for a BWR) was used in the GEIS as the basis for the reference reactor-year. A number of fuel management improvements have been adopted by nuclear power plants to achieve higher performance and to reduce fuel and enrichment requirements, reducing annual fuel requirements. Therefore, NRC Table S-3 remains a conservative estimate of the environmental impacts of the fuel cycle fueling nuclear power reactors operating today.

5.7.1.1 **Land Use**

The total annual land requirement for the fuel cycle supporting Fermi 3 is approximately 200 acres. Approximately 23 acres are permanently committed land, and 179 acres are temporarily committed. A "temporary" land commitment is a commitment for the life of the specific fuel cycle plant, (e.g., mill, enrichment plant, or succeeding plants). Following decommissioning, such land can be used for unrestricted use. "Permanent" commitments represent land that may not be released for use after plant shutdown and/or decommissioning because decommissioning activities do not result in removal of sufficient radioactive material to meet the limits in 10 CFR 20, Subpart E, for release of land for unrestricted use. Of the 179 acres per year of temporarily committed land, 141 acres are undisturbed and 39 acres are disturbed. In comparison, a coal-fired power plant with the same output as Fermi 3 and that uses using strip-mined coal requires the disturbance of approximately 360 acres per year for fuel alone.

If the quality and opportunity cost of the land is equivalent, then it is reasonable to say the land requirements are minor. Accordingly, the impact on land use to support Fermi 3 is SMALL, and does not warrant mitigation.

5.7.1.2 **Water Use**

The principal water use for the fuel cycle supporting Fermi 3 is that required to remove waste heat from the power stations supplying electricity to the enrichment step of this cycle. Scaling from NRC Table S-3 shows that of the total annual water use of 2.04×10^{10} gallons for the Fermi 3 fuel cycle approximately 2.0×10^{10} gallons are required for the removal of waste heat, assuming that these plants use once-through cooling. ~~As discussed below,~~ Fermi 3 uses a cooling tower; therefore, these values are very conservative. Other water uses involve the discharge to air (e.g., evaporation losses in process cooling) of approximately 2.9×10^8 gallons per year and water discharged to ground (e.g., mine drainage) of approximately 2.3×10^8 gallons per year.

~~Regarding thermal effects, annual discharges from the nuclear fuel cycle are approximately 7.2 percent of the thermal effluent from Fermi 3 using once-through cooling. The consumptive water use of 2.9 × 10^8 gallons per year is approximately 3.6 percent of the thermal effluent from Fermi 3 using cooling towers. The maximum consumptive water use (assuming that all plants supplying electrical energy to the nuclear fuel cycle used cooling towers) would be approximately 10.7~~

~~percent of the thermal effluent from Fermi 3 using cooling towers. Under this condition, thermal effluents would be negligible.~~

~~The amount of water withdrawn from surface and ground water and discharged to air within the UFC represents only 3.6 percent of the annual discharges to air of Fermi 3 with cooling towers. The fuel cycle discharges are spread among facilities involved in the various stages of the UFC; thus, the water discharge to air from any one of these facilities is less than 3.6 percent. The amount of water withdrawn from surface and ground water and discharged to water bodies and to the ground represents only 10.7 percent of the annual discharges to water bodies and the ground of Fermi 3 with once through cooling. The fuel cycle discharges are spread among facilities involved in the various stages of the UFC; thus, the water discharges from any one of these facilities are less than 10.7 percent.~~

Given that the water discharged to water bodies and to the ground from other fuel cycle facilities for a reference reactor-year is only a small fraction of the discharge from a LWR; therefore, the impact on water use to support Fermi 3 is SMALL, and does not warrant mitigation.

5.7.1.3 **Fossil Fuel Impacts**

Electric energy and process heat are required during various phases of the fuel cycle process. The electric energy is usually produced by the combustion of fossil fuel at conventional power plants. Electric energy associated with the fuel cycle represents approximately 9.0 percent of the annual electric power production of Fermi 3. The original analysis in WASH-1248 shows that the environmental impacts are almost totally from the electrical generation needed for the gaseous diffusion process. These impacts result from the emissions from the electrical generation that is assumed to be from coal plants, the water needed to cool the coal plants, and the water needed to cool the gaseous diffusion plant equipment. However, the process used for enrichment is undergoing a transition from gaseous diffusion to centrifuge enrichment. Centrifuge enrichment technology requires less than 10 percent of the energy need for the gaseous diffusion process. In the U.S., Louisiana Energy Services (LES) and the United States Enrichment Corporation (USEC) are in the process of construction new centrifuge enrichment plants. By the time enrichment services are required for Fermi 3, it is possible that the majority of United States supplied enrichment services will utilize centrifuge technology. As such, the environmental impacts associated with fossil fuel electrical generation would be correspondingly less for Fermi 3.

Process heat is primarily generated by the combustion of natural gas. As concluded in the GEIS, this gas consumption, if used to generate electricity, represents less that 0.72 percent of the annual electric power production of Fermi 3.

Therefore, the fossil fuel impact from the consumption of electrical energy for UFC operations to support Fermi 3 is SMALL relative to the net power production of Fermi 3.

5.7.1.4 **Chemical Effluents**

The quantities of liquid, gaseous, and particulate discharges associated with the fuel cycle processes are shown in Table 5.7-2 for the reference 1000 MWe LWR and Fermi 3. The quantities of effluents for Fermi 3 will be approximately 79 percent greater than the reference 1000 MWe

Attachment 8
NRC3-09-0014

Response to RAI letter related to Fermi 3 ER

RAI Question FC5.7-2

NRC RAI FC5.7-2

Provide corrected information related to uranium fuel cycle Tc-99 releases.

Supporting Information

There is a typographical error on page 5-145 of the Fermi 3 ER where it is stated that releases of Tc-99 for Fermi 3 are a total of 0.012 Ci per reactor year. The reference reactor is estimated to release 0.012 Ci per reactor year, in which case the releases associated with Fermi 3 would be 0.022 Ci.

Response

The estimated releases of technetium-99 for Fermi 3 are based upon scaling the estimated releases of the 1000 MWe LWR reference reactor described in GEIS (NUREG-1437). The correct text for ER Section 5.7.1.5 is reflected in the attached markup. The text continues to support the conclusion with respect to the impact of radioactive effluents from the uranium fuel cycle contained in ER Section 5.7.1.5.

Proposed COLA Revision

Fermi 3 COLA Part 3, ER Section 5.7.1.5 will be revised to correct the reference to NUREG-1437 as reflected in the attached markup.

Markup of Detroit Edison COLA
(following 1 page)

The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be different than presented here.

Section 6.2 of the GEIS, the NRC estimated the radon-222 releases from mining and milling operation, and from mill tailings for each year of operations of the reference 1000 MWe LWR. The estimated releases of radon-222 for the reference reactor-year for the reference 1000 MWe LWR is approximately 5200 Ci. The estimated releases of radon-222 for Fermi 3 are 9308 Ci per reactor-year. Of this total, approximately 78 percent would be from mining, 15 percent from milling operations, 7 percent from inactive tails prior to stabilization. For radon releases from stabilized tailings, the NRC assumed that the reference 1000 MWe LWR would result in an emission of 1 Ci per year which yields an estimated 1.79 Ci release for Fermi 3. The major risks from radon-222 are from exposure to the bone and the lung, although there is a small risk from exposure to the whole body. The organ-specific dose weighting factors from 10 CFR 20 were applied to the bone and lung doses to estimate the 100-year dose commitment from radon-222 to the whole body. The estimated population dose commitment from mining, milling, and tailings before stabilization for each reactor-year of operation for the reference 1000 MWe LWR would be approximately 920 person-rem to the whole body and an estimated 1647 person-rem for Fermi 3. From stabilized tailings piles, the estimated 100-year environmental dose commitment would be approximately 18 person-rem to the whole body for the reference 1000 MWe LWR and an estimated 32 person-rem for Fermi 3.

Also in the GEIS, the NRC considered the potential health effects associated with the releases of technetium-99. The estimated releases of technetium-99 per reactor-year for the ~~reference reactor-year for the~~ reference 1000 MWe LWR is approximately 0.007 Ci from chemical processing of recycled UF6 before it enters the isotope enrichment cascade and 0.005 Ci into the groundwater from a candidate repository. The estimated releases of technetium-99 for ~~Fermi 3~~ the reference reactor are a total of 0.012 Ci per reactor-year, which yields an estimated 0.022 Ci per reactor year for Fermi 3. The major risks from technetium-99 are from exposure of the gastrointestinal tract ~~and kidney~~, although there is a small risk from exposure to the whole body. Applying the organ-specific dose weighting factors from 10 CFR 20 to the gastrointestinal tract and kidney doses, the total-body 100-year dose commitment from technetium-99 was estimated to be 100 person-rem for the reference 1000 MWe LWR and an estimated 179 person-rem for Fermi 3.

As stated in NUREG-1555, radiation may cause cancers at high doses and high dose rates, but currently there are no data that unequivocally establish the occurrence of cancer following exposure to low doses and dose rates, below approximately 10,000 mrem. However, radiation protection experts conservatively assume that any amount of radiation may pose some risk of causing cancer or a severe hereditary effect and that the risk is higher for higher radiation exposures. Therefore, a linear, no-threshold dose response model is used to describe the relationship between radiation dose and detriments such as cancer induction. A recent report by the National Research Council, the BEIR VII report, supports the linear, no-threshold dose response model. Simply stated, any increase in dose, no matter how small, results in an incremental increase in health risk. This theory is accepted by the NRC as a conservative model for estimating health risks from radiation exposure, recognizing that the model probably overestimates those risks.

Based on this model, the NRC estimated the risk to the public from radiation exposure using the nominal probability coefficient for total detriment 730 fatal cancers, nonfatal cancers, and severe hereditary effects per 1,000,000 person-rem from International Commission on Radiation

Attachment 9
NRC3-09-0014

Response to RAI letter related to Fermi 3 ER

RAI Question HH5.4.1-3

NRC RAI HH5.4.1-3

Provide discussion on the unusual animals, plants, agricultural practices, game harvests, or food processing operations having the potential to contribute 10% or more to either individual or population doses in areas affected by liquid effluents, and food- processing operations involving large quantities of water.

Supporting Information

According to ESRP 5.4.1, the following information is needed to perform site-specific analysis: "unusual animals, plants, agricultural practices, game harvests, or food processing operations having the potential for contributing 10% or more to either individual or population doses." Section 2.2 of the ER does not address any unusual animals, plants, agricultural practices, game harvests, or food processing operations.

Response

The principal aquatic species, including invertebrates, in Lake Erie are presented in ER Section 2.4.2.2.2.1. The basis for the quantities of invertebrates harvested and consumed by individuals used to estimate the radiation dose to individuals and the general population was presented in response to ER RAI HH5.4.1-2 submitted to the NRC on July 31, 2009 in Detroit Edison letter NRC3-09-0012. This estimate provides a very conservative estimate of the radiation dose from the consumption of invertebrates given that no known commercial invertebrate harvesting is conducted in the western basin of Lake Erie. This estimate would thus bound any recreational harvesting operations, such as harvesting for clams, lake grasses, etc., in the affected areas around the Fermi 3 discharge.

ER Section 2.3.2.1.2 describes the consumptive surface water usage in the local area and region. Specifically, Table 2.3-30 identifies that in 2004, 12.33 M gallons of water per day were withdrawn for the purpose of domestic supply (i.e. potable water) from Lake Erie. That same year, only 1.42 M gallons of water per day for irrigation and 1.56 M gallons of water per day for livestock were consumed from the entire Lake Erie, thus minimizing the regional potential for unusual activities contributing more than 10% or more to either the individual dose or the population dose regionally.

ER Table 2.3-34 describes the consumptive surface water usage in the local area of Monroe County. Locally, irrigation from the western basin of Lake Erie is not utilized on a reportable scale for irrigation or livestock and thus would not provide a significant means for contributing 10% or more to either the individual or the public dose due to local animals, plants, agricultural practices, and game harvests.

No food processing operations utilizing large quantities of water drawn from the western basin of Lake Erie in the immediate vicinity of the Fermi 3 site are known to exist.

Proposed COLA Revision

None

Attachment 10
NRC3-09-0014

Response to RAI letter related to Fermi 3 ER

RAI Question HY2.3.1-8

NRC RAI HY2.3.1-8

Provide a new estimate for the flow characteristics of Swan Creek based on data from a gauged, nearby, and comparable watershed. Estimates of the maximum, average maximum, average, average minimum, and minimum flow of Swan Creek (on a monthly basis) should be provided.

Supporting Information

Flow data are not available for Swan Creek. ER Section 2.3.1.1.3.1 states that the drainage-area ratio method was used to estimate the flow of the creek by using data from the Plum Brook gauge station (04163500) which has a much smaller watershed area and is located more than 20 miles north of Detroit. There are other gauged streams that are closer and more similar to Swan Creek that would provide a more appropriate basis for estimation.

Response

A new estimate for the flow characteristics of Swan Creek is not being provided in this response. Supporting information to the RAI question (provided above) indicated that using gauging data from the Plum Brook watershed to estimate the flow characteristics of Swan Creek was not the best choice due to Plum Brook's distance from Swan Creek and its smaller size. In order to respond to this question, Detroit Edison reviewed the basis for using Plum Brook data for the estimate with the appropriate personnel at the Michigan Department of Environmental Quality (MDEQ). The MDEQ indicated that the use of Plum Brook data was the best choice for generating flow estimates for Swan Creek. Details of this review, including additional information on the development of the monthly flow values is provided in the following discussion.

Monthly Flow Rates:

Monthly flow rates for Swan Creek are provided in ER Table 2.3-16. As stated on page 2-65 of the ER, the monthly flow rates for Swan Creek were generated from the measurements taken from the Plum Brook gauge near Utica, MI. MDEQ Hydrologic Studies Unit, Land and Water Management Division personnel indicated that the Plum Brook watershed was selected because geologically it was the most similar to the Swan Creek watershed and because the two watersheds behave in a similar manner in terms of interactions with groundwater and base flow, which is an important component of monthly flow rates.

Gauged streams that are closer to Swan Creek were not selected for the analysis because less historical flow data was available at these streams. The MDEQ indicated that Plum Brook was a better choice for the analysis because of the longer available period of recorded flow data.

Swan Creek is an un-gauged stream. Thus, it is not possible to extract estimates of the maximum, average maximum, average, average minimum, and minimum flow rates from a historical database of Swan Creek flow values. The MDEQ provided data that characterizes the flow in Swan Creek over a wide range of conditions. This data is provided in ER Tables 2.3-15 and 2.3-16.

Monthly maximum and average maximum flow values can be evaluated by reviewing the 10 percent and 5 percent exceedance values presented in ER Table 2.3-16. Average flows are presented as mean monthly flow rates in ER Table 2.3-15. Minimum and average minimum flow values can be evaluated by reviewing the 95 percent exceedance values presented in ER Table 2.3-16.

Proposed COLA Revision

None.

Attachment 11
NRC3-09-0014

Response to RAI letter related to Fermi 3 ER

RAI Question HY2.3.1-15

NRC RAI HY2.3.1-15

Provide information on all NPDES discharge and temperature violations for Fermi 2.

Provide the history of any radwaste/waste water discharges (to any location) from Fermi 2.

Supporting Information

An understanding of the previous operational history for Fermi 2 is needed for the impact analysis to be included in the EIS.

Response

Letters addressing NPDES discharge and temperature violations are provided in this response as Enclosure 1 and are listed below. Those letters which address spills that did not affect surface or ground water are not included.

Letter from Arthur Heidrich, Jr. (Detroit Edison) to Mr. R. Schrameck (MDNR), "Re: Spill Notification Follow-Up Report, Fermi-2 Power Plant, NPDES Permit No. MI0037028 ", dated January 17, 1996

Letter from Joseph Cazeno, Jr. (Detroit Edison) to Mr. Robert Miller (MDNR), "Re: Spill Notification Follow-Up Report, Plant: Fermi 2 Power Plant, NPDES Permit #MI0037028 ", dated February 1, 1993

Letter from Arthur Heidrich, Jr. (Detroit Edison) to Mr. P.D. Zugger (MDNR), "Re: Spill Notification Follow-Up Report, Plant: Fermi 2 Power Plant, NPDES Permit #MI0037028 ", dated March 16, 1987

Letter from Mary J. Babiera (Detroit Edison) to Mr. Linn Duling (MDEQ), "Re: Non-Compliance Notification, Fermi 2 Power Plant, NPDES Permit No.: MI0037028", dated April 7, 2000

Letter from Mary J. Babiera (Detroit Edison) to Mr. Linn Duling (MDEQ), "Re: Non-Compliance Notification, Fermi 2 Power Plant, NPDES Permit No.: MI0037028", dated April 14, 2000

Letter from Joseph Cazeno, Jr. (Detroit Edison) to Mr. Robert Miller (MDNR), "Re: Notification of Possible Non-Compliance, Plant, Fermi-2 Power Plant, NPDES Permit # MI0037028 ", dated June 23, 1993

Letter from Joseph Cazeno, Jr. (Detroit Edison) to Mr. Robert Miller (MDNR), "Re: Spill Notification Follow-Up Report, Plant – Fermi 2 Power Plant, NPDES Permit #MI0037028 ", dated June 28, 1993

Letter from Arthur Heidrich, Jr. (Detroit Edison) to Mr. P.D. Zugger (Michigan Water Resources Commission), "Re: Spill Notification Follow-Up Report, Enrico Fermi, Unit I, NPDES Permit #MI0001830 ", dated August 5, 1986

Letter from Arthur Heidrich, Jr. (Detroit Edison) to Mr. R. Schrameck (MDNR), "Re: Spill Notification Follow-Up Report, Fermi-2 Power Plant, NPDES Permit No. MI0037028 ", dated September 2, 1994

Letter from Arthur Heidrich, Jr. (Detroit Edison) to Mr. P.D. Zugger (MDNR), "Re: Spill Notification Follow-Up Report, Fermi - 2 Power Plant, NPDES Permit No. MI 0037028 ", dated October 27, 1987

Letter from Arthur Heidrich, Jr. (Detroit Edison) to Mr. P.D. Zugger (MDNR), "Re: Spill Notification Follow-Up Report, Fermi - 2 Power Plant, NPDES Permit No. MI 0037028 ", dated November 7, 1989

Letter from Arthur Heidrich, Jr. (Detroit Edison) to Mr. R. Schrameck (MDNR), "Re: Spill Notification Follow-Up Report, Fermi-2 Power Plant, NPDES Permit No. MI0037028 ", dated November 20, 1991

Letter from Arthur Heidrich, Jr. (Detroit Edison) to Mr. P.D. Zugger (MDNR), "Re: Noncompliance Notification, Fermi - 2 Power Plant, NPDES Permit No. MI 0037028 ", dated December 11, 1989

Letter from Arthur Heidrich, Jr. (Detroit Edison) to Mr. R.J. Courchaine (MDNR), "Re: Enrico Fermi Atomic Power Plant Unit 2, Construction Site, NPDES Permit No. MI 0039110", dated December 27, 1982

Letter from Mary J. Babiera (Detroit Edison) to Ms. Jennifer Krejcik (MDEQ), "Re: Detroit Edison-Fermi 2 Power Plant, NPDES Permit No.: MI0037028, Follow-up Report: Corrective Action Summary – Outfall 011", dated June 27, 2003

Letter from Mary J. Babiera (Detroit Edison) to Mr. Jon Russell (MDEQ), "Re: Detroit Edison-Fermi 2 Power Plant, NPDES Permit No.: MI0037028, Follow-up Report: Unusual Characteristic of the Discharge", dated May 2, 2003

Letter from Mary J. Babiera (Detroit Edison) to Mr. Jon Russell (MDEQ), "Re: Detroit Edison-Fermi 2 Power Plant, NPDES Permit No.: MI0037028, Follow-up Report: Loss of Ethylene Glycol", dated March 28, 2003

Letter from Mary J. Babiera (Detroit Edison) to Mr. Jon Russell (MDEQ), “Re: Detroit Edison-Fermi 2 Power Plant, NPDES Permit No.: MI0037028, Follow-up Report: Loss of Ethylene Glycol”, dated February 28, 2003

Letter from Mary J. Babiera (Detroit Edison) to Mr. Jon Russell (MDEQ), “Re: Detroit Edison-Fermi 2 Power Plant, NPDES Permit No.: MI0037028, Notice Letter: NL-01-03-03-011J”, dated February 28, 2003

Letter from Mary J. Babiera (Detroit Edison) to Mr. Jon Russell (MDEQ), “Re: Detroit Edison-Fermi 2 Power Plant, NPDES Permit No.: MI0037028, Follow-up Report – Loss of Oil to Groundwater”, dated January 17, 2003

Letter from Mary J. Babiera (Detroit Edison) to Mr. Jon Russell (MDEQ), “Re: Detroit Edison-Fermi 2 Power Plant, NPDES Permit No.: MI0037028, Pollution Incident Report: Loss of Ethylene Glycol”, dated February 14, 2003

Letter from Mary J. Babiera (Detroit Edison) to Mr. Jon Russell (MDEQ), “Re: Detroit Edison-Fermi 2 Power Plant, NPDES Permit No.: MI0037028, Possible Non-Compliance Report: Total Residual Oxidant”, dated February 10, 2003

Letter from Jennifer Krejcik (MDEQ) to Lynda Craine (Detroit Edison), “Subject: DECO-Fermi 2 Plant, NPDES Permit No.: MI0037028, Oil & Grease Non-Compliance, Monitoring Point 011C”, dated November 12, 2002

Letter from Mary J. Babiera (Detroit Edison) to Ms. Debora Snell (MDEQ) and Mr. Jim Sygo (MDEQ), “Re: Spill Notification Follow Up Report – Sodium Hypochlorite, Detroit Edison - Fermi 2 Power Plant, NPDES Permit No. MI0037028”, dated February 14, 2002

Letter from Dennis Leonard (Detroit Edison) to Mr. R. Schrameck (MDEQ), “Re: Non-Compliance Notification, Fermi II Power Plant, NPDES Permit No. MI0037028”, dated June 27, 1996

Letter from Arthur Heidrich, Jr. (Detroit Edison) to Mr. R. Schrameck (MDNR), “Re: Notice Letter – NL# 10-94-02-39D, Supplemental Response, Fermi-2 Power Plant, NPDES Permit No. MI0037028 ”, dated November 18, 1994

Letter from Arthur Heidrich, Jr. (Detroit Edison) to Mr. R. Schrameck (MDNR), “Re: Notice Letter – NL# 10-94-02-39D, Fermi-2 Power Plant, NPDES Permit No. MI0037028”, dated October 26, 1994

Letter from Arthur Heidrich, Jr. (Detroit Edison) to Mr. R. Schrameck (MDNR), "Re: Notice of Noncompliance, NNC 07-93-01-041D, Issued July 30, 1993, Fermi-2 Power Plant, NPDES Permit No. MI0037028 ", dated August 26, 1993

Letter from Joseph Cazeno, Jr. (Detroit Edison) to Mr. Robert Miller (MDNR), "Re: Spill Notification Follow-up Report, Plant: Fermi 2 Power Plant, NPDES Permit #MI0037028", dated January 25, 1993

Letter from Joseph Cazeno, Jr. (Detroit Edison) to Mr. Robert Miller (MDNR), "Re: Spill Notification Follow-up Report, Plant: Fermi 2 Power Plant, NPDES Permit #MI0037028", dated February 3, 1993

Letter from Mary J. Babiera (Detroit Edison) to Mr. Jon Russell (MDEQ), "Re: Detroit Edison-Fermi 2 Power Plant, NPDES Permit No.: MI0037028, Follow up Report – Michigan Part 5 Oil Release", dated August 6, 2004

Letter from Mary J. Babiera (Detroit Edison) to Mr. Jon Russell (MDEQ), "Re: Detroit Edison-Fermi 2 Power Plant, NPDES Permit No.: MI0037028, Possible Non-Compliance Report: Total Residual Oxidant", dated February 10, 2003

Letter from Mary J. Babiera (Detroit Edison) to Mr. Jon Russell (MDEQ), "Re: Detroit Edison-Fermi 2 Power Plant, NPDES Permit No.: MI0037028, Pollution Incident Report: Loss of Ethylene Glycol", dated February 14, 2003

Letter from Mary J. Babiera (Detroit Edison) to Mr. Jon Russell (MDEQ), "Re: Detroit Edison-Fermi 2 Power Plant, NPDES Permit No.: MI0037028, Follow-up Report: Loss of Ethylene Glycol", dated February 28, 2003

Letter from Mary J. Babiera (Detroit Edison) to Mr. Jon Russell (MDEQ), "Re: Detroit Edison-Fermi 2 Power Plant, NPDES Permit No.: MI0037028, Follow-up Report: Loss of Ethylene Glycol", dated March 28, 2003

Letter from Mary J. Babiera (Detroit Edison) to Mr. Jon Russell (MDEQ), "Re: Detroit Edison-Fermi 2 Power Plant, NPDES Permit No.: MI0037028, Follow-up Report: Loss of Ethylene Glycol", dated December 5, 2003

Letter from Mary J. Babiera (Detroit Edison) to Mr. Jon Russell (MDEQ), "Re: Detroit Edison-Fermi 2 Power Plant, NPDES Permit No.: MI0037028, Follow-up Report: Unusual Characteristic of the Discharge", dated May 2, 2003

Letter from Mary J. Babiera (Detroit Edison) to Mr. Jon Russell (MDEQ), "Re: Detroit Edison - Fermi 2 Power Plant, NPDES Permit No.: MI0037028, Follow-up Report – Loss of Oil to Groundwater", dated January 17, 2003

Letter from Arthur Heidrich, Jr. (Detroit Edison) to Mr. P.D. Zugger (MDNR), "Re: Spill Notification Follow-Up Report, Enrico Fermi Station Unit 1, NPDES Permit No. MI 0001830 ", dated April 2, 1987

Letter from Joseph Cazeno, Jr. (Detroit Edison) to Mr. P. D. Zugger (MDNR), "Re: Spill Notification Follow-Up Report, Fermi 2 - NPDES Permit #0037028", dated August 19, 1988

Letter from Arthur Heidrich, Jr. (Detroit Edison) to Mr. P.D. Zugger (MDNR), "Re: Spill Notification Follow-Up Report", dated January 9, 1989

Letter from Arthur Heidrich, Jr. (Detroit Edison) to Mr. P.D. Zugger (MDNR), "Re: Spill Notification Follow-Up Report, Fermi-2 Power Plant, NPDES Permit No. 0037028", dated February 3, 1989

Letter from Arthur Heidrich, Jr. (Detroit Edison) to Mr. P.D. Zugger (MDNR), "Re: Spill Notification Follow-Up Report, Fermi-2 Power Plant, NPDES Permit No. 0037028", dated July 21, 1989

Letter from Joseph Cazeno, Jr. (Detroit Edison) to Mr. Roy Schrameck (MDNR), "Re: Spill Notification Follow-up Report, Plant - Fermi 2 Power Plant, NPDES Permit #MI0037028", dated January 7, 1994

Letter from Arthur Heidrich, Jr. (Detroit Edison) to Mr. R. Schrameck (MDNR), "Re: Spill Notification Follow-Up Report, Fermi-2 Power Plant, NPDES Permit No. MI0037028", dated June 3, 1994

Letter from Arthur Heidrich, Jr. (Detroit Edison) to Mr. R. Schrameck (MDNR), "Re:Spill Notification Follow-Up Report, Fermi-2 Power Plant, NPDES Permit No. MI0037028", dated December 12, 1995

Letter from Arthur Heidrich, Jr. (Detroit Edison) to Mr. R. Schrameck (MDNR), "Re: Spill Notification Follow-Up Report, Fermi-2 Power Plant, NPDES Permit No. MI0037028", dated February 5, 1996

Letter from Arthur Heidrich, Jr. (Detroit Edison) to Mr. R. Schrameck (MDNR), "Re: Follow-Up Report Unusual Characteristics of Discharge Notification, NPDES Permit No. MI0037028", dated April 17, 1996

Letter from Arthur Heidrich, Jr. (Detroit Edison) to Mr. R. Schrameck (MDNR), "Re: Spill Notification Follow-Up Report, Fermi-2 Power Plant, NPDES Permit No. MI0037028", dated June 7, 1996

Letter from Mary J. Babiera (Detroit Edison) to Mr. Linn Duling (MDEQ), "Re: Overland Cooling Water Spill Follow-up Report, Fermi 2 Power Plant, NPDES Permit No.: MI0037028", dated March 22, 2000

Letter from Mary J. Babiera (Detroit Edison) to Mr. Linn Duling (MDEQ), "Re: Unusual Characteristic, Foam – Follow-up Report, Fermi 2 Power Plant, NPDES Permit No.: MI0037028", dated March 28, 2000

Letter from Jennifer Krejcik (MDEQ) to Mary J. Babiera (Detroit Edison) "Subject: Detroit Edison Company - Fermi 2 Power Plant, NPDES Permit No. MI0037028, Loss of Oil to Groundwater Reporting Requirements", dated January 27, 2003

Letter from Arthur Heidrich, Jr. (Detroit Edison) to Mr. R. Schrameck (MDNR), "Re: Follow-Up Report – Cooling Water Loss, Fermi-2 Power Plant, NPDES Permit No. MI0037028", dated August 2, 1993

A portion of the radioactive-waste liquid effluent discharge reports are provided from 1985 through 1996 in Enclosure 2. After 1995, Fermi 2 no longer discharged radioactive liquid effluents and as such the 1996 report on liquid effluent discharges is representative of the years that follow. Note that those pages of the reports which do not address the issue of radioactive liquid effluents have been removed for ease of reading.

Letter from F.E. Agosti (Detroit Edison) to Mr. James G. Keppler (USNRC), "Semi-Annual Radiological Effluent Release Report," dated February 28, 1986.

Letter from B. Ralph Sylvie (Detroit Edison) to USNRC, "Semi-Annual Radiological Effluent Release Report," dated March 1, 1990.

Letter from William S. Orser (Detroit Edison) to USNRC, "Semi-Annual Radiological Effluent Release Report," dated August 28, 1990.

Letter from William S. Orser (Detroit Edison) to USNRC, "Semi-Annual Radiological Effluent Release Report," dated March 1, 1991.

Letter from William S. Orser (Detroit Edison) to USNRC, "Semi-Annual Radiological Effluent Release Report," dated August 30, 1991.

Letter from William S. Orser (Detroit Edison) to USNRC, "Semi-Annual Radiological Effluent Release Report," dated February 28, 1992.

Letter from William S. Orser (Detroit Edison) to USNRC, "Semi-Annual Radiological Effluent Release Report," dated August 28, 1992.

Letter from Douglas R. Gibson (Detroit Edison) to USNRC, “Semi-Annual Radiological Effluent Release Report,” dated August 27, 1993.

Letter from Douglas R. Gibson (Detroit Edison) to USNRC, “Annual Radiological Effluent Release Report,” dated March 31, 1995.

Letter from Douglas R. Gibson (Detroit Edison) to USNRC, “Annual Radiological Effluent Release Report,” dated March 31, 1997.

Proposed COLA Revision

None

NRC3-09-0014
RAI Question HY2.3.1-15

Enclosure 1

Letters addressing NPDES Violations
(following 83 pages)

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

January 17, 1996

Mr. R. Schrameck, Supervisor
Surface Water Quality Division
Michigan Department of Environmental Quality
Southeast Michigan District Headquarters
38980 Seven Mile Road
Livonia, Michigan 48152

Re: Spill Notification Follow-Up Report
Fermi-2 Power Plant
NPDES Permit No. MI0037028

Dear Mr. Schrameck:

At approximately 2315 hours on January 9, 1996, a member of the Fermi-2 Power Plant staff notified MDEQ Emergency Operator Kathy of a spill of Ethylene Glycol at the Fermi-2 Power Plant. The Company recognizes that Ethylene Glycol is not a substance listed on the Critical Materials Register and that the notification provided and this follow-up report are, therefore, not required under the Part V Rules, however, in the interest of full disclosure the Company felt the Notification and the Follow-Up Report should be made.

At approximately 2200 hours on January 9, 1996, an operator on routine rounds discovered that all four of the Ethylene Glycol reservoirs on the south cooling tower deicing system were empty. Upon investigation it was determined that the deicing system had suffered a catastrophic failure resulting in 37 line ruptures on the system. As a result approximately 200 gallons of a 50% solution of Ethylene Glycol were lost to the 35 million gallon closed cooling system of the plant which ultimately discharges to Lake Erie through Outfall 001.

The cause of the deicing system failure is still under investigation by the plant staff. The plant's corrective action system will document the cause of the failure and the corrective action necessary to prevent a reoccurrence. Until the deicing system is repaired the south cooling tower will operate without the deicing system in service.

If you have any questions relative to this report of the incident, please contact me on (313) 235-7021.

Sincerely,

Arthur Heidrich, Jr.
Administrator,
Water and Land Use Programs

AH:pr

cc: A. MacArthur-Brown

bcc: S. Bartman
J. Cazeno
R. Delong
P. Fessler
J. Flynn
K. Shields
M. Sterling
File 220.70

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

February 1, 1993

Mr. Robert Miller, Chief
Surface Water Quality Division
Michigan Department of Natural Resources
P.O. Box 30028
Lansing, Michigan 48909

Re: Spill Notification Follow-up Report
Plant: Fermi 2 Power Plant
NPDES Permit #MI0037028

Dear Mr. Miller:

In accordance with Part IIA6 of the NPDES Permit No. MI0037028 and the Part 5 Rules of the Michigan Water Resources Commission, the Detroit Edison Company hereby notifies your office that on January 22, 1993 at approximately 1318 hours, a spill occurred at the Fermi 2 Power Plant located at 6400 Dixie Highway, Newport, Michigan.

On January 22, 1993 at 1318 hours, an operator at the Fermi 2 Power Plant observed water bubbling from the ground adjacent to a sanitary sewer manhole. The operator observed the spill while walking the sewer line down to check for leaks following the observance of an indicated 10 % flow difference between the leak detection system flow instruments. Plant personnel immediately reported the spill to the main control room and Operations shut down the sewer forwarding pumps at 1322 hours. Sewage stopped issuing from the ground at approximately 1335 hours. Spilled sewage migrated approximately 30 feet along the shoreline in a northerly direction where it enter Lake Erie adjacent to the Fermi 1 intake structure. An undetermined amount of sewage was spilled. The incident was reported to the MDNR Emergency Operator # 16 by Mr. Fritz Lehmann at approximately 1515 hours on January 22, 1993.

The cause of the spill was due to a coupling on the sewer main becoming disconnected. Plant maintenance crews excavated the soil in the vicinity of the spill to uncover the main on the same day. The coupling was repaired and line integrity verified on January 25, 1993. The system was declared operable on January 25, 1993.

Should you have any questions relative to this incident, please contact me at (313) 237-7022.

Sincerely,

Joseph Cazeno Jr.

Joseph Cazeno, Jr.
Administrative Specialist
Water Quality
Environmental Protection

JCjr/

bcc: J. Flynn
A. Heidrich
F. Lehmann
M. Sterling

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

March 16, 1987

Mr. P. D. Zugger, Chief
Surface Water Quality Division
Michigan Department of Natural Resources
Stevens T. Mason Building
P. O. Box 30028
Lansing, Michigan 48909

Re: Spill Notification Follow-up Report
Fermi-2 Power Plant
NPDES Permit No. MI 0037028

Dear Mr. Zugger:

In accordance with the Part 5 Rules of the Michigan Water Resources Commission and Part IIA6 of NPDES Permit No. MI 0037028 the Detroit Edison Company is submitting this spill follow-up report.

On March 6, 1987, at approximately 1500 hours sanitary fluid was seen spilling from around a solid manhole cover onto the ground at the northeast edge of a shallow lagoon which covers several hundred acres of the southern portion of the Fermi Power Plant site. The plant control room was notified of the situation at 1522 hours and the pumps which pressurize the sanitary forwarding system were secured at 1530 hours. The Pollution Emergency Alert System operator was notified of the spill at 1545 hours.

The manhole in question is an intermediate point in the piping system which forwards sanitary waste from the power plant to the Monroe Waste Water Treatment System sewer line along Pointe Aux Peaux Road which runs south of the plant site. Two sanitary waste pumps, which develop a combine flow of approximately 60 to 70 gallons per minute forward the sanitary waste to the sewer system. Pressure is monitored at each end of the line and when a specified pressure differential is sensed, the forwarding system discharge valve is automatically closed terminating flow. An investigation of the control system revealed a failure of the electronic control system explaining the system's failure to automatically terminate flow. The control system has been repaired, tested, and returned to service. That control system failure and the inundation of the area by wind driven Lake Erie water makes it impossible to estimate the quantity of sanitary waste spilled.

Inspection of the manhole by maintenance personnel revealed that an adjustable clamp securing one end of a flexible coupling in the manhole had loosened allowing the coupling to partially slip off the pipe. The system was repaired, tested and returned to service on March 7, 1987.

No further remedial action is believed necessary at this time. If you ahve any questions regarding this incident, please contact me on (313) 237-7021.

Sincerely,

Arthur Heidrich, Jr.

Arthur Heidrich, Jr.
Administrator - Water
and Land Use Programs

AH/bjw

cc: R. Schrameck

bcc: J. Flynn
J. Kepus
M. Sterling

The Detroit Edison Company
2000 2nd Ave., Detroit. MI 48226-1279

220.12

Detroit Edison
A DTE Energy Company

FILE COPY

April 7, 2000

Mr. Linn Duling, Supervisor
Surface Water Quality Division
Michigan Department of Environmental Quality
Jackson District Office
State Office Building
301 E. Louis B. Glick Highway
Jackson, Michigan 49201

Re: Non-Compliance Notification
Fermi 2 Power Plant
NPDES Permit No. MI0037028

Dear Mr. Duling:

In accordance with Part IIA5 of NPDES Permit No. MI0037028, the Detroit Edison Company is hereby notifying you of a possible non-compliance with a Daily Maximum Effluent Limitation specified in the Permit. On April 4, 2000 at 2128, it was observed that the circulating water dehalogenation tanks were empty with the circulating water (CW) decant system in service. A sample taken at the decant line (Outfall 001) for Total Residual Oxidant (TRO) was 0.11mg/l (ppm) which is above the Daily Maximum Effluent Limitation of 0.036 ppm for continuous discharge mode during chlorination that is specified in Part IA1 of the Permit.

Upon discovery of the empty dehalogenation tanks, and the subsequent TRO analysis, sulfite was added to the west dehalogenation tank and the pump stroke was increased to its maximum. Outfall 001 was re-sampled at 2155 and the result was 0.05 ppb. The CW decant system was shut down at 2221, stopping the discharge. General Service Water (GSW) chlorination was shut down at 2318, and sulfite was added directly to the circulating water pond, which proved to be ineffective due to the lack of mixing (no circulating water pumps in service). After verification that the west dehalogenation pump was pumping sulfite, the CW decant system was put back in to service April 5, 2000 at 0210. Outfall 001 was sampled again, with the result being 0.06 ppm. The CW decant system was shut down again at 0232. At 0430 on April 5, 2000, the west dehalogenation pump was checked again, including the suction strainer, which was cleaned of minor scale. The pump was verified to be pumping sulfite, and the CW decant system was restored to service. Another sample at Outfall 001 was taken, with the results <0.03 ppb.

Calculations were performed to determine the total amount of chlorine discharged in exceedence of the allowable amount specified in Part IA1 of the Permit. Conservative calculations yielded a total of approximately 1.3 pounds of excess chlorine that was discharged, which is less than the 10 pound Reportable Quantity for chlorine.

A preliminary investigation of why the dehalogenation tanks were empty was done. It appears that over the previous 48 hour period (April 1 and April 2), a draw down rate was determined and the tank was filled accordingly on Tuesday April 3, and was not checked again before the engineering technician went home on that day. This seems to be an isolated event of bad judgement on the part of the technician. Chemistry management has made the expectation clear that the dehalogenation tanks are to be checked daily from now on to prevent a reoccurrence of this event.

Mr. Linn Duling, Supervisor
April 7, 2000
Page 2

If you have any questions relative to this report or the non-compliance incident, please contact me at (313) 235-8704, or via e-mail at babieram@dteenergy.com.

Sincerely,

Mary J. Babiera

Mary J. Babiera
Environmental Management & Resources

cc: M. Campbell

Bcc: S. Boyd
L. Craine
P. Fessler
D. Gipson
E. Kokosky
P. Marquardt
M. Parrish
M. Rodenberg
File 220.12
M. Askew

The Detroit Edison Company
2000 2nd Ave., Detroit, MI 48226-1279

220.12

Detroit Edison
A DTE Energy Company

FILE COPY

April 14, 2000

Mr. Linn Duling, Supervisor
Surface Water Quality Division
Michigan Department of Environmental Quality
Jackson District Office
State Office Building
301 E. Louis B. Glick Highway
Jackson, Michigan 49201

Re: Non-Compliance Notification
Fermi 2 Power Plant
NPDES Permit No. MI0037028

Dear Mr. Duling:

In a letter dated April 7, 2000, the Detroit Edison Company notified you of a possible non-compliance with a Daily Maximum Effluent Limitation for Total Residual Oxidant (TRO), which is specified in NPDES Permit No. MI0037028. It has been brought to my attention that there were two discrepancies in the reported TRO concentration measurements in the second paragraph of that report.

The second sentence of paragraph two states that "Outfall 001 was re-sampled at 2155 and the result was 0.05 ppb.", which is not in excess of the permitted value of 0.036ppm. The correct concentration for that sample is "0.05 ppm". Also, the last sentence of paragraph two should be changed to read "< 0.03 ppm" rather than "< 0.03 ppb". I apologize for any confusion the incorrect units may have caused in the original report.

If you have any questions relative to this letter or desire additional information, please contact me at (313) 235-8704, or via e-mail at babieram@dteenergy.com.

Sincerely,

Mary J. Babiera

Mary J. Babiera
Environmental Management & Resources

cc: M. Campbell

Bcc: M. Askew
S. Boyd
L. Craine
P. Fessler
D. Gipson
E. Kokosky
P. Marquardt
M. Parrish
M. Rodenberg
File 220.12

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

June 23 ,1993

Mr. Robert Miller, Chief
Surface Water Quality Division
Michigan Department of Natural Resources
P.O. Box 30028
Lansing, MI 48909

Re: Notification of Possible Non-Compliance
Plant, Fermi-2
NPDES Permit # MI0037028
==

Dear Mr. Miller:

In accordance with Part II A5, Non-Compliance Notification, of NPDES Permit No. MI0037028, the Detroit Edison Company is hereby notifying you of a possible non-compliance with a Daily Maximum Total Residual Chlorine (TRC) limitation specified in the permit.

On June 20, 1993 at approximately 1145 hours a routine sample for Total Residual Chlorine (TRC) analysis indicated that the TRC concentration in the plant effluent (outfall 001) exceeded the effluent limitation specified in Part I A1 of the permit. Part I A1 specifies a daily maximum effluent limitation for TRC of 0.3 mg/l. The result showed a TRC sample of 0.6 mg/l. The circulating water decant line was secured at 1220 hours on June 20, 1993.

Investigation of the incident by plant personnel determined that the cause of the exceedence was a discharge pipe to the decant discharge line which was plugged with solidified sodium sulfite. The line was unplugged and cleaned. The dechlorination system was restored and circulating water decant was restarted on June 20, 1993 at 1435 hours.

If you have any questions relative to this incident , please contact me at (313) 237-7022 .

Sincerely

Joseph Cazeno Jr.

Joseph Cazeno Jr.
Administrative Specialist
Water Quality
Environmental Protection

cc : C. Schmitt
R. Schrameck

bcc: A. Blount
J. Flynn
A. Heidrich
K. Shields

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

June 28, 1993

Mr. Robert Miller, Chief
Surface Water Quality Division
Michigan Department of Natural Resources
P.O. Box 30028
Lansing, Michigan 48909

Re: Spill Notification Follow-up Report
Plant - Fermi 2 Power Plant
NPDES Permit #MI0037028

Dear Mr. Miller:

In accordance with Part IIA6 of the NPDES Permit No. MI0037028 and the Part 5 Rules of the Michigan Water Resources Commission, the Detroit Edison Company hereby notifies your office, that on June 21, 1993 at approximately 2050 hours, a spill occurred at the Fermi 2 Power Plant located at 6400 Dixie Highway, Newport, Michigan.

On June 21, 1993 the plant was in the process of conducting a feed and bleed of the Turbine Building Closed Cooling Water (TBCCW) system. This system is chemically treated with Mitco Water Treatment Chemical for corrosion control. The primary components of this corrosion inhibitor are sodium nitrite and sodium molybdate.

During the feed and bleed process, hoses were connected to an air conditioning chiller drain valve and routed to the Fermi 2 auxiliary boiler blowdown sump to the chemical waste basin. At approximately 2050 hours, it was discovered that the hose was leaking and contents had spilled into a nearby storm drain sewer. Plant operations personnel closed the drain valve and terminated the release.

Assuming that all the water drained directly to the storm drain, it is estimated that approximately 850 gallons of water was spilled to outfall 002. The chemical analysis of the TBCCW water indicates that approximately 240 ppm of sodium nitrite and 145 ppm of sodium molybdate were released. This converts to 772 grams sodium nitrate and 467 grams sodium molybdate.

The incident was reported to the MDNR Emergency Operator by the Shift Technical Advisor (STA) at approximately 0110 hours on June 22, 1993.

Should you have any questions relative to this incident, please contact me at (313) 237-7022.

Sincerely,

Joseph Cazeno Jr.

Joseph Cazeno, Jr.
Administrative Specialist
Water Quality
Environmental Protection

JCjr/

cc: C. Schmitt
R. Schrameck

FILE COPY

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

August 5, 1986

Mr. P. D. Zugger, Executive Secretary
Michigan Water Resources Commission
Stevens T. Mason Building
P. O. Box 30028
Lansing, Michigan 48909

Re: Spill Notification Follow-Up Report
Enrico Fermi, Unit I
NPDES Permit No. MI 0001830

Dear Mr. Zugger:

In accordance with Part IIA6 of NPDES Permit No. MI 0001830, Enrico Fermi, Unit I, The Detroit Edison Company is submitting this follow-up report on a spill of 20 to 30 gallons of sanitary waste an undetermined portion of which reached Lake Erie by way of a parking lot storm sewer. The spill occurred at approximately 0100 hours on July 26, 1986, was discovered at 0120 hours, and reported to MDNR Operator No. 9 at approximately 0200 hours. The cause of the spill was the malfunction of a pump control which allowed a sanitary waste accumulation tank to overflow. The pump was immediately placed on manual control overriding the faulty control circuit. An engineering study is currently underway to determine what, if any, modification of the system will be required to prevent future reoccurrence.

If you have any questions regarding this incident, please contact me on (313) 237-7021.

Sincerely,

Arthur Heidrich, Jr.
Administrator - Water
and Land Use Programs

AH/bjw

cc: R. Schrameck

bcc: J. Flynn
J. Kepus
M. Sterling

AUG 5

Fermi Energy Center
Spill Report

1. Date/time of discovery 7/26/86 0120 HRS
2. Date/time of occurrence Approximately 0100 HRS
3. Location of spill FERMI I PARKING AREA
4. Substance spilled SANITARY WASTE
5. Quantity spilled 20 - 30 GALLONS
6. Reportable Quantity (Enclosure 1) if applicable N/A
7. Explanation of occurrence FAULTY OPERATION OF THE PUMP CONTROL LOGIC
8. Immediate action taken MANUAL OVERRIDE OF PUMP CIRCUITRY
9. Follow-up action taken AN ENGINEERING ANAYLSIS OF THE PROBLEM IS IN PROGRESS. RECOMMENDATIONS FOR CORRECTIVE ACTION ARE EXPECTED.
10. Measures taken to prevent recurrence SEE ABOVE

Completed by: JK J. E. KEPUS, ENVIRONMENTAL PROGRAMS COORDINATOR

Noted by: CC 7/31/86
Operations Engineer

Noted by: CC 7/31/86
Superintendent, Nuclear Production

* J. KEPUS NOTIFIED MDNR OPERATOR #9 AT APPROXIMATELY 0200 HRS.

051065

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

September 2, 1994

Mr. R. Schrameck, Supervisor
Surface Water Quality Division
Michigan Department of Natural Resources
Southeast Michigan District Headquarters
38980 Seven Mile Road
Livonia, Michigan 48152

Re: Spill Notification Follow-Up Report
Fermi-2 Power Plant
NPDES Permit No. MI0037028

Dear Mr. Schrameck:

In accordance with Part IIA6 of NPDES Permit No. MI0037028 and the Part V Rules of the Michigan Water Resources Commission, the Detroit Edison Company is submitting this Follow-Up Report to a spill notification made at approximately 1400 hours on August 25, 1994, by a member of the Fermi-2 Power Plant staff.

During the maintenance of the cooling water circulating system at the plant, a diesel driven portable pump was stationed next to the cooling water circulating pond. As a preventive measure, the pump had been placed within a temporary "diked area" to prevent any loss of diesel fuel should there be a leak. At approximately 1320 hours on August 25th, it was discovered that the fuel tank on the pump had ruptured spraying approximately one quart of No. 2 diesel oil onto the surface of the cooling water circulating pond. The decant pumps which discharge from the cooling water circulating pond to Lake Erie through Outfall 001 were immediately shut down and the discharge and lake in the vicinity of the Outfall were observed for signs of oil. No evidence of an oil sheen was noted either at the discharge or the lake. Since the decant pump suction is submerged, there should not have been any oil discharge to the lake.

Absorbent materials were used to collect the oil sheen on the surface of the water in the cooling water circulating pond. The decant pumps were restarted and observation of the outfall did not detect any visible sign of oil. As of August 28th, there was no visible sign of oil on the surface of the cooling water circulating pond.

If you have any questions relative to this report or the spill, please contact me on (313)237-7021.

Sincerely,

Arthur Heidrich, Jr.
Administrator,
Water and Land Use Programs

cc: A. MacArthur-Whitman

bcc: M. Sterling
J. Flynn
K. Shields
S. Bartman
R. Delong
P. Fessler
File 220.80

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

October 27, 1987

Mr. P. D. Zugger, Chief
Surface Water Quality Division
Michigan Department of Natural Resources
Stevens T. Mason Building
P. O. Box 30028
Lansing, MI 48909

Re: Spill Notification Follow-Up Report
Fermi - 2 Power Plant
NPDES Permit No. MI 0037028

Dear Mr. Zugger:

In accordance with Part IIA6 of NPDES Permit No. MI 0037028 and the Part V Rules of the Michigan Water Resources Commission the Detroit Edison Company is hereby submitting this spill notification follow-up report. On October 19, 1987, between 1100 and 1500 hours, as a result of the failure of an underground pipe, approximately 2000 gallons of waste-water was lost at the Fermi-2 Power Plant site. The waste-water was demineralizer regenerant containing approximately 4 percent sodium hydroxide. An estimated 1620 pounds of sodium hydroxide on a dry wet basis was lost. Following verification of the loss, the National Response Center (Petty Officer Oertli) was notified at 1050 hours on October 20, 1987, and the MDNR Emergency Response Center (Operator #17) was notified at 1100 hours on October 20, 1987.

Subsequent excavation of the line revealed a hole in the line apparently caused by corrosion of the vetrified clay sewer piping. Repair of the line has been delayed to allow for an engineering evaluation to determine a more suitable material to preclude reoccurrence of the failure.

Further excavation to the groundwater level revealed the water in the immediate area had a pH of 12.8. On the advice of Ms. M. Fields of the Detroit District Office, Surface Water Quality Division, the plant will pump the groundwater in the excavation into the plant's demineralizer waste neutralization tank, and following appropriate treatment as necessary, will discharge it as authorized under Part IA3 of the above cited NPDES Permit. Groundwater pumping is expected to continue until a pH of 9.5 is reached per instructions from Ms. Fields.

If you have any questions or need additional information relative to this incident, please contact me on (313) 237-7021.

Sincerely,

Arthur Heidrich, Jr.

Arthur Heidrich, Jr.
Administrator
Water and Land Use Programs

AH:pp

cc: M. Fields
R. Schrameck

bcc: J. Flynn
J. Kepus
T. Randazzo
K. Roberts
M. Sterling

son 2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

November 7, 1989

Mr. P. D. Zugger, Chief
Surface Water Quality Division
Department of Natural Resources
P.O. Box 30028
Lansing, MI 48909

Re: Spill Notification Follow-up Report
Fermi-2 Power Plant
NPDES Permit No. MI 0037028

Dear Mr. Zugger:

On October 31, 1989, at approximately 0200 hours, an operator at the Fermi-2 Power Plant discovered a sewage tank had overflowed spilling an estimated 200 gallons of raw sewage into a storm sewer. The storm sewer discharges to Swan Creek through Outfall 002 and the Fermi I Overflow Canal. Plant personnel immediately notified MDNR Operator No. 12 of the spill. The immediate remedial action taken was to manually start a backup sewage pump.

The cause of the spill appeared to be the failure of the sewage pump to start when it received an automatic start signal. The situation was further compounded by the failure of an alarm system to alert the control room operators of the pump's malfunction.

Plant personnel are presently investigating the incident including the testing of the pump's auto-start system and the functioning of the tank high level alarms. Further corrective action will be developed and implemented to prevent a reoccurence of this incident.

If you have any questions regarding the incident or this report, please contact me on (313) 237-7021.

Sincerely,

Arthur Heidrich, Jr.
Administrator
Water & Land Use Programs

AH:pp

cc: R. Schrameck
H. Yoon

bcc: J. Flynn
F. Lehmann 35577
M. Sterling
W. Terrasi

FILE COPY

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

November 20, 1991

Mr. R. Schrameck
Surface Water Quality Division
Southeast Michigan District Headquarters
Michigan Department of Natural Resources
38980 Seven Mile Road
Livonia, Michigan 48152

Re: Spill Notification Follow-Up Report
Fermi-2 Power Plant
NPDES Permit No. MI0037028

Dear Mr. Schrameck:

In accordance with Part IIA6 of NPDES Permit No. MI0037028 and the Part V Rules of the Michigan Water Resources Commission, Detroit Edison is submitting this follow-up report to a spill notification made by the Company on November 9, 1991. At approximately 2025 hours, an operator at the Fermi-2 Power Plant discovered raw sewage bubbling up to the surface of the ground in the vicinity of the plant's four inch underground sewage main. At the time of the discovery, the operator was investigating an activation of an alarm on the plant's sewage leak detection system. An undetermined amount of sewage had migrated approximately 100 feet in an easterly direction and had entered Lake Erie. Plant personnel immediately shut down the plant's sewage forwarding pumps and notified MDNR Operator No. 17 of the spill.

Upon excavation of the sewage main it was discovered that coupling on the main had become disconnected. No apparent cause of the disconnection was evident. The coupling was repaired, line integrity was verified, and the line was returned to service November 15, 1991.

If you have any questions relative to the spill or this report, please contact me on (313) 237-7021.

Sincerely,

Arthur Heidrich

Arthur Heidrich, Jr.
Administrator,
Water and Land Use Programs

AH:pr

cc: A. Whitman

bcc: J. Flynn
R. McKeon
J. Plona
M. Sterling
W. Terrasi
File 220.70

210·20

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

December 11, 1989

Mr. P. D. Zugger, Chief
Surface Water Quality Division
Michigan Dept. of Natural Resources
P. O. Box 30028
Lansing, MI 48909

Re: Noncompliance Notification
Fermi-2 Power Plant
NPDES Permit No. MI0037028

Dear Mr. Zugger:

On December 6, 1989, at the Fermi-2 Power Plant (Plant) during a review of Plant operating data for preparation of the November 1989 Discharge Monitoring Report, it was discovered by Plant staff that on November 24, 1989, the Daily Maximum Effluent Limitation of 0.2 mg/l of Total Residue Chlorine, as specified in part IA1 of NPDES Permit No. MI0037028, may have been exceeded. Evaluation of the analytical data obtained during the chlorine discharge period indicated a calculated daily maximum total residual chlorine concentration of 0.24 mg/l in the discharge from Outfall 001. No single analysis exceeded the 0.3 mg/l limitation.

A review of the circumstances associated with this chlorination period indicated two significant factors contributed to the possible noncompliance. First, the General Service Water System which supplies make-up water to the Plant's circulating Water System had been treated with a molluscicide the previous day which may have substantially reduced the chlorine demand in the system. Plant staff had not anticipated this effect and did not compensate for it. Secondly, the Plant had been out of service and there was no heat load on the system, therefore, the cooling towers were being bypassed. This resulted in lower than normal chlorine losses from the system through aeration.

To prevent reoccurrence of this incident in the future, the Plant will suspend chlorination for a longer duration following treatement with a molluscicide and will initiate chlorination at a reduced level when it is resumed.

If you have any questions relative to this incident or this report, please contact me on (313) 237-7021.

Sincerely,

Arthur Heidrich Jr

Arthur Heidrich, Jr.
Administrator
Water & Land Use Programs

AH:pp

cc: R. Schrameck
H. Yoon

bcc: J. Flynn, F. Lehmann, M. Sterling, W. Terrasi

FILE COPY

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

December 27, 1982

Mr. R. J. Courchaine
Executive Secretary
Michigan Water Resources Commission
P.O. Box 30028
Lansing, MI 48909

Re: Enrico Fermi Atomic Power Plant Unit 2, Construction Site, NPDES Permit No. MI 0039110

Dear Mr. Courchaine:

On December 2, 1982, the chlorination system for the closed-cycle condenser cooling water system underwent a series of pre-operational acceptance tests. Following completion of those tests, because it contained residual chlorine, the condenser cooling system was maintained in the recirculation mode which isolated it from Lake Erie. Potential paths of cooling water to the environment were tagged to preclude the inadvertent discharge of chlorinated water which is not provided for in the subject permit.

At approximately 0120 hours on December 3, 1982, an operator at the plant in the course of placing a General Service Water pump in service also placed the controller for the pump's strainer backwash system in the "continuous" rather than the "off" mode contrary to instructions.

This resulted in a continuous discharge of between 50 and 100 gallons per minute of water from the cooling system to the overflow canal of Unit 1 which was not in service. At that time the water in the cooling system had a Total Residual Chlorine level of approximately 1.1 ppm.

At 0830 on December 3, 1982, the discharge was discovered and secured. Water samples taken at the Unit 1 discharge canal contained no measurable residual chlorine.

This incident was reported by telephone to Mr. S. Ross of your staff at approximately 1330 hours on December 3, 1982 and discussed with Mr. R. Schrameck at approximately 1430 hours on December 3, 1982.

In order to ensure that similar incidents will not occur in the future, operating instructions and the system design are currently being re-evaluated to determine which, if any, changes may be appropriate to insure future compliance. It is anticipated that those changes, if appropriate, will be implemented prior to plant start up.

This information is being conveyed to you in compliance with Part IIA4 of the above cited NPDES permit. If you have any questions related to this matter, please contact me on (313) 237-8618.

Sincerely,

Arthur Heidrich, Jr.,
Acting Administrator -
Water & Land Use Programs
Environmental Affairs Department

AH/aj

cc: R. Schrameck - MDNR

bcc: J. Kepus
E. Madsen
M. Sterling
W. Wichers

DTE Energy
2000 2nd Ave., Detroit, MI 48226-1279

DTE Energy

June 27, 2003

Ms. Jennifer Krejcik, Environmental Quality Analyst
Water Division
Michigan Department of Environmental Quality
Jackson District Office
301 E. Louis B. Glick Highway
4th Floor
Jackson, Michigan 49201

Re: Detroit Edison-Fermi 2 Power Plant
NPDES Permit No.: MI0037028
Follow-up Report: Corrective Action Summary – Outfall 011

Dear Ms. Krejcik:

In a letter, dated November 12, 2002, from you to Ms. Lynda Craine of the Detroit Edison Company (the Company) Fermi 2 Power Plant, you requested that the findings and corrective actions regarding an oil & grease noncompliance be submitted to you at the conclusion of the Company's investigation. The Fermi 2 Power Plant submitted supplemental information with its October 2002 Discharge Monitoring Reports indicating that a batch discharge of 31,000 gallons of treated oily wastewater to Swan Creek via Outfall 011 was in excess of the permitted maximum monthly average concentration of 15.0 mg/L for oil & grease. Analysis of the sample obtained at the time of discharge indicated a concentration of 17.6 mg/L. Since this was the only discharge that occurred in the month of October, the monthly average was exceeded. However, the sample was within the permitted maximum daily concentration of 20.0 mg/L. Initially, there was no apparent cause for the elevated oil & grease concentration.

The Company obtained approval to forward approximately 35,000 gallons of treated oily wastewater from the Fermi equalization basin to the Monroe Sanitary Sewage System, with the condition that the water first pass through a portable oil/water separator. Authorization was given to pump the water from below the surface oil layer, but 6 feet above the bottom of the basin where a layer of sludge was anticipated. This activity began on December 12, 2002. After pumping the treated oily wastewater to the Monroe Sanitary Sewage System, an additional 35,730 gallons of wastewater was vacuumed into tankers and disposed of at Advanced Resource Recovery (ARR). Additionally, 7,610 gallons of sludge was disposed of at ARR. This occurred between December 12, 2002 through January 1, 2003.

Marine Pollution Control (MPC) was contracted to clean the Fermi equalization basin and the train of the oily wastewater treatment system. The oil/water separator was drained, the separator plates were power washed, and the sediment and water were removed. The AFL Polisher sock filters were removed, cleaned and reinstalled. Lastly, the coalescing filters (final treatment process) were replaced.

After the equalization basin was completely drained, MPC used pressure washers to thoroughly clean the basin walls and floor. During the cleaning and inspection that was performed by MPC, no oily waste treatment system abnormalities were observed that could account for the high oil & grease level. All indications were that the physical and mechanical aspects of the system were operating as intended, but that the buildup of organic decomposition residue needed to be cleaned from the various components.

The system was operated on April 24, 2003 and 31,000 gallons was discharged. Duplicate oil & grease samples were obtained and analyzed, resulting in an average oil & grease concentration of 2.8 mg/L, with individual sample results of 2.5 mg/L and 3.0 mg/L. Based on these results, the system appears to be operating properly and no further actions are required.

If you have any questions relative to this report, or desire any additional information, please contact me at (313) 235-8704 or via e-mail at babieramj@dteenergy.com.

Sincerely,

Mary J. Babiera

Mary J. Babiera
Environmental Management and Resources

CC: J. Russell

DTE Energy
2000 2nd Ave., Detroit, MI 48226-1279

DTE Energy

May 2, 2003

Mr. Jon Russell, District Supervisor
Water Division
Michigan Department of Environmental Quality
Jackson District Office
301 E. Louis B. Glick Highway
4th Floor
Jackson, Michigan 49201

Re: Detroit Edison-Fermi 2 Power Plant
NPDES Permit No.: MI0037028
Follow-up Report: Unusual Characteristic of the Discharge

Dear Mr. Russell:

In accordance with Part I.A.1.c of NPDES Permit No. MI0037028, the Detroit Edison Company is submitting this follow-up report to notification of an oil sheen that was observed on the Fermi 2 overflow canal in the vicinity of Outfall 011 and a nearby stormwater outfall (002) at approximately 0830 hours on April 28, 2003. A permanent boom is installed downstream from Outfall 002, however due to low water levels the containment boom was not in contact with the surface of the water near the shoreline. This allowed the sheen to extend beyond the containment into the canal.

Concurrent with the appropriate notifications, plant personnel placed oil absorbent boom across the canal downstream from the observed sheen, and placed sandbags and oil absorbent socks around the boom in the vicinity of the breaches. A spill control contractor was also called to clean up the sheen. The contractor inspected the permanent containment boom and recommended design changes to prevent a recurrence of the breach. A proposal is forthcoming.

Investigation indicates that the source of the release was via roof drains from the Turbine Building. During a refill of the hydrogen seal oil system, oil was inadvertently discharged to the roof through the hydrogen vent. Clean up of the roof was begun, but was interrupted due to lightening. Clean up will be completed as soon as practicable. The spill control contractor has placed several containment, oil absorbent and rubberizer booms in various locations within the outfall canal to prevent any further release that may occur while clean up of the roof is in progress. Once the cause of the inadvertent release to the roof is more clearly identified, measures will be instituted to prevent recurrence of this incident.

If you have any questions relative to this report, or desire any additional information, please contact me at (313) 235-8704 or via e-mail at babieramj@dteenergy.com.

Sincerely,

Mary J. Babiera

Mary J. Babiera
Environmental Management and Resources

CC: J. Krejcik

DTE Energy
2000 2nd Ave., Detroit, MI 48226-1279

DTE Energy

March 28, 2003

Mr. Jon Russell, District Supervisor
Water Division
Michigan Department of Environmental Quality
Jackson District Office
301 E. Louis B. Glick Highway
4th Floor
Jackson, Michigan 49201

Re: Detroit Edison-Fermi 2 Power Plant
NPDES Permit No.: MI0037028
Follow-up Report: Loss of Ethylene Glycol

In accordance with Part II.C.7 of NPDES Permit No. MI0037028, the Detroit Edison Company hereby submits this follow-up report to notification of a loss of ethylene glycol from its Fermi 2 Power Plant that was discovered at approximately 1330 hours on Wednesday, March 19, 2003. At that time, the loss of ethylene glycol was estimated at 130 pounds over a six-week period. Please note that the previous two ethylene glycol releases reported on February 18, 2003 and February 4, 2003 were from the south cooling tower de-icing system, which plant personnel has continued to monitor, and which appears to be in a stable configuration. This follow-up report involves a release from the north cooling tower de-icing system. Release of ethylene glycol from either de-icing system enters the circulating-water reservoir, which discharges through Outfall 001.

The cooling tower de-icing system at Fermi 2 uses a mixture of ethylene glycol and water as a hydraulic fluid to position valves that divert hot return water from the condenser to portions of the tower for the purpose of preventing ice formation during winter months. Each cooling tower de-icing system consists of four (4) 60-gallon reservoirs, connected by an equalizing line, and a common header that leads to the hot return water diversion valves.

After the ethylene glycol loss was discovered upon inspection of the north cooling tower reservoirs on March 19, 2003, the system was walked down. No visible leaks could be identified. At that time, the weather was warm and the system was not in use so it was not pressurized, making the identification of a slow leak difficult. The configuration of the north cooling tower de-icing system has been modified so that each reservoir is isolated, preventing communication between the reservoirs. When this corrective action was performed on the south cooling tower system, the leakage of ethylene glycol stopped. The ethylene glycol levels were checked on March 28, 2003 and it appears that the north cooling tower de-icing system is in a stable configuration at this time.

The Fermi 2 Power Plant begins a refueling outage today, March 28, 2003 that will last approximately one month. During this period, both cooling towers will be drained of water, so any ethylene glycol leakage that might occur will not enter the circulating water system, and will not be discharged via Outfall 001. Work packages have been added to the scope of this outage to trouble shoot both cooling tower de-icing systems to identify leaks and make repairs. This activity will be much easier to perform with the water drained, as it will enable personnel to see any puddles of ethylene glycol that may form when the system is pressurized.

If you have any questions relative to this report, or desire any additional information, please contact me at (313) 235-8704 or via e-mail at babieramj@dteenergy.com.

Sincerely,

Mary J. Babiera

Mary J. Babiera

CC: J. Krejcik

The Detroit Edison Company
2000 2nd Ave., Detroit, MI 48226-1279

Detroit Edison
A DTE Energy Company

February 28, 2003

Mr. Jon Russell, District Supervisor
Water Division
Michigan Department of Environmental Quality
Jackson District Office
301 E. Louis B. Glick Highway
4th Floor
Jackson, Michigan 49201

Re: Detroit Edison – Fermi 2 Power Plant
NPDES Permit No. MI0037028
Follow-up Report: Loss of Ethylene Glycol

In accordance with Part II.C.7 of NPDES Permit No. MI0037028 the Detroit Edison Company (the Company) hereby submits this follow-up report to notification of a loss of ethylene glycol from its Fermi 2 Power Plant that was discovered at approximately 1010 hours on Tuesday, February 18, 2003. At the time of the initial report, it was estimated that between 290 to 430 pounds of ethylene glycol had been lost from the cooling tower de-icing system into the circulating water reservoir, which discharges through Outfall 001.

The cooling tower de-icing system at Fermi 2 uses a mixture of ethylene glycol and water to position valves that divert hot return water from the condenser to portions of the tower for the purpose of preventing ice formation during the winter months. The system consists of four (4) 60-gallon reservoirs, connected by an equalizing line, and a common header that leads to the hot return water diversion valves. A similar event occurred on February 3 and 4, 2003, when it was discovered that a Michigan Part 5 Rule Threshold Reporting Quantity (TRQ) had been released into the circulating water reservoir. At that time, an expansion joint hose in the header was determined to have been the cause of the release, and was subsequently replaced. Fluid levels in the reservoirs were routinely checked on a monthly basis when that release occurred. Since that time, the fluid levels have been checked on a weekly basis.

After the ethylene glycol loss was discovered on February 18, 2003, the equalizing line between the reservoirs was isolated to prevent communication. The 5 remaining expansion joint hoses were replaced by February 19. No obvious leaks have been found in the system. The reservoir levels were monitored on February 18, 19, 21, and 25, and no change in fluid level in each reservoir was apparent, indicating that the leak has been isolated.

There are two potential sources of leakage from the system that can only be investigated either in better weather or when the cooling tower is not required for plant operations, such as during a refueling outage.. Working on the de-icing system during present conditions is a significant safety concern, due to the fact that the workers must enter the water to get to system components. The two possibilities are (1) the reservoir equalizing line or (2) overflowing of the reservoirs due to bad solenoid valves. These potential sources will be investigated at the next possible opportunity. Until such time as that can occur, the reservoir fluid levels will continue to be monitored on a weekly basis.

If you have any questions relative to this report, or desire any additional information, please contact me at (313) 235-8704 or via e-mail at babieramj@dteenergy.com.

Sincerely,

Mary J. Babiera

Mary J. Babiera
Environmental Management and Resources

Cc: J. Krejcik

The Detroit Edison Company
2000 2nd Ave., Detroit, MI 48226-1279

Detroit Edison
A DTE Energy Company

February 28, 2003

Mr. Jon Russell, District Supervisor
Water Division
Michigan Department of Environmental Quality
Jackson District Office
301 E. Louis B. Glick Highway
4th Floor
Jackson, Michigan 49201

Re: Detroit Edison – Fermi 2 Power Plant
NPDES Permit No. MI0037028
Notice Letter: NL-01-03-03-011J

The Detroit Edison Company (the Company) verbally reported a loss of oil to the groundwaters of the state in accordance with Part II.C.7 of NPDES Permit No. MI0037028 on January 10, 2003 and a follow-up report was submitted on January 17. The Company has since reviewed the Michigan Department of Environmental Quality (MDEQ) Notice Letter NL-01-03-03-011J "Loss of Oil to Groundwater Reporting Requirements" (Notice Letter) dated January 27, 2003, and hereby submits this update and request for an extension to respond more fully to issues raised in the Notice Letter.

The Company met with Mr. Dowe Parsons and Mr. Peter Masson of the MDEQ Remediation and Redevelopment Division (RRD) on February 19, 2003 at Fermi 2 Power Plant to provide an update on the current status of the site. The Company is in the process of preparing a hydrogeological work plan to investigate and characterize the release at the site that will be submitted to the MDEQ RRD.

Per the Notice Letter, Fermi 2 Power Plant is required to verify that procedures are in place to ensure immediate notification is provided to the MDEQ upon discovering a release of polluting materials impacting waters of the state. It is the Company's understanding that the boilerplate language of Part II.C.7 of the NPDES permit was originally based upon the Michigan Part 5 Rules. Also, the Company believes there are apparent discrepancies in the wording of the current NPDES Part II.C.7 and the recently revised Michigan Part 5 Rules. This was discussed in two recent telephone conversations with Jennifer Krejcik of the MDEQ, the most recent being Wednesday, February 26, 2003. It is the Company's understanding that these discrepancies are affecting facilities that have NPDES permits throughout the State of Michigan, and that the MDEQ is having internal discussions to try and resolve these discrepancies. For these reasons, the Company hereby requests an extension of the response date, February 28, 2003, which is required per the Notice Letter. The Company asks that this response date be extended to 30 days after it receives, in writing, clarification from the MDEQ of the discrepancies in the wording of the Part 5 Rules and NPDES Part II.C.7.

The Company proposes reporting only those spills and losses that meet the requirement of a Threshold Reporting Quantity (TRQ) under the current Part 5 Rules for loss of oils and polluting materials under Part II.C.7 of the Fermi 2 Power Plant NPDES permit (this section of the permit is based upon the Part 5 Rules). Due to the fact that Fermi 2 is a nuclear power plant, there are significantly greater reporting requirements that must be met. Therefore, the Company requests a written response from the MDEQ confirming that this reporting threshold for Fermi 2 is acceptable. Within 30 days after receipt of the MDEQ clarification, reporting procedures will be revised, if necessary, and submitted to the MDEQ.

The Company would like to propose a meeting with the MDEQ to further discuss the recent occurrences at the Fermi 2 Power Plant site, and how the current Part 5 Rules affect reporting requirements at this and other Company sites based upon Part II.C.7 of their respective NPDES permits. We will be in contact with your office in the near future to discuss possible meeting times and locations. Thank you in advance for your consideration in this matter.

If you have any questions relative to this letter, or desire any additional information, please contact me at (313) 235-8704 or via e-mail at babieramj@dteenergy.com.

Sincerely,

Mary J. Babiera

Mary J. Babiera
Environmental Management and Resources

Cc: J. Krejcik

The Detroit Edison Company
2000 2nd Ave., Detroit, MI 48226-1279

Detroit Edison

A DTE Energy Company

January 17, 2003

Mr. Jon Russell, District Supervisor
Water Division
Michigan Department of Environmental Quality
Jackson District Office
301 E. Louis B. Glick Highway
4th Floor
Jackson, Michigan 49201

Re: Detroit Edison – Fermi 2 Power Plant
NPDES Permit No. MI0037028
Follow-up Report – Loss of Oil to Groundwater

In accordance with Part II.C.7 of NPDES Permit No. MI0037028, the Detroit Edison Company (Company) is submitting this follow-up report to a notification of loss of oil to the groundwater at its Fermi 2 Power Plant that was made on January 10, 2003 at approximately 1540 hours. On June 11, 2002, plant personnel detected oil in a groundwater dewatering sump. This discovery was evaluated for reportability. Since no immediate source of oil (i.e., a spill, equipment failure) could be determined, the investigation into the cause and source of oil initially proceeded under the Michigan Part 201 Rules and the Michigan Part 5 Rules. It was determined that no release, as defined in the Part 201 and Part 5 Rules, had occurred. Under these Rules, a release occurs when loss of a reportable quantity (RQ) of oil occurs within a 24-hour timeframe, which subsequently requires immediate reporting. Therefore, no immediate report of this discovery was made at that time.

Within the first 30 days, numerous investigations occurred in an effort to identify a source. Samples of the oil were obtained from the dewatering sump. Olfactory and visual evidence indicated that the contamination was weathered diesel fuel, which was verified by analysis in October 2002. Four (4) other sumps near the RHR building were observed for the presence of oil. No oil was detected in the other sumps. No drawings were found that could establish the purpose of the sumps, however, personnel who had worked on site during construction stated that the sumps were used for dewatering purposes during construction of the RHR building. A vacuum truck was used to clean out the impacted dewatering sump and to evaluate if the diesel fuel in the sump was localized to the sump or was representative of groundwater conditions. After the diesel fuel was vacuumed out, the sump was pumped down, creating a cone of depression. Diesel fuel slowly bubbled back into the sump, suggesting that a diesel fuel plume was impacting the groundwater surface. At the time, the point-of-origin for the potential plume was unknown.

Numerous interviews and reviews of available drawings indicated that the only potential source for diesel fuel in the area of the RHR building is a 21-inch "dump line" that connects the RHR building to the site's chemical wastewater pond located outside of the protected area of the plant. The RHR building houses four (4) Emergency Diesel Generators (EDGs), which are required as a plant safety system for backup power. Each EDG has a 50,000 gallon diesel fuel tank associated with it that is housed completely within the RHR building. In an extreme emergency, such as a fire, the line is designed to allow the contents of the tank to be dumped directly to the chemical wastewater pond. This line also acts as a stormwater drain, with 4 catch basins located along the 700 feet of line between the RHR building and the chemical wastewater pond.

Inputs of diesel fuel into the line have historically come from two places. Both are operational, and both have been eliminated. The first occurred whenever the EDG diesel fuel tanks were routinely checked for water. A sample was taken for visual inspection, and then discarded into the drain line. This practice has been altered so that the sample is now collected in a drum for energy recovery. The second source, which is minor, occurs during weekly testing of the EDGs. One EDG is run each week for 2.5 hours. Leak by of the fuel injectors results in less than 1.5 liters of diesel fuel each week that drips into the drain. This leak by is now collected for energy recovery as well.

An environmental consultant specializing in hydrogeological projects was contracted in August 2002 to assist the Company with investigating the source of the diesel fuel, to implement a hydrogeological investigation and to implement a remediation strategy. Robotic inspection was determined to be the most effective method to inspect the drain line, prior to developing a hydrogeological investigation work plan. Onsite work at Fermi 2 was delayed several times due to heightened security issues, particularly around September 11. The robotic inspection was performed during a 3-day-long work evolution, beginning on November 20, 2002, and revealed two breaks in the 21-inch line that connects the RHR building within the protected area to the chemical wastewater pond outside of the protected areas of the plant. Concurrently, methods to line the 21" concrete drain line to prevent diesel fuel leakage were investigated. Due to the configuration of the line and associated sumps, approximately 700 gallons of diesel was recovered during the cleaning process that preceded the robotic inspection. Also, a passive skimmer was purchased to recover fuel from the dewatering sump. The Company is currently planning to repair the 2 breaks in the 21" line. This work is a high priority and is expected to be complete in February 2003.

Up to this time, the investigation has been performed using the Part 201 and Part 5 rules as regulatory guidance. Inadvertently, Part II.C.7 of the NPDES Permit was not recognized as being applicable until January 10, 2003, at which time your office was contacted. The Company believes that the investigation into the source of the diesel fuel, and the remedial actions taken thus far, demonstrates commitment to expeditiously define and remediate the contaminant plume and to preventing future loss to the groundwater. The hydrogeological work plan that is being developed is scheduled to be implemented before the end of March, when the site's refueling outage is scheduled to begin.

If you have any questions relative to this report, or desire any additional information, please contact me at (313) 235-8704 or via e-mail at babieramj@dteenergy.com.

Sincerely,

Mary J. Babiera

Mary J. Babiera
Environmental Management and Resources

Cc: J. Krejcik

The Detroit Edison Company
2000 2nd Ave., Detroit, MI 48226-1279

Detroit Edison

A DTE Energy Company

February 14, 2003

Mr. Jon Russell, District Supervisor
Water Division
Michigan Department of Environmental Quality
Jackson District Office
301 E. Louis B. Glick Highway
4th Floor
Jackson, Michigan 49201

Re: Detroit Edison – Fermi 2 Power Plant
NPDES Permit No. MI0037028
Pollution Incident Report: Loss of Ethylene Glycol

In accordance with Part II.C.7 of NPDES Permit No. MI0037028 and Rule 324.2007 (2) of the Michigan Administrative Code, the Detroit Edison Company hereby submits the following Pollution Incident Report for the release of ethylene glycol in excess of the reportable quantity (RQ) of 500 pounds within 24 hours from its Fermi 2 Power Plant. A loss of polluting material was initially reported to the Jackson District Water Division of the Michigan Department of Environmental Quality (MDEQ) at approximately 1100 hours on Tuesday, February 4, 2003. At that time, no leak rate had been determined. On February 5, it was confirmed that an RQ had been released, and additional reports were made as required.

The cooling tower de-icing system at Fermi 2 uses a mixture of ethylene glycol and water to position valves that divert hot return water from the condenser to portions of the tower for the purpose of preventing ice formation during the winter months. A routine monthly check is made on the tank fluid level in the de-icing system. On February 3 it was discovered that during the 30-day period between checks, there was a loss of approximately 750 pounds of ethylene glycol from the de-icing system tanks into the circulating water reservoir. This check only occurs once a month; therefore no 24-hour leak rate could be determined. Investigation into the cause of the leak involved re-filling the tanks at approximately 1400 hours on February 4 to the specified level, then checking tank levels the next day to determine leak rate. The tank levels were checked at approximately 0950 hours on February 5, when a loss of approximately 535 pounds of ethylene glycol was discovered. This release exceeded the RQ for reporting under Rule 324.2007, because it was greater than 500 pounds within 24 hours. Ms. Jones of the National Response Center (NRC) was contacted to report the release at approximately 1237 hours on February 5, 2003 (NRC Report #636023).

Investigation into the cause of this release revealed that a 1.5-inch hose had become disconnected from a pump in the de-icing system. A minor actuator bellows leak was also identified. The hose connection and bellows leak were repaired by approximately 1800 hours on February 6. The two identified leaks appear to have been the source of the release, as no further drop in tank fluid levels in the de-icing system is apparent. The frequency of tank inspections has been increased from monthly to weekly checks for the purpose of identifying and correcting potential leakage issues in the future. A thorough preventative maintenance program is also being implemented to upgrade the de-icing system. No recurrence of this event is expected.

If you have any questions relative to this report, or desire any additional information, please contact me at (313) 235-8704 or via e-mail at babieramj@dteenergy.com.

Sincerely,

Mary J. Babiera

Mary J. Babiera
Environmental Management and Resources

Cc: J. Krejcik

The Detroit Edison Company
2000 2nd Ave., Detroit, MI 48226-1279

Detroit Edison

A DTE Energy Company

February 10, 2003

Mr. Jon Russell, District Supervisor
Water Division
Michigan Department of Environmental Quality
Jackson District Office
301 E. Louis B. Glick Highway
4th Floor
Jackson, Michigan 49201

Re: Detroit Edison – Fermi 2 Power Plant
NPDES Permit No. MI0037028
Possible Non-Compliance Report: Total Residual Oxidant

In accordance with Part II.C.6 of NPDES Permit No. MI0037028, the Detroit Edison Company (Company) is submitting this follow-up report for a possible non-compliance of the Maximum Daily Concentration discharge limitation for Total Residual Oxidant (TRO) at the Fermi 2 Power Plant Outfall 001, which occurred at approximately 0430 hours on Wednesday, February 5, 2003.

At approximately 0430 hours on February 5, 2003, a Fermi 2 chemistry technician performed the daily sampling and analysis at Outfall 001 in accordance with Part I.A.1.e of the NPDES permit, and with plant procedure Chemistry Specification CHS-AUX-02. Following sampling, the circulating water dehalogenation system was shut down. At approximately 0525 hours, the circulating water decant pumps were shut down. These pumps regulate the discharge flow through Outfall 001. At approximately 0930 hours, the circulating water pond was sampled and found to have a TRO level of 75 µg/l. This would appear to indicate that during the 55-minute period that transpired between shutting down the dehalogenation system and shutting down the circulating water decant pumps, it is possible that the permitted Maximum Daily Concentration discharge limit of 38 µg/l was exceeded. Observation of the outfall indicated no abnormalities.

Investigation indicated that human error by the chemistry technician who shut off the dehalogenation system before the decant pumps were shut down was the cause of this possible non-compliance. Prior to this occurrence, the Fermi 2 Chemistry Department had self-identified a potential training weakness associated with implementing Chemistry Specification CHS-AUX-02. Therefore, just-in-time training had been developed to prevent implementation errors. A portion of the chemistry technicians had already received this training at the time the possible non-compliance occurred. However, the technician on the night shift had not yet received this training when the possible non-compliance occurred. As of February 10, 2003, all Fermi chemistry technicians have completed this training. No recurrence of this event is anticipated.

If you have any questions relative to this report, or desire any additional information, please contact me at (313) 235-8704 or via e-mail at babieramj@dteenergy.com.

Sincerely,

Mary J. Babiera

Mary J. Babiera
Environmental Management and Resources

Cc: J. Krejcik

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
JACKSON DISTRICT OFFICE

JOHN ENGLER
GOVERNOR

DEQ

RUSSELL J. HARDING
DIRECTOR

November 12, 2002

DECo - EM&R
NOV 19 2002

Ms. Lynda Craine
Detroit Edison Company-Fermi 2 Plant
6400 N. Dixie Highway, 110 AIB
Newport, Michigan 48166

Dear Ms. Craine:

SUBJECT: DECO-Fermi 2 Plant
NPDES Permit No. MI0037028
Oil & Grease Non-Compliance, Monitoring Point 011C

The Department of Environmental Quality, Water Division has received the supplemental information page regarding the oil & grease non-compliance event. It is understood that the non-compliance occurred on October 3, 2002, with a batch discharge of 31,000 gallons of treated oily wastewater from monitoring point 011C through outfall 011 to Swan Creek. The results of the sample taken with this discharge showed the concentration of oil & grease to be 17.6 mg/L, in exceedance of the 15 mg/L maximum monthly average concentration final effluent limitation. It is noted that you are continuing to investigate the cause of the elevated oil & grease concentration, as there were no abnormalities discovered in your preliminary investigation.

Please submit your findings at the conclusion of your investigation. Please also provide the corrective actions taken as a result of your investigation, including the dates that these actions were implemented. Feel free to contact me should you have any questions.

Sincerely,

Jennifer Krejcik

Jennifer Krejcik
Environmental Quality Analyst
Field Operations Section
Water Division
517-780-7933

cc: Ms. Mary Babiera, Detroit Edison Company
File: DECO-Fermi 2, Correspondence, Monroe County

The Detroit Edison Company
2000 2nd Ave., Detroit, MI 48226-1279

Detroit Edison

A DTE Energy Company

February 14, 2002

Ms. Debora Snell, Acting District Supervisor
Surface Water Quality Division
Michigan Department of Environmental Quality
Jackson District Office
301 E. Louis B. Glick Highway
4th Floor
Jackson, Michigan 49201

Mr. Jim Sygo, Chief
Waste Management Division
Michigan Department of Environmental Quality
P.O. Box 30241
Lansing, Michigan 48909-7741

Re: Spill Notification Follow Up Report – Sodium Hypochlorite
Detroit Edison - Fermi 2 Power Plant
NPDES Permit No. MI0037028

Dear Ms. Snell and Mr. Sygo:

In accordance with Part II.C.7 of NPDES Permit No. MI0037028, the Detroit Edison Company's Fermi 2 Power Plant hereby submits this follow up report to a spill of sodium hypochlorite to the ground that exceeded the ten (10) pound Reportable Quantity (RQ) on February 7, 2002. This report is also being submitted in accordance with Rule 324.2007 (2) of the Michigan Administrative Code to serve as a Pollution Incident Report in fulfillment of the Part 5 Rules.

At approximately 1320 hours on February 7, 2002, a spill of sodium hypochlorite occurred near the Circulating Water Pump House at the Fermi 2 Power Plant. The spill consisted of a 15% sodium hypochlorite solution, which was being transferred from a delivery tanker truck to an on site storage tank. During the transfer, a rupture disk on the delivery tanker truck ruptured and released an estimated twenty (20) gallons of the solution to the ground. Calculations indicate that approximately 27 pounds of sodium hypochlorite were released, which is 17 pounds in excess of the 10 pound RQ.

Upon discovery, the transfer operation was suspended and the leak from the tanker rupture disk was stopped. Corrective actions included digging a shallow pit to collect the spilled sodium hypochlorite solution, as well as the water that was used to flush the ground where it had spilled. The sodium hypochlorite and water were then pumped from the collection pit into the storage tank's secondary containment. The contents of the secondary containment were subsequently neutralized and discharged to the Circulating Water Pond. The minimal amount of residual soil in the containment will be removed and disposed of in a dumpster. The Plant will use internal review and corrective action processes to address concerns regarding this spill. Recurrence is not expected.

If you have any questions relative to this report or desire additional information, please contact me at (313) 235-8704, or via e-mail at babieram@dteenergy.com.

Sincerely,

Mary J. Babiera

Mary J. Babierg
Environmental Management and Resources

Bcc: E. Ankawi
S. Boyd
D. Cobb
L. Craine
W. Estes
H. Higgins
P. Marquardt
W. O'Connor
M. Parrish
M. Rodenberg
File 220.10

cc: J. Rogers

239.10
FILE COPY

Detroit Edison
2000 2nd Avenue
Detroit, Michigan 48226-1279

June 27, 1996

Mr. R. Schrameck, Supervisor
Surface Water Quality Division
Michigan Department of Environmental Quality
Southeast Michigan District Headquarters
38980 Seven Mile Road
Livonia, Michigan 48152

Re: Non-Compliance Notification
Fermi II Power Plant
NPDES Permit No. MI0037028

Dear Mr. Schrameck:

In accordance with Part IIA5 of NPDES Permit No. MI0037028, the Detroit Edison Company is hereby notifying you of a possible non-compliance on June 22, 1996, with a Daily Maximum Effluent Limitation specified in Part IA1 of the above-cited NPDES permit at the Company's Fermi II Power Plant.

At 1745 hours on June 22, 1996, a technician, while adjusting the Circulating Water Decant Dehalogenation system, sampled the decant line and found that Total Residual Oxidant (TRO) levels greater than allowed by the NPDES permit were being discharged at Outfall 001. The limit for TRO at Outfall 001 is 50 ug/L for the intermittent discharge of Bromine with Chlorine. The Circulating Water system decant line TRO was 250 ug/L at the time of discovery.

The Nuclear Shift Supervisor was notified of the NPDES non-compliance at 1800 hours and was requested to have the Circulating Water Decant shut down. The discharge was terminated at 1825 hours.

Trouble shooting of the Dehalogenation system revealed that the pump suction strainers were clogged with fish fly debris and sediment which severely limited the injection rate. The pump strainers were cleaned and the dehalogenation tanks were drained and rinsed. The tanks were recharged and decant was restarted at 2115 hours.

The Dehalogenation system detoxifies the circulating water system blowdown with Sodium Sulfite to below detectable levels and is operated continuously while decant is in operation and residual oxidant is detected.

If you have any questions relative to this incident, please contact me at (313) 235-8714.

Sincerely,

Dennis Leonard
Environmental Protection

DL/plm

cc: A. MacArthur-Whitman

bcc: S. Bartman
J. Czech
P. Fessler
E. Kokosky

239.10 **FILE COPY**

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

November 18, 1994

Mr. R. Schrameck, District Supervisor
Surface Water Quality Division
Michigan Department of Natural Resources
Southeast Michigan District Headquarters
38980 Seven Mile Road
Livonia, Michigan 48152

Re: Notice Letter - NL# 10-94-02-39D
Supplemental Response
Fermi-2 Power Plant
NPDES Permit No. MI0037028

Dear Mr. Schrameck:

In the Company's initial response, dated October 26, 1994, to the above cited Notice Letter, it was indicated that there was some confusion on the Company's part as to which of the various Betz water treatment additives which were approved for use and in use at the Fermi-2 Power Plant was being referred to as the "Betz Scale Inhibitor". It was further indicated that I had been unable to reach Ms. A. MacArthur-Whitman to obtain a clarification, was assuming that the product in question was Betz Powerline 3461, and was responding accordingly.

On November 16, 1994, in a telephone conversation with Ms. A. MacArthur-Whitman, the necessary clarification was received. Ms. MacArthur-Whitman indicated that the "Betz Scale Inhibitor" referred to in the Notice Letter was Betz Powerline 865. She further indicated that her review of the record indicated that there was no reporting requirement mandated in Fermi-2 Power Plant's NPDES Permit for the Betz Powerline 865 and that the allegation that the plant failed to properly report information on the Betz Powerline 865 on the January through August, 1994 DMRs was erroneously based on a misinterpretation she had made of internal MDNR correspondence.

The Company is submitting this Supplemental Response to the Notice Letter to document the above described telephone conversation with Ms. MacArthur-Whitman and considers this matter resolved. If you have any questions relative to this submittal, please contact me on (313) 237-7021.

Sincerely,

Arthur Heidrich, Jr.
Administrator,
Water and Land Use Programs

AH:pr

cc: A. MacArthur-Whitman

239.10

FILE COPY

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

October 26, 1994

Mr. R. Schrameck, Supervisor
Surface Water Quality Division
Michigan Department of Natural Resources
Southeast Michigan District Headquarters
38980 Seven Mile Road
Livonia, Michigan 48152

Re: Notice Letter - NL# 10-94-02-039D
Fermi-2 Power Plant
NPDES Permit No. MI0037028

Dear Mr. Schrameck:

The Detroit Edison Company has received the subject Notice Letter and appreciates your calling to our attention the apparent reporting deficiencies in the Discharge Monitoring Reports (DMR) submitted for the Fermi-2 Power Plant for the months of January through August, 1994. We have reviewed the DMRs of concern and have taken steps to remedy these reporting deficiencies. There is some confusion on our part, however, as to the appropriate set of instructions for completing the DMRs. In addition to the instructions found on the back of the DMR, we are in possession of two other sets of instructions for completing the DMRs, one dated March 19, 1990 and the other dated June 1, 1993. These instructions in some aspects are contradictory and we have been unable to reach Ms. MacArthur-Whitman to discuss the issues with her. We are presuming at this point that the June 1, 1993 instructions are definitive and current and will use them until instructed otherwise.

We do wish to point out that during the period in question the plant did not chlorinate its cooling water system and, therefore, there were no discharges of chlorine to monitor or report. This information was clearly presented on the Daily Monitoring Reports which accompanied the DMRs. Likewise, the Outfall Observations required for Outfall 001, which were not preprinted on the DMRs, were made and reported on the Daily Monitoring Reports. We have previously contacted the Permit Compliance System Unit of the Compliance and Enforcement Section of the Surface Water Quality Division pointing out that the "Outfall Observation" was not included on the preprinted form and requested corrected DMRs. We were informed that corrected forms would be supplied but have not as yet received them. We will recontact the PCSU to ascertain the cause of the delay and once again request corrected forms, however, we do recognize our responsibility to report the information on the DMRs even if it is not included on the preprinted form. We are uncertain as to which of the several Betz products used at the plant is being referred to in the Notice Letter and, as previously mentioned, have been unable to contact Ms. MacArthur-Whitman for clarification. We are assuming the Betz product in question is Betz Powerline 3461, however, that product was not utilized during the period in question, so there was no information or data to report.

The management of the Fermi-2 Power Plant shares your concern for the number of reportable spills which have occurred at the plant. Because the number of those spills which were contractor related, in June, Senior Management at the plant conducted meetings with all plant personnel whose responsibilities included contractor control. These meetings focused on the communication necessary to effectively manage contractors emphasizing spill prevention. In addition, the plant has recently presented "lessons learned" training to Maintenance personnel at the plant which again emphasized spill prevention. This training was completed at the end of September. It may be too early to assess the results of the training, however, plant management expects significant improvement in spill prevention. Finally, as you may be aware, the Fermi-2 Power Plant has been and continues to be in a high maintenance mode which involves many unusual maintenance activities which, although not an excuse, presents many more opportunities for spills to occur.

Please be assured that the plant management understands and takes extremely seriously its environmental responsibilities and is determined to do whatever is necessary to assure compliance with all applicable laws and regulations. If you have further questions or desire additional information, please contact me on (313) 237-7021.

Sincerely,

Arthur Heidrich, Jr.
Administrator,
Water and Land Use Programs

AH:pr

cc: A. MacArthur-Whitman

bcc: S. Bartman
R. Delong
P. Fessler
J. Flynn
R. McKeon
M. Sterling
File 239.10

FILE COPY

239.10

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

August 26, 1993

Mr. R. Schrameck, Supervisor
Surface Water Quality Division
Southeast Michigan District Office
Michigan Department of Natural Resources
38980 Seven Mile Road
Livonia, Michigan 48152

Re: Notice of Noncompliance
NNC 07-93-01-041D
Issued July 30, 1993
Fermi-2 Power Plant
NPDES Permit No. MI0037028

Dear Mr. Schrameck:

The Detroit Edison Company prides itself on being an exemplary corporate citizen and takes its environmental responsibilities very seriously. The Company's long standing record of compliance with environmental regulations as well as its commitment to go beyond the mandates of law and regulation when it is environmentally beneficial and reasonable to do so has demonstrated the Company's commitment to environmental excellence.

The receipt of the above cited Notice of Noncompliance was most distressing to the management of the Company and particularly to the staff and management of the Fermi-2 Power Plant. Given the opportunity, the Company feels the alleged reporting deficiencies could have been resolved to our mutual satisfaction without the necessity of the issuance of a Notice of Noncompliance.

In regard to the allegations made in the Notice of Noncompliance, there are four generic issues. Those issues are:

1. Timeliness of notification of spills,

2. Timeliness of follow-up reports to those notifications,

3. Notification of the proper office within the MDNR, and

4. Reporting responsibilities under the "unusual characteristics of the discharge" language in the Permit.

The Company wishes to address these issues generically prior to commenting on the individual incidents cited in the Notice of Noncompliance.

In Part IIA6 of NPDES Permit No. MI0037028 and in Rule 164 of the Part 5 Rules of the Michigan Water Resources Commission are requirements for the "immediate" notification of a spill incident by the regulated party. To the best of the Company's knowledge, nowhere in either State or Federal environmental law or regulation is that term "immediate" defined, so that one must rely on common usage to determine what constitutes "immediate" notification. To add confusion and ambiguity, depending on the section of a NPDES Permit being read, "immediate" can mean without delay or the next working day in certain instances. The Nuclear Regulatory Commission defines "immediate notification" in terms of one to four hours, depending on circumstances, adding further confusion to the situation.

The Company agrees, however, that a two to eight-hour delay under these circumstances is not reasonable. The cause of the delay can only be attributed to the plant staff's practice of thoroughly investigating an incident prior to notification in order to be prepared to answer detailed questions relative to the incident. This practice is the result of Nuclear Regulatory Commission notification requirements. To correct this, the plant staff has been instructed as to the minimum information requirements needed to make the initial spill notification which should eliminate future delays. In addition, the plant's operational procedures have been modified to indicate that such notifications should be made as soon as reasonably possible. However, in all cases, that notification should be made within one hour of discovery of the spill.

With regard to the issue of timely submission of written follow-up reports after the agency notification of a spill, the Company believes that the two cited "late" reports, those related to the January 15, 1993 spill and the January 22, 1993 spill, were in fact submitted on time. The Company believes you are misinterpreting the language of Part IIA6 of the Permit and of Rule 164 of the Part 5 Rules of the Michigan Water Resources Commission. Although there is a slight difference between the language of Part IIA6 of the Permit and Rule 164 which creates some ambiguity, the Company believes the written report must be filed within ten days <u>following</u> the spill. To illustrate the point, if a report was due within one day of the spill that would clearly mean the following day. In other words, the day of the spill would be day "zero". Under your interpretation of the requirement, the report in this illustration would be due the same day as the spill. The Company believes this to be an unreasonable reading of the language of Part IIA6 of the Permit and Rule 164 of the Part 5 Rules of the Michigan Water Resources Commission.

The question of to whom a follow-up report after a spill notification should be addressed raises additional concerns because of a conflict between the language of Part IIA6 of the Permit and Rule 164 of the Part 5 Rules of the Michigan Water Resources Commission. Although Part IIA6 of the Permit requires that the report be submitted to the Detroit District Supervisor, Rule 164 of the Part 5 Rules requires the report be submitted to the Michigan Water Resources Commission. Because the Company is bound by both the language of the Part 5 Rules as well as the language of the Permit, the Company's practice has been to send those reports, whether or not they apply to a NPDES permitted facility, to the Commission, i.e. the Lansing office, with a copy to the appropriate District Office. However, to prevent any future confusion regarding this matter, the Company has changed its practice regarding the submission of these reports as it applies to NPDES permitted facilities. In the future these reports will be submitted to the appropriate District Office with a copy to the Commission in Lansing.

Finally, the Company does not believe it had any responsibility to provide any notification or report to the Michigan Department of Natural Resources or the Michigan Water Resources Commission under Part IA1c, "unusual characteristics of the discharge" in any of the incidents cited in the Notice of Noncompliance. The "unusual characteristics of the discharge" that require notification are clearly defined in Part IA1c of the Permit as "unnatural turbidity, color, oil film, floating solids, foams, settleable solids, or deposits". None of these specified characteristics were observed in any of the cited incidents.

With regard to the individually cited incidents in the Notice of Noncompliance, the Company has the following comments.

June 21, 1993

The Company objects to the characterization of a spill as an unpermitted discharge merely because it reached State waters by way of a permitted storm sewer. Spills are unanticipated and unplanned events. The Company sees no distinction between spills based on the flow path by which they may reach State waters. To attempt to permit all conceivable future spills under the NPDES system clearly is not the intent of either the spill regulations or the NPDES permitting rules.

January 15, 1993

The Company's report clearly indicated that the source of the spill was terminated within 30 minutes of its discovery. Although the Company can understand some curiosity as to the activities of Company personnel during the period between discovery and termination of the spill and the filing of the notification, the Company believes that to be irrelevant. However, if events of that period are truly of concern, the Company is willing to attempt to reconstruct a record of those activities from existing plant records.

January 22,1993

The Company has no additional comments other than the generic issue comments above.

January 25, 1993

This incident was apparently the result of lack of attention to his duties by an employe of an outside contractor. The day of the incident the contractor was notified by telephone of the incident and informed of the ramifications of the actions of his employe. This telephone notification was followed by a written notification to the contractor that any repeat of the incident would result in the termination of his contract.

February 10, 1993

Although it was not clear from the report submitted, the spill/underground leak had stopped at the time of discovery. The source of the spill/leak was the discharge line from a float controlled pump. In order to verify the source of the spill/leak, the pump was manually started at approximately 1450 hours and immediately shut down again when the spill/leak reoccurred.

June 20, 1993

The Company believes it had no responsibility under the plant's NPDES Permit to make any notification or report to the Michigan Department of Natural Resources or the Michigan Water Resources Commission regarding the June 20, 1993 incident cited. The possible noncompliance reported both by FAX and letter was the result of a new environmental person making a decision to report a possibly reportable situation rather than discover later that it should have been reported but wasn't.

Part IIA5 of the Permit requires the Company to notify the Detroit District Office in writing within five days of becoming aware that a Daily Maximum Effluent Limitation has or will be exceeded. In this case the Daily Maximum Effluent Limitation in question specified in Part IA1 of the Permit is 0.2 mg/l of Total Residual Chlorine. The Daily Maximum Effluent Limitation is defined in the Permit as the average of at least three evenly spaced samples taken during the discharge of chlorine. The plant records indicate that the average, i.e. the Daily Maximum Effluent Limitation, did not exceed 0.2 mg/l even though a single sample did exceed the single sample limitation of 0.3 mg/l. Therefore, the Company believes that under the circumstances neither a notification nor follow-up report were necessary under the terms of the Permit.

The Fermi-2 Power Plant staff has taken or is taking a number of additional steps to enhance compliance with the terms of its NPDES Permit and the Rules of the Michigan Water Resource Commission. These actions along with those previously cited constitute the Company's response to the pollution prevention plan requested in the Notice of Noncompliance.

During a recently completed staffing transition program the position of Environmental Engineer was re-evaluated. It was found that in addition to the responsibilities for environmental regulatory compliance the Environmental Engineer also had responsibility for certain plant chemistry programs. In order to allow the Environmental Engineer to better focus on environmental issues, the additional responsibilities of chemical control have been transferred to another group within the plant chemistry organization. The Environmental Engineer is now solely responsible for coordinating and communicating environmental awareness at the Fermi-2 site. This includes response to spills, NPDES monitoring and reporting, and HAZMAT movement, transport, and disposal.

All plant personnel with specific responsibilities associated with the investigation and reporting of spills have been retrained emphasizing the importance of timely reporting to the various agencies involved and the information needs specific to those notifications. Plant operating procedures related to spill reporting are being reviewed and updated as necessary.

Maintenance procedures are developed for all routine and extraordinary maintenance performed at the Fermi-2 Power Plant. Each of those procedures is independently reviewed for completeness and adequacy prior to execution of the maintenance. Following completion of the maintenance, the results of the work and any problems that were encountered are again reviewed in order to update the maintenance procedure for its next use. In the future, these reviews will include, as necessary, an evaluation of the adequacy of the precautions intended to prevent releases to the environment including spills.

Finally, attached is a copy of the plant's recently reviewed and updated Pollution Incident Prevention Plan.

The Company and the staff of the Fermi-2 Power Plant are committed to doing whatever is necessary to ensure compliance with all existing and future environmental regulations. To that end, the Company requests a meeting with you and appropriate members of your staff as soon as practical to discuss in detail the issues identified in this response and to provide whatever additional detail on the plant environmental compliance program you would desire. I will contact your office within two weeks of the filing of this response to arrange such a meeting.

If you have any questions relative to this response to the Notice of Noncompliance, or would like to discuss any of the issues identified prior to the proposed meeting, please contact me on (313) 237-7021.

Sincerely,

Arthur Heidrich, Jr.
Arthur Heidrich, Jr.
Administrator,
Water and Land Use Programs

Approved:

Robert McKeon for
Douglas R. Gipson
Senior Vice-President
Nuclear Generation

Attachment

cc: C. Panagiotides

bcc: S. Bartman w\o attachment
R. Eberhardt " "
J. Flynn " "
P. Marquardt " "
R. McKeon " "
K. Shields " "
M. Sterling " "
File 239.10

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

January 25, 1993

Mr. Robert Miller, Chief
Surface Water Quality Division
Michigan Department of Natural Resources
P.O. Box 30028
Lansing, Michigan 48909

Re: Spill Notification Follow-up Report
Plant: Fermi 2 Power Plant
NPDES Permit #MI0037028

Dear Mr. Miller:

In accordance with Part IIA6 of the NPDES Permit No. MI0037028 and the Part 5 Rules of the Michigan Water Resources Commission, the Detroit Edison Company hereby notifies your office that on January 15, 1993 at approximately 0930 hours, a spill occurred at the Fermi 2 Power Plant located at 6400 Dixie Highway, Newport, Michigan.

On January 15, 1993 at 0930 hours, an operator at the Fermi 2 Power Plant observed water bubbling up from the ground adjacent to the Auxiliary Boiler Blowdown Sump. At the time of the discovery, the only input into the sump was wastewater from the Make-up Water Reverse Osmosis unit (R.O. unit). An undetermined amount of R.O. unit wastewater had leaked into the ground. Plant personnel re-routed the R.O. waste line at 1000 hours, thereby stopping the spill. The incident was reported to the MDNR Emergency Operator by Mr. Fritz Lehmann at approximately 1730 hours on January 15, 1993.

Plant maintenance crews excavated the soil in the vicinity of the spill on the following day. The cause of the spill was due to a broken expansion joint on the Auxiliary Boiler Blowdown Sump pump discharge line. The expansion joint was repaired and line integrity verified on January 21, 1993. The system was declared operable on January 22, 1993.

The Make-up Water R.O. unit is used to make demineralized water for plant use. Potable water is used as the raw water source. R.O. unit wastewater consists of potable water with minerals concentrated to three (3) times that seen in potable water. In essence, R.O. unit wastewater quality is better than Lake Erie water.

Should you have any questions relative to this incident, please contact me at (313) 237-7022.

Sincerely,

Joseph Cazeno Jr.

Joseph Cazeno, Jr.
Administrative Specialist
Water Quality
Environmental Protection

JCjr/plm

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

February 3, 1993

Mr. Robert Miller, Chief
Surface Water Quality Division
Michigan Department of Natural Resources
P.O. Box 30028
Lansing, Michigan 48909

Re: Spill Notification Follow-up Report
Plant: Fermi 2 Power Plant
NPDES Permit #MI0037028

Dear Mr. Miller:

eport - 9 days
tification: 3 hrs, 50 min

In accordance with Part IIA6 of the NPDES Permit No. MI0037028 and the Part 5 Rules of the Michigan Water Resources Commission, the Detroit Edison Company hereby notifies your office, that on January 25, 1993 at approximately 0810 hours, a spill occurred at the Fermi 2 Power Plant located at 6400 Dixie Highway, Newport, Michigan.

On January 25, 1993 at 0810 hours, a security officer at the Fermi 2 Power Plant reported to the Main Control Room that sewage was issuing from a three (3) inch hose which was being used to pump out the sewage system septic tank. Suburban Sewer Service had been periodically pumping sewage from the septic tank while repairs were underway on the broken sewage forwarding line. Control Room personnel immediately dispatched an operator to the scene. The operator found the hose syphoning from the septic tank and removed the suction end from the tank, thereby stopping the spill at 0821 hours.

Sewage spilled to the parking lot where it flowed to an adjacent storm drain and eventually emptied into Swan Creek. It is estimated that approximately 100 gallons of sewage entered the storm drain system. The incident was reported to the MDNR Emergency Operator by Mr. Fritz Lehmann at approximately 1200 hours on January 25, 1993.

The cause of the spill was due to Suburban Sewer Service crew's failure to remove the suction hose from the septic tank when they were finished pumping. The Suburban personnel responsible were counseled on their failure to follow Fermi procedures regarding the use of temporary pump equipment.

Should you have any questions relative to this incident, please contact me at (313) 237-7022.

Sincerely,

Joseph Cazeno Jr.

Joseph Cazeno, Jr.
Administrative Specialist
Water Quality
Environmental Protection

JCjr/

bcc: J. Flynn
A. Heidrich
F. Lehmann
M. Sterling

August 6, 2004

Mr. Jon Russell, District Supervisor
Michigan Department of Environmental Quality
Water Division, Jackson District Office
301 E. Louis B. Glick Highway, 4th Floor
Jackson, Michigan 49201

Re: Detroit Edison-Fermi 2 Power Plant
NPDES Permit No.: MI0037028
Follow up Report – Michigan Part 5 Oil Release

In accordance with Part II.C.7 of NPDES Permit No. MI0037028 and with the Michigan Part 5 Rules, the Detroit Edison Company (the Company) hereby submits this follow up letter to the notification of a release of a polluting material that occurred at approximately 1400 hours on July 29, 2004 at the Fermi 2 Power Plant. Fermi environmental staff were notified that a Gradall, which is a large piece of construction equipment, had tipped over on its hood and had become lodged in the plant's overflow canal. An oil sheen was observed around the vehicle, with no immediately discernable or continuous source.

Immediate actions taken by Fermi staff included deploying a hard boom downstream of the incident to prevent migration of the sheen into Swan Creek, although the water level in the overflow canal was observed to be higher than that in the creek. Absorbent boom was also placed around the vehicle to prevent the sheen from spreading and to contain any potential continued leakage. Notifications were made to the National Response Center (Report #730-030), PEAS Operator #3, and 911 (as required by the recently revised Michigan Part 5 Rules). Further investigation determined that removal of the vehicle was not feasible at the time due to safety concerns including overhead high voltage lines and encroaching darkness. Marine Pollution Control (MPC), a spill recovery contractor, was contacted on July 30 to manage the recovery effort. The maximum amount of oil contained in the vehicle was determined to be 40 gallons of diesel fuel, 45 gallons of hydraulic fluid and 12 quarts of lubricating oil.

MPC moved the hard boom closer to the overturned equipment, re-positioned the absorbent boom and then staged a vacuum truck near the canal to remove the oily sheen. The cap from the hydraulic vent came off as the Gradall was removed, and released fluid into the canal. However, MPC was able to quickly capture the lost product. Approximately 80 gallons of product and water were recovered. The actual quantity of product was not quantifiable, but no other product reservoirs appeared to have ruptured during the removal of the Gradall. Stained vegetation was removed from the vegetation and soil in and around the shoreline. The hard boom, additional absorbents and a rubberizer boom (to capture the sheen) remain in place, since some of the product may leach from the soil and vegetation.

If you have any questions relative to this report, or desire any additional information, please contact me at (313) 235-8704 or via e-mail at babieramj@dteenergy.com.

Sincerely,

Mary J. Babiera
Detroit Edison
Environmental Management and Resources

cc: J. Krejcik

February 10, 2003

Mr. Jon Russell, District Supervisor
Water Division
Michigan Department of Environmental Quality
Jackson District Office
301 E. Louis B. Glick Highway
4th Floor
Jackson, Michigan 49201

Re: Detroit Edison – Fermi 2 Power Plant
NPDES Permit No. MI0037028
Possible Non-Compliance Report: Total Residual Oxidant

In accordance with Part II.C.6 of NPDES Permit No. MI0037028, the Detroit Edison Company (Company) is submitting this follow-up report for a possible non-compliance of the Maximum Daily Concentration discharge limitation for Total Residual Oxidant (TRO) at the Fermi 2 Power Plant Outfall 001, which occurred at approximately 0430 hours on Wednesday, February 5, 2003.

At approximately 0430 hours on February 5, 2003, a Fermi 2 chemistry technician performed the daily sampling and analysis at Outfall 001 in accordance with Part I.A.1.e of the NPDES permit, and with plant procedure Chemistry Specification CHS-AUX-02. Following sampling, the circulating water dehalogenation system was shut down. At approximately 0525 hours, the circulating water decant pumps were shut down. These pumps regulate the discharge flow through Outfall 001. At approximately 0930 hours, the circulating water pond was sampled and found to have a TRO level of 75 μg/l. This would appear to indicate that during the 55-minute period that transpired between shutting down the dehalogenation system and shutting down the circulating water decant pumps, it is possible that the permitted Maximum Daily Concentration discharge limit of 38 μg/l was exceeded. Observation of the outfall indicated no abnormalities.

Investigation indicated that human error by the chemistry technician who shut off the dehalogenation system before the decant pumps were shut down was the cause of this possible non-compliance. Prior to this occurrence, the Fermi 2 Chemistry Department had self-identified a potential training weakness associated with implementing Chemistry Specification CHS-AUX-02. Therefore, just-in-time training had been developed to prevent implementation errors. A portion of the chemistry technicians had already received this training at the time the possible non-compliance occurred. However, the technician on the night shift had not yet received this training when the possible non-compliance occurred. As of February 10, 2003, all Fermi chemistry technicians have completed this training. No recurrence of this event is anticipated.

If you have any questions relative to this report, or desire any additional information, please contact me at (313) 235-8704 or via e-mail at babieramj@dteenergy.com.

Sincerely,

Mary J. Babiera
Environmental Management and Resources

Cc: J. Krejcik

February 14, 2003

Mr. Jon Russell, District Supervisor
Water Division
Michigan Department of Environmental Quality
Jackson District Office
301 E. Louis B. Glick Highway
4^{th} Floor
Jackson, Michigan 49201

Re: Detroit Edison – Fermi 2 Power Plant
NPDES Permit No. MI0037028
Pollution Incident Report: Loss of Ethylene Glycol

In accordance with Part II.C.7 of NPDES Permit No. MI0037028 and Rule 324.2007 (2) of the Michigan Administrative Code, the Detroit Edison Company hereby submits the following Pollution Incident Report for the release of ethylene glycol in excess of the reportable quantity (RQ) of 500 pounds within 24 hours from its Fermi 2 Power Plant. A loss of polluting material was initially reported to the Jackson District Water Division of the Michigan Department of Environmental Quality (MDEQ) at approximately 1100 hours on Tuesday, February 4, 2003. At that time, no leak rate had been determined. On February 5, it was confirmed that an RQ had been released, and additional reports were made as required.

The cooling tower de-icing system at Fermi 2 uses a mixture of ethylene glycol and water to position valves that divert hot return water from the condenser to portions of the tower for the purpose of preventing ice formation during the winter months. A routine monthly check is made on the tank fluid level in the de-icing system. On February 3 it was discovered that during the 30-day period between checks, there was a loss of approximately 750 pounds of ethylene glycol from the de-icing system tanks into the circulating water reservoir. This check only occurs once a month; therefore no 24-hour leak rate could be determined. Investigation into the cause of the leak involved re-filling the tanks at approximately 1400 hours on February 4 to the specified level, then checking tank levels the next day to determine leak rate. The tank levels were checked at approximately 0950 hours on February 5, when a loss of approximately 535 pounds of ethylene glycol was discovered. This release exceeded the RQ for reporting under Rule 324.2007, because it was greater than 500 pounds within 24 hours. Ms. Jones of the National Response Center (NRC) was contacted to report the release at approximately 1237 hours on February 5, 2003 (NRC Report #636023).

Investigation into the cause of this release revealed that a 1.5-inch hose had become disconnected from a pump in the de-icing system. A minor actuator bellows leak was also identified. The hose connection and bellows leak were repaired by approximately 1800 hours on February 6. The two identified leaks appear to have been the source of the release, as no further drop in tank fluid levels in the de-icing system is apparent. The frequency of tank inspections has been increased from monthly to weekly checks for the purpose of identifying and correcting potential leakage issues in the future. A thorough preventative maintenance program is also being implemented to upgrade the de-icing system. No recurrence of this event is expected.

If you have any questions relative to this report, or desire any additional information, please contact me at (313) 235-8704 or via e-mail at babieramj@dteenergy.com.

Sincerely,

Mary J. Babiera
Environmental Management and Resources

Cc: J. Krejcik

February 28, 2003

Mr. Jon Russell, District Supervisor
Water Division
Michigan Department of Environmental Quality
Jackson District Office
301 E. Louis B. Glick Highway
4th Floor
Jackson, Michigan 49201

Re: Detroit Edison – Fermi 2 Power Plant
NPDES Permit No. MI0037028
Follow-up Report: Loss of Ethylene Glycol

In accordance with Part II.C.7 of NPDES Permit No. MI0037028 the Detroit Edison Company (the Company) hereby submits this follow-up report to notification of a loss of ethylene glycol from its Fermi 2 Power Plant that was discovered at approximately 1010 hours on Tuesday, February 18, 2003. At the time of the initial report, it was estimated that between 290 to 430 pounds of ethylene glycol had been lost from the cooling tower de-icing system into the circulating water reservoir, which discharges through Outfall 001.

The cooling tower de-icing system at Fermi 2 uses a mixture of ethylene glycol and water to position valves that divert hot return water from the condenser to portions of the tower for the purpose of preventing ice formation during the winter months. The system consists of four (4) 60-gallon reservoirs, connected by an equalizing line, and a common header that leads to the hot return water diversion valves. A similar event occurred on February 3 and 4, 2003, when it was discovered that a Michigan Part 5 Rule Threshold Reporting Quantity (TRQ) had been released into the circulating water reservoir. At that time, an expansion joint hose in the header was determined to have been the cause of the release, and was subsequently replaced. Fluid levels in the reservoirs were routinely checked on a monthly basis when that release occurred. Since that time, the fluid levels have been checked on a weekly basis.

After the ethylene glycol loss was discovered on February 18, 2003, the equalizing line between the reservoirs was isolated to prevent communication. The 5 remaining expansion joint hoses were replaced by February 19. No obvious leaks have been found in the system. The reservoir levels were monitored on February 18, 19, 21, and 25, and no change in fluid level in each reservoir was apparent, indicating that the leak has been isolated.

There are two potential sources of leakage from the system that can only be investigated either in better weather or when the cooling tower is not required for plant operations, such as during a refueling outage. Working on the de-icing system during present conditions is a significant safety concern, due to the fact that the workers must enter the water to get to system components. The two possibilities are (1) the reservoir equalizing line or (2) overflowing of the reservoirs due to bad solenoid valves. These potential sources will be investigated at the next possible opportunity. Until such time as that can occur, the reservoir fluid levels will continue to be monitored on a weekly basis.

If you have any questions relative to this report, or desire any additional information, please contact me at (313) 235-8704 or via e-mail at babieramj@dteenergy.com.

Sincerely,

Mary J. Babiera
Environmental Management and Resources

Cc: J. Krejcik

March 28, 2003

Mr. Jon Russell, District Supervisor
Water Division
Michigan Department of Environmental Quality
Jackson District Office
301 E. Louis B. Glick Highway
4th Floor
Jackson, Michigan 49201

Re: Detroit Edison-Fermi 2 Power Plant
NPDES Permit No.: MI0037028
Follow-up Report: Loss of Ethylene Glycol

In accordance with Part II.C.7 of NPDES Permit No. MI0037028, the Detroit Edison Company hereby submits this follow-up report to notification of a loss of ethylene glycol from its Fermi 2 Power Plant that was discovered at approximately 1330 hours on Wednesday, March 19, 2003. At that time, the loss of ethylene glycol was estimated at 130 pounds over a six-week period. Please note that the previous two ethylene glycol releases reported on February 18, 2003 and February 4, 2003 were from the south cooling tower de-icing system, which plant personnel has continued to monitor, and which appears to be in a stable configuration. This follow-up report involves a release from the north cooling tower de-icing system. Release of ethylene glycol from either de-icing system enters the circulating-water reservoir, which discharges through Outfall 001.

The cooling tower de-icing system at Fermi 2 uses a mixture of ethylene glycol and water as a hydraulic fluid to position valves that divert hot return water from the condenser to portions of the tower for the purpose of preventing ice formation during winter months. Each cooling tower de-icing system consists of four (4) 60-gallon reservoirs, connected by an equalizing line, and a common header that leads to the hot return water diversion valves.

After the ethylene glycol loss was discovered upon inspection of the north cooling tower reservoirs on March 19, 2003, the system was walked down. No visible leaks could be identified. At that time, the weather was warm and the system was not in use so it was not pressurized, making the identification of a slow leak difficult. The configuration of the north cooling tower de-icing system has been modified so that each reservoir is isolated, preventing communication between the reservoirs. When this corrective action was performed on the south cooling tower system, the leakage of ethylene glycol stopped. The ethylene glycol levels were checked on March 28, 2003 and it appears that the north cooling tower de-icing system is in a stable configuration at this time.

The Fermi 2 Power Plant begins a refueling outage today, March 28, 2003 that will last approximately one month. During this period, both cooling towers will be drained of water, so any ethylene glycol leakage that might occur will not enter the circulating water system, and will not be discharged via Outfall 001. Work packages have been added to the scope of this outage to trouble shoot both cooling tower de-icing systems to identify leaks and make repairs. This activity will be much easier to perform with the water drained, as it will enable personnel to see any puddles of ethylene glycol that may form when the system is pressurized.

If you have any questions relative to this report, or desire any additional information, please contact me at (313) 235-8704 or via e-mail at babieramj@dteenergy.com.

Sincerely,

Mary J. Babiera

CC: J. Krejcik

December 5, 2003

Mr. Jon Russell, District Supervisor
Water Division
Michigan Department of Environmental Quality
Jackson District Office
301 E. Louis B. Glick Highway
4th Floor
Jackson, Michigan 49201

Re: Detroit Edison-Fermi 2 Power Plant
NPDES Permit No.: MI0037028
Follow-up Report: Loss of Ethylene Glycol

In accordance with Part II.C.7 of NPDES Permit No. MI0037028, the Detroit Edison Company hereby submits this follow-up report to notification of a release of ethylene glycol in excess of the threshold reporting quantity (TRQ) specified in the Michigan Part 5 Rules from its Fermi 2 Power Plant that was discovered at approximately 1730 hours on Tuesday, November 25, 2003. An estimated 692 pounds of ethylene glycol was released from the north cooling tower de-icing system, which subsequently entered the circulating-water reservoir from which it will eventually be discharged to Lake Erie through Outfall 001. The immediate action taken by the plant upon discovery of the release was to shut down the system. The Michigan Department of Environmental Quality PEAS line was called and a message was left at approximately 1747 hours on November 25. Mr. Crews of the National Response Center was notified of the release at approximately 1755 hours.

The cooling tower de-icing system at Fermi 2 uses a mixture of ethylene glycol and water as a hydraulic fluid to position valves that divert hot return water from the condenser to portions of the tower for the purpose of preventing ice formation during winter months. Each cooling tower de-icing system consists of four (4) 60-gallon reservoirs, connected by an equalizing line, and a common header that leads to the hot return water diversion valves.

On November 26, 2003, maintenance personnel identified the source of the leak as a pipe union at a solenoid that had been installed on November 19, 2003. It appeared that the connection had not been tightened adequately, resulting in an estimated leak rate of 0.83 gallons per minute. Further investigation was carried out to determine if this leak rate was sufficient to result in the release of ethylene glycol in excess of the TRQ, which is 500 pounds per day. The operation of the de-icing system is temperature dependent. At temperatures below 30 °F, the system operates more frequently than at a higher temperature. Based upon the estimated leak rate, the configuration of the de-icing system and the ambient air temperatures from the morning of November 24 to the afternoon of November 25, a release of greater than the TRQ within a 24-hour time frame was indicated.

As of November 26, 2003, the source of the leak was stopped and the north cooling tower de-icing system had been refilled to operating level. Operations personnel will check the system once per day to insure that there are no more leaks in the system. There is a long-term plan in the development stages to pursue a modification to the cooling tower de-icing system for the purpose of minimizing or eliminating the possibility of the release of a TRQ of ethylene glycol.

If you have any questions relative to this report, or desire any additional information, please contact me at (313) 235-8704 or via e-mail at babieramj@dteenergy.com.

Sincerely,

Mary J. Babiera
Environmental Management and Resources

CC: J. Krejcik

May 2, 2003

Mr. Jon Russell, District Supervisor
Water Division
Michigan Department of Environmental Quality
Jackson District Office
301 E. Louis B. Glick Highway
4^{th} Floor
Jackson, Michigan 49201

Re: Detroit Edison-Fermi 2 Power Plant
NPDES Permit No.: MI0037028
Follow-up Report: Unusual Characteristic of the Discharge

Dear Mr. Russell:

In accordance with Part I.A.1.c of NPDES Permit No. MI0037028, the Detroit Edison Company is submitting this follow-up report to notification of an oil sheen that was observed on the Fermi 2 overflow canal in the vicinity of Outfall 011 and a nearby stormwater outfall (002) at approximately 0830 hours on April 28, 2003. A permanent boom is installed downstream from Outfall 002, however due to low water levels the containment boom was not in contact with the surface of the water near the shoreline. This allowed the sheen to extend beyond the containment into the canal.

Concurrent with the appropriate notifications, plant personnel placed oil absorbent boom across the canal downstream from the observed sheen, and placed sandbags and oil absorbent socks around the boom in the vicinity of the breaches. A spill control contractor was also called to clean up the sheen. The contractor inspected the permanent containment boom and recommended design changes to prevent a recurrence of the breach. A proposal is forthcoming.

Investigation indicates that the source of the release was via roof drains from the Turbine Building. During a refill of the hydrogen seal oil system, oil was inadvertently discharged to the roof through the hydrogen vent. Clean up of the roof was begun, but was interrupted due to lightening. Clean up will be completed as soon as practicable. The spill control contractor has placed several containment, oil absorbent and rubberizer booms in various locations within the outfall canal to prevent any further release that may occur while clean up of the roof is in progress. Once the cause of the inadvertent release to the roof is more clearly identified, measures will be instituted to prevent recurrence of this incident.

If you have any questions relative to this report, or desire any additional information, please contact me at (313) 235-8704 or via e-mail at babieramj@dteenergy.com.

Sincerely,

Mary J. Babiera
Environmental Management and Resources

CC: J. Krejcik

January 17, 2003

Mr. Jon Russell, District Supervisor
Water Division
Michigan Department of Environmental Quality
Jackson District Office
301 E. Louis B. Glick Highway
4^{th} Floor
Jackson, Michigan 49201

Re: Detroit Edison – Fermi 2 Power Plant
NPDES Permit No. MI0037028
Follow-up Report – Loss of Oil to Groundwater

In accordance with Part II.C.7 of NPDES Permit No. MI0037028, the Detroit Edison Company (Company) is submitting this follow-up report to a notification of loss of oil to the groundwater at its Fermi 2 Power Plant that was made on January 10, 2003 at approximately 1540 hours. On June 11, 2002, plant personnel detected oil in a groundwater dewatering sump. This discovery was evaluated for reportability. Since no immediate source of oil (i.e., a spill, equipment failure) could be determined, the investigation into the cause and source of oil initially proceeded under the Michigan Part 201 Rules and the Michigan Part 5 Rules. It was determined that no release, as defined in the Part 201 and Part 5 Rules, had occurred. Under these Rules, a release occurs when loss of a reportable quantity (RQ) of oil occurs within a 24-hour timeframe, which subsequently requires immediate reporting. Therefore, no immediate report of this discovery was made at that time.

Within the first 30 days, numerous investigations occurred in an effort to identify a source. Samples of the oil were obtained from the dewatering sump. Olfactory and visual evidence indicated that the contamination was weathered diesel fuel, which was verified by analysis in October 2002. Four (4) other sumps near the RHR building were observed for the presence of oil. No oil was detected in the other sumps. No drawings were found that could establish the purpose of the sumps, however, personnel who had worked on site during construction stated that the sumps were used for dewatering purposes during construction of the RHR building. A vacuum truck was used to clean out the impacted dewatering sump and to evaluate if the diesel fuel in the sump was localized to the sump or was representative of groundwater conditions. After the diesel fuel was vacuumed out, the sump was pumped down, creating a cone of depression. Diesel fuel slowly bubbled back into the sump, suggesting that a diesel fuel plume was impacting the groundwater surface. At the time, the point-of-origin for the potential plume was unknown.

Numerous interviews and reviews of available drawings indicated that the only potential source for diesel fuel in the area of the RHR building is a 21-inch "dump line" that connects the RHR building to the site's chemical wastewater pond located outside of the protected area of the plant. The RHR building houses four (4) Emergency Diesel Generators (EDGs), which are required as a plant safety system for backup power. Each EDG has a 50,000 gallon diesel fuel tank associated with it that is housed completely within the RHR building. In an extreme emergency, such as a fire, the line is designed to allow the contents of the tank to be dumped directly to the chemical wastewater pond. This line also acts as a stormwater drain, with 4 catch basins located along the 700 feet of line between the RHR building and the chemical wastewater pond.

Inputs of diesel fuel into the line have historically come from two places. Both are operational, and both have been eliminated. The first occurred whenever the EDG diesel fuel tanks were routinely checked for water. A sample was taken for visual inspection, and then discarded into the drain line. This practice has been altered so that the sample is now collected in a drum for energy recovery. The second source, which is minor, occurs during weekly testing of the EDGs. One EDG is run each week for 2.5 hours. Leak by of the fuel injectors results in less than 1.5 liters of diesel fuel each week that drips into the drain. This leak by is now collected for energy recovery as well.

An environmental consultant specializing in hydrogeological projects was contracted in August 2002 to assist the Company with investigating the source of the diesel fuel, to implement a hydrogeological investigation and to implement a remediation strategy. Robotic inspection was determined to be the most effective method to inspect the drain line, prior to developing a hydrogeological investigation work plan. Onsite work at Fermi 2 was delayed several times due to heightened security issues, particularly around September 11. The robotic inspection was performed during a 3-day-long work evolution, beginning on November 20, 2002, and revealed two breaks in the 21-inch line that connects the RHR building within the protected area to the chemical wastewater pond outside of the protected areas of the plant. Concurrently, methods to line the 21" concrete drain line to prevent diesel fuel leakage were investigated. Due to the configuration of the line and associated sumps, approximately 700 gallons of diesel was recovered during the cleaning process that preceded the robotic inspection. Also, a passive skimmer was purchased to recover fuel from the dewatering sump. The Company is currently planning to repair the 2 breaks in the 21" line. This work is a high priority and is expected to be complete in February 2003.

Up to this time, the investigation has been performed using the Part 201 and Part 5 rules as regulatory guidance. Inadvertently, Part II.C.7 of the NPDES Permit was not recognized as being applicable until January 10, 2003, at which time your office was contacted. The Company believes that the investigation into the source of the diesel fuel, and the remedial actions taken thus far, demonstrates commitment to expeditiously define and remediate the contaminant plume and to preventing future loss to the groundwater. The hydrogeological work plan that is being developed is scheduled to be implemented before the end of March, when the site's refueling outage is scheduled to begin.

If you have any questions relative to this report, or desire any additional information, please contact me at (313) 235-8704 or via e-mail at babieramj@dteenergy.com.

Sincerely,

Mary J. Babiera
Environmental Management and Resources

Cc: J. Krejcik

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

April 2, 1987

Mr. P. D. Zugger, Chief
Surface Water Quality Division
Michigan Department of Natural Resources
Stevens T. Mason Building
P. O. Box 30028
Lansing, Michigan 48909

Re: Spill Notification Follow-Up Report
Enrico Fermi Station Unit 1
NPDES Permit No. MI 0001830

Dear Mr. Zugger:

In accordance with Part IIA6 of NPDES Permit No. MI 0001830 and the Part V Rules of the Michigan Water Resources Commission, the Detroit Edison Company is submitting this follow-up report on a sanitary waste spill that occurred on March 30, 1987 at the Enrico Fermi Station, Unit 1 (Plant). At approximately 1545 hours on that date, plant personnel discovered sanitary waste overflowing from the sanitary waste forwarding station, flowing across the parking lot and into a storm drain. The storm drain flows to Outfall 002 which is identified in the above cited NPDES Permit. At approximately 1550 hours the system was secured and a sanitary waste hauler was called in to begin clean up operations. At approximately 1820 hours that day a verbal report of the incident was made to DNR Operator No. 27 at the DNR Emergency Response Center. The quantity of waste spilled could not be determined.

Because of the repetitive nature of this type of incident at the plant, the plant management has reassessed work priorities at the plant to make the sanitary system a high priority item for resolution. A comprehensive engineering analysis of the system has been completed. A total system mechanical upgrading which has been planned will be executed in the near future. A review of the plant operating and maintenance procedures for the system is being made and, if found inadequate, will be upgraded. As part of that review, routine inspection procedures and a preventive maintenance schedule will be developed. Once these steps have been completed, the plant is confident this type of incident will not reoccur.

If you have any questions relative to this report or desire additional information, please contact me on (313) 237-7021.

Sincerely,

Arthur Heidrich, Jr.
Administrator - Water
and Land Use Programs

AH/bjw

cc: M. Fields
R. Schrameck

bcc: J. Flynn
J. Kepus
T. Randazzo
M. Sterling

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

August 19, 1988

Mr. P. D. Zugger, Chief
Surface Water Quality Division
Michigan Department of Natural Resources
Stevens T. Mason Building
P. O. Box 30028
Lansing, MI 48909

Re: Spill Notification Follow-up Report
Fermi 2 - NPDES Permit No. 0037028

Dear Mr. Zugger:

In accordance with Part 5 Rules of the Michigan Water Resources Commission and Part IIA6 of NPDES Permit No. MI 0037028, the Detroit Edison Company is submitting this spill followup report:

On August 13, 1988 at approximately 1400 hours, Fermi 2 notified MDNR PEAS Operator No. 2 that an unknown quantity of non-chemically treated, lake quality, non-contact cooling water had spilled (leaked) through the rock berm surrounding the circulating water reservoir (CWR) and entered Lake Erie. This leakage occurred when the level in the CWR rose above its normal operating range and thus, above the clay liner of the CWR.

CWR level was above its normal operating range for two reasons: 1) an unusually high water input due to unseasonally high lake water temperatures and 2) a below normal outflow due to unanticipated plant operating conditions. CWR level was reduced and is being controlled through a temporary reconfiguration of plant cooling water systems.

To reduce the potential for recurrence, the plant intends to augment its capability to discharge water directly from the CWR to Lake Erie via NPDES Permit MI 37028 Outfall 001.

If you have any questions related to this incident or desire additional information, please contact me on (313) 237-7022.

Sincerely,

Joseph Cazeno Jr.

Joseph Cazeno, Jr.
Administrative Specialist
Water Quality
Environmental Protection

JCJr/lml

cc: A. Heidrich
J. Kepus

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Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

January 9, 1989

Mr. P. D. Zugger, Chief
Surface Water Quality Division
Michigan Dept. of Natural Resources
P. O. Box 30028
Lansing, MI 48909

Re: Spill Notification Follow-Up Report

Dear Mr. Zugger:

On December 13, 1988, at approximately 1447 hours, MDNR Operator No. 16 was notified by the Detroit Edison Company of a possible loss of non-contact cooling water from the closed cycle cooling system at the Fermi-2 power plant. At the time of the discovery, there was no continuing loss of water but observable evidence indicated water had flowed from near the base of the plant's south cooling tower into Swan Creek, a distance of 65 yards. No estimate of the quantity of water loss could be made, the south cooling tower was immediately removed from service and an investigation undertaken.

Periodically, during extremely cold weather, the cooling towers at the Fermi-2 power plant must be operated in the "deicing" mode. In this mode, the warm water is directed to the outer ring of the "active" portion of the tower to reduce ice buildup. Deflector plates at the perimeter of the tower prevent this water from spilling off of the tower onto the ground. The plant speculated that during a previous deicing period, this water spilled from the tower due to either misalignment and/or damage to the plates. The investigation revealed six deflector plates in need of repair. The repairs were completed on December 14, 1988 and the tower has since been returned to service. An increase in the area inspection frequency has been established to more quickly identify this type of problem and prevent recurrence of the incident.

If you have any questions relative to this report or the incident, please call me on (313) 237-7021.

Sincerely,

Arthur Heidrich, Jr.
Administrator
Water & Land Use Programs

AH:pp

cc: C. Morse
R. Schrameck

bcc: J. Flynn
M. Sterling
W. Terrasi

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Detroit Edison 2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

February 3, 1989

Mr. P. D. Zugger, Chief
Surface Water Quality Division
Michigan Dept. of Natural Resources
Stevens T. Mason Building
Lansing, MI 48909

Re: Spill Notification Follow-Up Report
Fermi-2 Power Plant
NPDES Permit No. MI 0037028

Dear Mr. Zugger:

In accordance with Part IIA6 of NPDES Permit No. MI 0037028 (permit), the Detroit Edison Company is hereby submitting to you this follow-up report on a spill notification made to MDNR Operator 20 on January 30,1989. In the evening of January 27, 1989 the Neutralization Tank at the Fermi-2 Power Plant was inadvertently overfilled resulting in a wastewater spill of 30 to 50 gallons on the ground in the vicinity of the tank. The wastewater consisted of demineralizer regenerants and had a pH of 2.2. The wastewater immediately soaked into the ground at the tank location.

Earlier in January, the high level indicator/alarm had been removed from the Neutralization Tank and returned to the manufacturer to be rebuilt because it had malfunctioned. Since that time, visual observations had been used to track tank levels. Prior to each addition of wastewater to the tank, operators made a determination as to whether the remaining tank capacity was sufficient for the anticipated wastewater addition. However, in this case, before the regeneration cycle was completed, the tank was observed overflowing and the regeneration cycle was immediately terminated. The level in the tank was lowered sufficiently to allow the contents of the tank to be treated after which the wastewater was discharged in accordance with Part IA3 of the permit.

It is expected that before the end of February, the level indicator/alarm will be returned from the manufacturer and reinstalled. During the interim period, the operators will be using other installed indicators to prevent reoccurence of this event as well as maintaining greater vigilance.

If you have any questions relative to this report or this incident, please contact me on (313) 237-7021.

Sincerely,

Arthur Heidrich, Jr.

Arthur Heidrich, Jr.
Administrator
Water & Land Use Programs

AH:pp

cc: C. Morse
R. Schrameck

bcc: J. Flynn, D. Grimes, W. Terrasi
M. Sterling

FILE COPY 3/2

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

July 21, 1989

Mr. P. D. Zugger, Chief
Surface Water Quality Division
Michigan Dept. of Natural Resources
P. O. Box 30028
Lansing, MI 48909

Re: Spill Report Follow-Up
Fermi-2 Power Plant
NPDES Permit No. MI 0037028

Dear Mr. Zugger:

On July 13, 1989, at approximately 1730 hours, Detroit Edison personnel reported to the Michigan Department of Natural Resources the inadvertent discharge of chlorine to the discharge canal of the Fermi I Power Plant while chlorinating the Fermi-2 Power Plant intake water. This follow-up report is being submitted by Detroit Edison in conformance with Part IIA6 of NPDES Permit No. MI 0037028.

During the scheduled chlorination cycle on July 13, 1989, it was determined that the General Service Water strainer backwash valves in the Fermi-2 Power Plant intake structure did not isolate the system and allowed chlorinated water to flow to the Fermi I Power Plant overflow canal. The normal strainer backwash flow is to the Fermi I Power Plant overflow canal except during chlorination periods. Upon confirmation of the situation, chlorination was terminated. Upon investigation it was determined that the valves in question were leaking past their seats and were in need of repair. Based on the concentration of chlorine in the water leaking by the valves and the other normal flows in the Fermi I Power Plant overflow canal, it was calculated that the concentration of chlorine in the discharge from the Fermi I Power Plant overflow canal would have been in compliance with the chlorine discharge limitations of Part IA1 of NPDES Permit No. MI 0001830 had the discharge been monitored.

Plant personnel are inspecting and replacing the backwash valves to prevent reoccurrence of the problem. In the interim period, because Fermi-2 Power Plant must chlorinate to prevent damage to plant systems, there is and will continue to be a discharge of chlorinated water to the

Fermi I Power Plant overflow canal while Fermi-2 Power Plant is chlorinating its intake water. The Fermi I Power Plant overflow canal discharge is being monitored in accordance with Part IA1 of NPDES Permit No. MI 0001830 and is in compliance with the chlorine limitations specified in that Permit.

If additional information relative to this temporary operating situation is required, or you have any questions relative to it, please contact me on (313) 237-7021.

Sincerely,

Arthur Heidrich, Jr.
Administrator
Water & Land Use Programs

AH:pp

cc: R. Schrameck

bcc: J. Flynn
D. Gipson
D. Grimes
M. Sterling
W. Terrasi

Detroit Edison 2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

January 7, 1994

Mr. Roy Schrameck, Detroit District Supervisor
Surface Water Quality Division
Michigan Department of Natural Resources
38908 Seven Mile Road
Livonia, Michigan 48152

Re: Spill Notification Follow-up Report
Plant - Fermi 2 Power Plant
NPDES Permit #MI0037028

Dear Mr. Schrameck:

In accordance with Part II A6 of the NPDES Permit No. MI0037028 and the Part 5 Rules of the Michigan Water Resources Commission, the Detroit Edison Company is submitting this follow-up report to your office. On December 31, 1993 at approximately 1550 hours, oil was observed at Fermi 2 Power Plant Outfall 002. The facility is located at 6400 Dixie Highway, Newport, Michigan.

On December 30, 1993 an oil spill follow-up report was submitted to the Michigan Department of Natural Resources regarding a oil spill which occurred at the plant on December 25, 1993 at 1550 hours. That report indicated that after a walk down of the storm sewer, downstream of the spill and an observation of the outfall, no oil or sheen was observed in the sewer or at the outfall. The conclusion was drawn that no oil actually went into the storm sewer. It was speculated at that time when the oil came into contact with the cold asphalt outside the building, the oil flow was altered allowing only the lake water and cooling water to enter the storm sewer.

However, on December 31, 1993, during routine outfall observations, oil was observed at Outfall 002. The ice showed oil stains for about 100 feet on both sides of the discharge. On December 31, 1993, the MDNR was contacted to provide an update regarding the December 25, 1993 oil spill. Also, Marine Pollution Control was contacted to respond to the spill. A containment boom was placed where Swan Creek exits the Detroit Edison property.

This was the only spot where the ice was thin enough to break through and place a boom. Since this boom was probably 1/4 mile downstream of the spill, another containment boom was placed closer to the spill area on January 2, 1994. An absorbent boom at the discharge of outfall 011 was replaced since this outfall is in close proximity to the discharge of outfall 002. As a result of these efforts, the spill is contained with little flow entering the spill area

Based on the ice conditions at the outfall, the Company believes the best option for the clean up is to wait until the ice melts and skim the contained oil off the water surface at that time. This will be performed at the earliest possibility.

Sincerely,

Joseph Cazeno Jr.

Joseph Cazeno, Jr.
Administrative Specialist
Water Quality
Environmental Protection

JCjr/

cc: Robert Miller

bcc: J. Flynn
A. Heidrich
K. Shields
M. Sterling

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

June 3, 1994

Mr. R. Schrameck, Supervisor
Surface Water Quality Division
Southeast Michigan District Headquarters
Michigan Department of Natural Resources
38980 Seven Mile Road
Livonia, Michigan 48152

Re: Spill Notification Follow-Up Report
Fermi-2 Power Plant
NPDES Permit No. MI0037028

Dear Mr. Schrameck:

In accordance with Part IIA6 of NPDES Permit No. MI0037028 and the Part V Rules of the Michigan Water Resources Commission, the Detroit Edison Company is submitting this follow-up report to a spill notification made to MDNR Operator No. 11 at approximately 1400 hours on May 31, 1994, by Mr. Gordon Nader of the Fermi-2 Power Plant staff.

On May 31, 1994, at approximately 1300 hours, during a routine job inspection Fermi-2 Power Plant staff members discovered evidence that a contractor working on the plant site had spilled a small amount of a sealant being used for building maintenance purposes and that the spilled material may have reached surface water by way of a storm sewer. The job was immediately stopped while the soil contacted was removed and the storm sewer covered. For initial reporting purposes, it was estimated that 8 ounces of the material may have reached surface water. The material spilled was a commercial product called Sikadur 52 Injection Adhesive Part B. The Material Safety Data Sheet for the product is attached.

Upon further investigation by the plant staff, it was learned that the spill actually had occurred on May 28, 1994, while the contractor's employees were pre-staging the pump used to apply the material. A small amount of the product believed to be less than 8 ounces leaked from the pump and sprayed on the ground and adjacent storm sewer cover. A small portion of the material on the storm sewer cover dripped into the storm sewer. The contractor's employees immediately wiped up the spilled material on the storm sewer cover but failed to notify the plant staff of the incident.

The Fermi-2 plant staff observed the storm sewer and its outlet but found no evidence of the spill. The staff also observed the absorbent boom which is downstream of the storm sewer outlet in the discharge canal and found no residue. Based on the product's specific gravity, it should have floated on the surface of the water.

The contractor's employees were counseled on the reportability of all spills. No further remedial action is believed necessary at this time.

If you have any questions relative to this report or the spill, or desire additional information, please contact me on (313) 237-7021.

Sincerely,

Arthur Heidrich

Arthur Heidrich, Jr.
Administrator,
Water and Land Use Programs

1/6/97

AH:pr

Attachment

cc: A. MacArthur- Whitman

220.70

FILE COPY

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

December 12, 1995

Mr. R. Schrameck, Supervisor
Surface Water Quality Division
Michigan Department of Environmental Quality
Southeast Michigan District Headquarters
38980 Seven Mile Road
Livonia, Michigan 48152

Re: Spill Notification Follow-Up Report
Fermi-2 Power Plant
NPDES Permit No. MI0037028

Dear Mr. Schrameck:

In accordance with Part IIA6 of NPDES Permit No. MI0037028 and the Part V Rules of the Michigan Water Resources Commission, the Detroit Edison Company is submitting this follow-up report to the notification of a spill of ethylene glycol at the Fermi-2 Power Plant that was make by a member of the plant staff to MDEQ Emergency Operator No. 12 at 1107 hours on December 8, 1995.

At approximately 1010 hours on December 8, 1995, a member of the plant staff who was monitoring the cooling tower deicing system performance noted that the ethylene glycol solution tank level had decreased from the level observed on December 7, 1995. The system was being monitored following the addition of 75 gallons of 50 % ethylene glycol solution to the system on December 7, 1995. A leak check performed on December 7, 1995 had been inconclusive. As a result of the apparent continued loss of the ethylene glycol solution from the system the cooling tower was isolated and removed from service to allow Plant Maintenance to identify the leak. The leak was repaired and the tower was returned to service.

The ethylene glycol solution is use as a hydraulic fluid to actuate the valves which recirculate warm water within the cooling water system to de-ice the system in cold weather. The ethylene glycol solution was leaked into the 35,000,000 gallon closed cooling system of the plant over an undefined period of time and ultimately discharged to Lake Erie through Outfall 001 as a component of the system blowdown.

If you have any questions relative to this report or the spill event, please contact me on (313) 237-7021.

Sincerely,

Arthur Heidrich, Jr.
Administrator,
Water and Land Use Programs

cc: A. MacArthur-Whitman

FILE COPY

220.70

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

February 5, 1996

Mr. R. Schrameck, Supervisor
Surface Water Quality Division
Michigan Department of Environmental Quality
Southeast Michigan District Headquarters
38980 Seven Mile Road
Livonia, Michigan 48152

Re: Spill Notification Follow-Up Report
Fermi-2 Power Plant
NPDES Permit No. MI0037028

Dear Mr. Schrameck:

At approximately 1636 hours on January 31, 1996, a member of the Fermi-2 Power Plant staff notified MDEQ Emergency Operator No.44 of a spill of Ethylene Glycol at the Fermi-2 Power Plant. The Company recognizes that Ethylene Glycol is not a substance listed on the Critical Materials Register and that the notification provided and this follow-up report are, therefore, not required under the Part V Rules, however, in the interest of full disclosure the Company felt the Notification and the Follow-Up Report should be made.

At approximately 1547 hours on January 31, 1996, an operator on routine rounds discovered that one of the four Ethylene Glycol reservoirs on the south cooling tower deicing system was empty. Upon investigation it was determined that an elbow and line leak had occurred in the deicing system. As a result, approximately 40 gallons of a 50% solution of Ethylene Glycol (approximately 117 pounds of pure Ethylene Glycol) were lost to the 35 million gallon closed cooling system of the plant which ultimately discharges to Lake Erie through Outfall 001. The leaks were repaired and the system was returned to service.

Due to the repetitive nature of the problems encountered with the cooling tower deicing system this winter, the investigation has received a high degree of management attention. The root cause of the problems encountered is still under investigation, however. The plant's corrective action system will further document the cause or causes and the required corrective actions to prevent reoccurrence. It is the Company's intent to supplement this report with its findings when the root cause(s) has been identified and corrective action implemented.

If you have any questions relative to this report of the incident, please contact me on (313) 235-7021.

Sincerely,

Arthur Heidrich, Jr.
Administrator,
Water and Land Use Programs

AH:pr

cc: A. MacArthur-Brown

220.70

FILE COPY

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

April 17, 1996

Mr. R. Schrameck, Supervisor
Surface Water Quality Division
Michigan Department of Environmental Quality
Southeast Michigan District Headquarters
38980 Seven Mile Road
Livonia, Michigan 48152

Re: Follow-Up Report - Unusual Characteristic of Discharge Notification
NPDES Permit No. MI0037028
Fermi 2 Power Plant

Dear Mr. Schrameck:

In accordance with Part IA4c of NPDES Permit No. MI0037028, the Detroit Edison Company is submitting this follow-up report to the notification of an unusual characteristic of a discharge, an oil sheen, that was made to Mr. W. Stone of your staff at approximately 0830 hours on April 15, 1996, by a member of the Fermi 2 Power Plant staff.

At approximately 1130 hours on April 13, 1996, a plant operator, while performing routine outfall observations, noted an oil sheen at Outfall 002 which was discharging storm water at the time. The Plant Nuclear Shift Supervisor was promptly notified of the situation and remedial action was commenced. An absorbent boom was placed at the discharge pipe and the oil was cleaned up. The oil sheen did not reach Swan Creek. The amount of oil involved was originally estimated to be approximately one gallon, however, based on the duration and amount of oil observed during the clean up, that estimate was revised to one quart or less.

Since oil is not expected to be discharged from Outfall 002, an inspection of the storm drains and the associated storm water collection area was conducted. No oil source in or around the storm drains was found. The Company believes the most plausible explanation of this incident is that oil residue from a previous spill or spills which was trapped somewhere in the storm drain was released following a sudden snow melt combined with rainfall events. A similar incident occurred on January 17, 1996. It was concluded at that time that the oil had been trapped in the storm drain during the oil spills which occurred on either December 25, 1993 and/or March 8, 1995. Following that incident the storm drain was flushed with water in an attempt to remove any additional oil it might contain. The plant is considering the practicality of cleaning the storm drain to prevent a similar future release.

If you have any questions relative to the incident or this report, please contact me on (313) 235-7021.

Sincerely,

Arthur Heidrich, Jr.
Administrator,
Water and Land Use Programs

AH:pr

cc: W. Stone

FILE COPY

220.70

Detroit Edison

2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

June 7, 1996

Mr. R. Schrameck, Supervisor
Surface Water Quality Division
Michigan Department of Environmental Quality
Southeast Michigan District Headquarters
38980 Seven Mile Road
Livonia, Michigan 48152

Re: Spill Notification Follow-Up Report
Fermi-2 Power Plant
NPDES No. MI0037028

Dear Mr. Schrameck:

In accordance with the Part V Rules and Part IIA6 of NPDES Permit No. MI0037028, the Detroit Edison Company is submitting this follow-up report to the notification of a spill of waste water at the Fermi-2 Power Plant that was made by a member of the plant staff to MDEQ Emergency Operator No. 17 at approximately 2347 hours on June 2, 1996.

At approximately 2217 hours on June 2, 1996, a member of the plant staff observed a ruptured hose spraying water onto the ground. The hose was being used to recirculate uncontaminated storm water, prior to sampling, that had been collected in the Neutralization Tank located near the Auxiliary Boiler Building. It was intended that following sampling the storm water would be discharged to the sanitary sewer system for disposal. It was estimated that approximately 1500 gallons of storm water were spilled on the gravel surface outside the building. The pH of the spilled water was 7.0. The recirculation pump was shut down immediately upon discovery of the ruptured hose and the incident was reported to plant management.

The incident is presently under review by plant management to determine what, if any, remedial action and /or procedural changes are necessary to ensure that this type of incident is not repeated.

The Company appreciates that the reporting of this type of spill event is not required under the Part V Rules or the terms of the plant's recently reissued NPDES Permit. However, until the plant's spill reporting procedures are revised to reflect the recently received spill reporting guidance from the Michigan Department of Environmental Quality and the terms of the reissued NPDES Permit, the Company is required under the terms of its operating license from the Nuclear Regulatory Commission to fully comply with all of the plant environmental procedures as long as they remain in force. It is expected that the plant will have its spill reporting procedures revised within the next 60 days, however, until that it is accomplished it will continue to report spills in accordance to those procedures.

If you have any questions relative to this report or the spill reporting procedure revision, please call me on (313) 235-7021.

Sincerely,

Arthur Heidrich, Jr.
Supervisor,
Water and Land Use Programs

AH:pr

cc: A. MacArthur-Brown

The Detroit Edison Company
2000 2nd Ave., Detroit, MI 48226-1279

220.70

FILE COPY

Detroit Edison
A DTE Energy Company

March 22, 2000

Mr. Linn Duling, Supervisor
Surface Water Quality Division
Michigan Department of Environmental Quality
Jackson District Office
State Office Building
301 E. Louis B. Glick Highway
Jackson, Michigan 49201

Re: Overland Cooling Water Spill Follow-up Report
Fermi 2 Power Plant
NPDES Permit No. MI0037028

Dear Mr. Duling:

In accordance with Part IIA6 of NPDES Permit No. MI0037028, the Detroit Edison Company is submitting this follow-up report to the notification of a treated cooling water spill at the Fermi 2 Power Plant that was communicated to Mathew Campbell of the MDEQ at 1532 hours on March 15, 2000.

Environmental personnel at Fermi 2 discovered the event at 1150 hours on March 15, 2000. Leakage from the south cooling tower was flowing overland into the Fermi 2 overflow canal, which subsequently flows into Swan Creek. The release was estimated to have a flow rate of approximately 5 gallons per minute. Flow to the overflow canal was blocked using earthen berms, and the flow stopped at approximately 1345 hours. An inspection by environmental health personnel at 0630 hours on March 16, 2000 confirmed that the earthen berms remained effective in isolating the overflow canal from the cooling tower water.

Because the cooling tower water is treated with chlorine and scale inhibitors, four separate grab samples between the cooling tower and the overflow canal were analyzed. Chlorine was detected in the range of 180 μg/l near the cooling tower and 100 μg/l in a puddle near the overflow canal. Chlorine was not detected (<30μg/l) at the point where the cooling tower water entered the canal. Although chlorine was not detected at the point where the cooling tower water entered the canal, it could not be verified that trace amounts of chlorine and other chemicals were not present. Therefore, it was conservatively assumed that polluting materials, as defined in the Michigan Critical Materials Register, had entered the overflow canal. Because chlorine was not detected at the entry point to the canal, it is believed that the reportable quantity of chlorine (10 pounds) was not exceeded.

Lynda Craine of Fermi 2 Environmental Health verbally notified Mathew Campbell of the MDEQ of the release at 1532 on March 15, 2000. Mr. Campbell requested additional chlorine analysis at the entry point into the overflow canal and where the canal discharged into Swan Creek. Analysis of these samples was completed at 1610 on March 15, 2000. The results indicated chlorine levels in both samples to be below the detection level of 30 μg/l. Its appears that no environmental degradation to the waters of the state has occurred as a result of this release, since chlorine was not detected in water samples collected from the following locations: (1) water flowing into the overflow canal, (2) the overflow canal, and (3) at the confluence of the overflow canal and Swan Creek.

The cause of the release was determined to be degraded concrete located on the top of the access door to the cooling tower. A work request to temporarily repair the cooling tower leak was written on the day of the release. Repairs were completed by 1500 hours on March 17, 2000. Permanent repair of the cooling tower leak will be completed as scheduled during a routine refueling outage, which begins in April 2000.

If you have any questions relative to this report or desire additional information, please contact me at (313) 235-8704, or via email at babieram@dteenergy.com.

Sincerely,

Mary J. Babiera

Mary J. Babiera
Environmental Management & Resources

cc: M. Campbell

Bcc: S. Boyd
L. Craine
P. Fessler
E. Kokosky
P. Marquardt
M. Rodenberg
File 220.70

The Detroit Edison Company
2000 2nd Ave., Detroit, MI 48226-1279

Detroit Edison

A DTE Energy Company

March 28, 2000

Mr. Linn Duling, Supervisor
Surface Water Quality Division
Michigan Department of Environmental Quality
Jackson District Office
State Office Building
301 E. Louis B. Glick Highway
Jackson, Michigan 49201

Re: Unusual Characteristic, Foam - Follow-up Report
Fermi 2 Power Plant
NPDES Permit No. MI0037028

Dear Mr. Duling:

In accordance with Part IA1c of NPDES Permit No. MI0037028, the Detroit Edison Company is submitting this follow-up report after observation of unusual foaming at the Fermi 2 Power Plant - Outfall 001 on March 23, 2000, which was communicated to Mr. Matthew Campbell of the MDEQ.

Environmental personnel at Fermi 2 observed the foam at 0900 hours on March 23, 2000 and contacted Mr. Campbell, who asked that the plant investigate to determine if there were any operational conditions that may have resulted in this occurrence. By 1340 hours on March 23, 2000, foaming was no longer apparent at Outfall 001.

In a telephone conversation on March 24, 2000, Ms. Lynda Craine (General Supervisor, Environmental Health – Fermi 2 Power Plant) and Mr. Robert Nearhoof (General Supervisor, Chemistry – Fermi 2 Power Plant), stated that circulating water additive calculations were verified, samples were analyzed, and additional visual observations were made. It is their conclusion that the foaming seen on March 23, 2000 was most likely caused by a combination of mechanical agitation due to low lake level and extremely calm weather conditions, and is therefore natural in origin.

Fermi 2 personnel took a conservative action in contacting Mr. Campbell regarding the observed foaming at Outfall 001, and have agreed to continue monitoring the discharges from this outfall (daily visual observations are required as part of NPDES Permit No. MI0037028). In a telephone conversation with Ms. Craine on March 24, 2000, Mr. Campbell stated that this situation is not considered to be an issue, but that he desired a follow up letter to document their conversation.

If you have any questions relative to this letter or desire additional information, please contact me at (313) 235-8704, or via email at babieram@dteenergy.com.

Sincerely,

Mary J. Babiera

Mary J. Babiera
Environmental Management & Resources

cc: M. Campbell

Bcc: S. Boyd
L. Craine
P. Fessler
E. Kokosky
P. Marquardt
R. Nearhoof
M. Parrish
M. Rodenberg
File 220.70

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
JACKSON DISTRICT OFFICE

JENNIFER M. GRANHOLM
GOVERNOR

DEQ

STEVEN E. CHESTER
DIRECTOR

January 27, 2003

CERTIFIED MAIL

NOTICE LETTER
NL-01-03-03-011J

Ms. Mary J. Babiera
Environmental Management and Resources
Detroit Edison Company
2000 2nd Avenue
Detroit, Michigan 48226-1279

Dear Ms. Babiera:

SUBJECT: Detroit Edison Company-Fermi 2 Power Plant
NPDES Permit No. MI0037028
Loss of Oil to Groundwater Reporting Requirements

The Department of Environmental Quality (DEQ), Water Division (WD), received your written report on January 23, 2003, regarding the loss of diesel fuel to the groundwater at the Detroit Edison Company-Fermi 2 Power Plant (Detroit Edison). We had also received an initial verbal notification of this incident on January 10, 2003. It is understood from your correspondence that this incident was not immediately reported to the DEQ based on the Part 201, Environmental Remediation, and Part 5 Rules of Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). Your report to the WD was in compliance with Part II. Section C.7 of the facility National Pollutant Discharge Elimination System permit.

A copy of your written report and information regarding this incident has been referred to the Remediation and Redevelopment Division (RRD). You may contact the RRD District Supervisor, Mitch Adelman, at 517-780-7852 or Dowe Parsons at 517-780-7919 for further information on remediation efforts or requirements associated with this incident.

As stated in the Part 5 Rules, R 324.2007 Pollution incident report, "As soon as practicable after detection of a release, the owner, operator, or manager of an oil storage facility or an on-land facility that releases or permit to be released any polluting material in excess of a threshold reporting quantity during any 24-hour period shall notify the department by contacting the department's PEAS at 1-800-292-4706." Upon the initial discovery of the diesel fuel in the dewatering sump, it was evident that the volume was within reportable parameters as described per R 324.2002 Definitions, "..."Threshold reporting quantity" means any of the following: ... (ii) For release of oil to the waters of the state, any quantity that causes unnatural turbidity, color, visible sheens, oil films, foams, solids, or deposits in the receiving waterbody." In spite of Detroit Edison's immediate evaluation failing to show any obvious source of the oil, by definitions of Part 5 Rules, a release of this nature is required to be reported as soon as practicable. Whereas Detroit Edison does meet the definition of an on-land facility and the release of diesel fuel was in excess of a threshold reporting quantity, you are in violation of pollution incident reporting requirements as specified in Part 5 Rules of Part 31 of NREPA, as amended.

You are hereby required to verify that procedures are in place to ensure immediate notification is provided to the DEQ upon discovering a release of polluting materials impacting waters of the state.

This Notice Letter does not preclude nor limit the DEQ's ability to initiate any other enforcement action, under state or federal law, as deemed appropriate. Please provide the required verification by February 28, 2003. Feel free to contact me should you have any questions regarding this letter.

Sincerely,

Jennifer Krejcik

Jennifer Krejcik
Environmental Quality Analyst
Field Operations Section
Water Division
517-780-7933

cc: PCS Unit, WD, DEQ-Lansing
Mr. Mitch Adelman, RRD, DEQ-Jackson District Office
Mr. Dowe Parsons, RRD, DEQ-Jackson District Office
File: DECO-Fermi 2, Correspondence, Monroe County

220.70

FILE COPY

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

1991 ELECTRIC UTILITY OF THE YEAR

August 2, 1993

Mr. R. Schrameck, Supervisor
Surface Water Quality Division
Southeast Michigan District Headquarters
Michigan Department of Natural Resources
38980 West Seven Mile Road
Livonia, Michigan 48152

Re: Follow-Up Report - Cooling Water Loss
Fermi-2 Power Plant
NPDES Permit No. MI0037028

Dear Mr. Schrameck:

In accordance with Part IIA6 of NPDES Permit No. MI0037028, the Detroit Edison Company is submitting this report as a follow-up to a telephone report made to the Michigan Department of Natural Resources on July 26, 1993, at 1140 hours notifying the Department that there had been an unplanned loss of cooling water to Lake Erie at the Fermi-2 Power Plant.

At 1050 hours on July 26, 1993, a system engineer trouble shooting a pressure problem on the plant's General Service Water System discovered that a normally closed cooling water recirculation valve in the General Service Pump House (plant intake structure) had been inadvertently opened by a maintenance person. The valve was immediately secured restoring the system to its normal configuration. The valve was open for a period of approximately 45 minutes.

As a result of the operation of the valve, cooling water from the cooling water reservoir was allowed to flow back to the General Service Pump House. Although the General Service Water Pumps were in service at that time, a temporary net water flow out of the intake structure was observed by the system engineer. Analysis of the water indicated that had the water been discharged through its normal flow path to Lake Erie (Outfall 001), it would have met the discharge limitations specified in Part IA1 of the Permit.

The plant staff has taken steps to better identify the electrical control switch that operates the valve and has de-energized the switch so that even if the switch were to be inappropriately operated in the future the valve would not be opened. In addition, the plant staff has formed a fact finding team to investigate the incident. Based on the results of that investigation any further remedial action deemed necessary will be taken to ensure the incident will not be repeated.

If you have any questions relative to this report or the incident, please contact me on (313) 237-7021.

Sincerely,

Arthur Heidrich, Jr.
Administrator,
Water and Land Use Programs

AH:pr

cc: C. Panagiotides

bcc: S. Bartman
A. Blount
R. Eberhardt
J. Flynn
R. McKeon
K. Shields
M. Sterling
File 220.70

NRC3-09-0014
RAI Question HY2.3.1-15

Enclosure 2

Radioactive-Waste Liquid Effluent Discharge Reports
(following 147 pages)

Frank E. Agosti
Vice President
Nuclear Operations

Detroit Edison

Fermi 2
6400 North Dixie Highway
Newport, Michigan 48166
(313) 586-4150

Nuclear Operations

February 28, 1986
VP860017

PRODUCTION INFORMATION CENTER

Mr. James G. Keppler
Regional Administrator
Region III
U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Dear Mr. Keppler:

Reference: (1) Fermi 2
NRC Docket No. 50-341

(2) Appendix A, Facility Operating License
No. NPF-43, Technical Specification 6.9.1.8

Subject: Semi-Annual Radiological Effluent Release Report

The Semi-Annual Effluent Release Report for Fermi 2 is attached. This report is being transmitted in compliance with Reference 2 and Regulatory Guide 1.21, Revision 1. The attached report covers the period from July 1 through December 31, 1985.

Please direct any questions or requests for additional information to Mr. Lewis Bregni at (313) 586-5313.

Sincerely,

F. E. Agosti

F. E. Agosti
Vice President
Nuclear Operations

cc: W. G. Rogers
M. D. Lynch
G. C. Wright
USNRC Document Control Desk
Washington, D. C. 20555

DETROIT EDISON COMPANY

FERMI-2

LICENSE NO. NPF - 43

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
FOR THE PERIOD
JULY 1, 1985 THROUGH DECEMBER 31, 1985

TABLE OF CONTENTS

LIST OF TABLES

INTRODUCTION

This Semi-annual Radioactive Effluent Release Report, hereinafter referred to as this REPORT, for the period July 1, 1985 through December 31, 1985 is submitted in accordance with Appendix A to Fermi-2 Plant, License No. 43. The appendix will be referred to hereinafter as the Fermi-2 Technical Specifications, or Tech. Specs.

For all effluent releases, the concentrations of radioactive material were within the required limits.

A. Supplemental Information

A.1 Regulatory Limits

a. Liquid Effluents

1) Concentration (Tech. Spec. 3.11.1.1)

The concentration of radioactive material released in liquid effluents to UNRESTRICTED AREAS shall be limited to the concentrations specified in 10CFR20, Appendix B, Table II, Column 2, for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 2.0 E-4 microcuries/ml total activity.

2) Dose (Tech. Spec. 3.11.1.2)

The dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released, from each reactor unit, to UNRESTRICTED AREAS shall be limited: During any calendar quarter to less than or equal to 1.5 mrems to the total body and to less than or equal to 5 mrems to any organ; and during any calendar year to less than or equal to 3 mrems to the total body and to less than or equal to 10 mrems to any organ.

b. Gaseous Effluents

1) Unrestricted Area Boundary Dose Rate (Tech. Spec. 3.11.2.1)

The dose rate, due to radioactive materials releases in gaseous effluent from the site to areas at and beyond the SITE BOUNDARY shall be limited to the following:

a) For noble gases: Less than or equal to 500 mrems/yr to the total body and less than or equal to 3000 mrems/yr to the skin, and,

b) For iodine-131, iodine-133, tritium, and for all radionuclides in particulate form, with half-lives greater than 8 days: Less than or equal to 1500 mrems/yr to any organ.

2) Unrestricted Area Air Dose (Tech. Spec. 3.11.2.2)

The air dose due to noble gases released in gaseous effluents, from each reactor unit, to areas at and beyond the SITE BOUNDARY shall be limited to the following:

a) During any calendar quarter: Less than or equal to 5 mrads for gamma radiation and less than or equal to 10 mrads for beta radiation.

b) During any calendar year: Less than or equal to 10 mrads for gamma radiation and less than or equal to 20 mrads for beta radiation.

3. Unrestricted Area Dose to Individual (Tech. Spec. 3.11.2.3)

The dose to a MEMBER OF THE PUBLIC from I-131, I-133, tritium, and all radionuclides in particulate form with half-lives greater than eight days, in gaseous effluents released, from each reactor unit, to areas at and beyond the SITE BOUNDARY shall be limited to the following:

a) During any calendar quarter: Less than or equal to 7.5 mrems to any organ.

b) During any calendar year: Less than or equal to 15 mrems to any organ.

c. Calculations

Equations and constants used to verify compliance with the above criteria are given in the Offsite Dose Calculation Manual (ODCM), previously submitted on October 11, 1984.

A.2 Maximum Permissible Concentrations

a. Liquids

The Maximum Permissible Concentrations (MPC) in liquids are those in 10CFR20, Appendix B, Table II, Column 2, with the lower of the soluble and insoluble MPC being used in all cases. For dissolved and entrained noble gases, an MPC of 2.0 E-4 microcuries/ml is applied.

b. Gases

The Fermi-2 Technical Specifications for gaseous effluents do not contain a concentration requirement. Therefore, MPC for gases does not apply.

A.3 Average Energy

Average Energy of effluent radionuclide mixtures does not apply to the Fermi-2 Technical Specifications or the ODCM.

A.4 Measurements and Approximations of Total Radioactivity

The following discussion summarizes the methods used to measure total radioactivity in gaseous and liquid effluents. Tables A4.2 and A4.1 give the sampling and analysis frequencies of gaseous and liquid effluents respectively.

a. Gaseous Effluents

Table A4.2 (which is Table 4.11.2.1.2-1 of Fermi-2 Technical Specifications) summarizes the gaseous waste sampling and analysis program. The four types of total radioactivity listed in Table B1.1 of this REPORT are discussed separately below. Note that in accord with the ODCM, gaseous effluent stack flow rates are always assumed to be the maximum design values. As a result, estimates of radioactivity are high, and error estimates are large in a conservative manner.

1) Fission and Activation Gases

Fission and activation gases are quantified by the gamma-ray analysis of appropriate samples using germanium detectors and multichannel analyzers. The radionuclides measured and included in the dose calculations (when present in measureable quantities as defined in Table A4.2) include the following:

Kr-85m	Kr-88	Xe-135m
Kr-85	Xe-133m	Xe-135
Kr-87	Xe-133	Xe-138

The reported total of fission and activation gases is maximum value of the sum of the releases of the above gases in all batch and continuous releases.

Considering uncertainties in radiation counting and in volume, flowrate, and pressure measurements, total fission and activation gases estimates are expected to be in error by less than 7.4% low and 50.3% high.

2) Radioiodines and Particulates

Radioiodines and particulates are quantified by the gamma-ray analysis of charcoal and filter cartridges using high-resolution germanium detectors and multichannel analyzers. In each case, the sampling flowrate for these continuous effluent samplers, the maximum flowrate in the sampled effluent paths, and the length of the sample period are known. The radionuclides measured and included in the dose calculations (when present in measurable quantities as defined in Table A4.2) include the following:

Mn-54	Zn-65	Cs-134	Other nuclides
Fe-59	Mo-99	Cs-137	with half-lives
Co-58	I-131	Ce-141	greater than
Co-60	I-133	Ce-144	8 days

The filters are also composited and separately analyzed for Sr-89, Sr-90, and gross alpha radioactivity. When detectable, these totals are included in the reported total particulate releases.

Considering uncertainties in radiation counting and in volume, flowrate, and pressure measurements, total radioiodine and particulate estimates are expected to be in error by less than 22.9% low and 54.8% high.

3) Tritium

Tritium is analyzed by liquid scintillation counting of special grab samples. The sum of the tritium results for all batch and continuous grab samples is reported as the total tritium release.

Considering uncertainties in radiation counting and in volume, flowrate and pressure measurements, total tritium estimates are expected to be in error by less than 12.3% low and 51.2% high.

b. Liquid Effluents

Table A4.1 (which is Table 4.11.1.1.1-1 of the Fermi-2 Technical Specifications) summarizes the liquid waste sampling and analysis program. The four types of total radioactivity given in Table C1.1 of this REPORT are discussed below.

1) Fission and Activation Products

Fission and activation products are quantified by the gamma-ray analysis of appropriate batch, grab and composite samples using high-resolution germanium detectors and multichannel analyzers. The radionuclides measured and included in the dose calculations (when present in measurable quantities as defined in Table A4.1) include the following:

Mn-54	Zn-65	Ce-144
Fe-59	Mo-99	Ba/La-140
Co-58	Cs-134	Other radio
Co-60	Cs-137	nuclides as
	Ce-141	appropriate

Composite samples are also analyzed for Fe-55 (by chemical separation and liquid scintillation counting), and for Sr-89 and Sr-90 (by chemical separation and proportional counting).

The total release given in this REPORT is the sum of all the above radionuclides in all batch and continuous release.

Considering uncertainties in radiation counting and flowrate and volume measurements, total fission and activation product estimates are expected to be in error by less than 14.3%.

2) Tritium

Tritium in batch or continuous releases is quantified by liquid scintillation counting of an appropriate composite sample. The total tritium activity reported is the sum of the tritium activities in all batch and continuous releases.

Considering uncertainties in radiation counting and in flow rate and volume measurements, total tritium estimates are expected to be in error by less than 14.3%.

3) Dissolved and Entrained Gases

Dissolved and entrained gases are quantified by the gamma-ray analysis of monthly grab samples, using high-resolution germanium detectors and multichannel analyzers. The radionuclides measured and included in the dose calculations (when present in measurable quantities as defined in Table A4.1) include the following:

Ar-41	Kr-90	Xe-135m
Kr-85m	Xe-131	Xe-135
Kr-85	Xe-133	Xe-137
Kr-88	Xe-133m	Xe-138
Kr-89		

Considering uncertainties in radiation counting and in flowrate and volume measurements, total dissolved and entrained gases estimates are expected to be in error by less than 15.0%.

4) Gross Alpha

Gross Alpha-emitting radionuclides are quantified by the counting of appropriate composite samples in a 2-pi geometry gas flow proportional counter. Considering uncertainties in radiation counting and in flowrate and volume measurements, total gross alpha estimates are expected to be in error by less than 22.5%.

A.5 Batch Release Summary

A summary of statistical data for batch releases is found in Table A5.1 of this REPORT. Stream flow data do not apply since Fermi-2 effluents pass directly into Lake Erie.

A.6 Abnormal Releases

The following summarizes abnormal releases which occurred during the six month reporting period.

a. Missed Sample of Primary Containment Atmosphere

On October 11 and 13, 1985, the primary containment was vented through the Reactor Building Ventilation Exhaust System and subsequently through the Reactor Building Exhaust Plenum. Samples of the primary containment atmosphere were not taken prior to initiating the venting. This is contrary to Fermi 2 Technical Specifications.

Effluents which are vented from the primary containment atmosphere are continuously monitored by the Reactor Building Ventilation Exhaust radiation monitor and subsequently by the Reactor Building Exhaust Plenum radiation monitor. Both monitors were capable of annunciating an alarm in the plant Control Room, if regulatory release limits were exceeded, allowing the operator to terminate the release. In addition, the Reactor Building Ventilation Exhaust radiation monitor will automatically terminate the release if regulatory limits are exceeded.

Samples of the primary containment atmosphere, taken previous to and after the venting, showed no detectable radioactivity.

This occurrence was reported in Licensee Event Report (LER) 85-070.

b. Condensate Storage Tank (CST) Spill

On November 17, 1985 approximately 35,000 gallons of water from the Condensate Storage Tank (CST) were spilled into the diked area surrounding the tank. Approximately 100 gallons of the spill water was recovered, with the majority soaking into the ground. Samples were taken of the CST water and of the spill water. Additionally, core samples have been taken of the ground around the CST, both inside and outside of the diked area.

Sample results from the CST sample water are shown below. The ground core samples have been sent off site for analysis and results should be available in March 1986. A preliminary radiological assessment of this occurrence has been performed, based on the CST water sample results. The potential radiation dose to a member of the public was calculated as 0.002 to 0.08 mrem, using conservative calculational assumptions and methods. This is less than 1% of the annual limit of 10 mrem in the Fermi 2 Technical Specifications.

Detroit Edison is still investigating this occurrence.

CST Water Sample Results

Radionuclide	Concentration (uCi/ml)	Total Activity* (uCi)
H-3	1.75 E-5	2320
Cr-51	4.92 E-7	65
Mn-54	6.31 E-8	8
Co-58	8.26 E-7	109
Co-60	1.26 E-7	17

* based on 35,000 gallons

c. Inoperable Radiation Monitor Sample Pump During Liquid Effluent Discharge

On November 27, 1985 an operator failed to place a sample pump in service for the Circulating Water Reservoir Decant Line radiation monitor during a discharge of two (2) waste sample tanks. This was contrary to Fermi 2 Technical Specifications.

The effluent discharge from the waste sample tanks is also monitored by the Liquid Radwaste Effluent radiation monitor, which will automatically terminate a release whenever the regulatory release limits are exceeded. This monitor was in service during the entire release period, in accordance with Technical Specifications. In addition, samples taken from the waste sample tanks prior to initiating the discharge showed no detectable radioactivity.

Samples are routinely taken from the Circulating Water Reservoir to confirm that there is no radioactivity present in the Circulating Water System. Samples taken previous to and after the discharge showed no detectable radioactivity.

This occurrence was reported in Licensee Event Report (LER) 85-080.

d. Discharge from Circulating Water Reservoir

On October 17, 1985 approximately 1.2 million gallons of water was inadvertently drained from the Circulating Water Reservoir (CWR) through the General Service Water (GSW) inlet to Lake Erie. Routine samples taken from the CWR previous to and after the release showed no detectable radioactivity. The routine sampling of the CWR is done to confirm that there is no radioactivity in the circulating water system.

No radioactivity was released, and this occurrence was not contrary to Technical Specifications. It has been included in this report for completeness.

B. Gaseous Effluents

B.1 Summation of all Releases

The Gaseous Effluent Summation for the Fermi-2 Plant is given in Table B1.1. Because the Fermi-2 Technical Specifications are dose-based, not curie-based, the lines labeled "% of Technical Specification Limit" do not apply, but are included in the standard report software used.

B.2 Continuous Releases

Continuous gaseous releases from the Fermi-2 Plant are summarized by release height in Table B2.1. No credit is taken for elevated releases, thus all releases are considered to occur at ground level, per the ODCM.

B.3 Batch Releases

No batch gaseous releases are made from the Fermi-2 Plant.

C. Liquid Effluents

C.1 Summation of all Releases

The Liquid Effluent Summation for the Fermi-2 Plant is given in Table C.1.1.

C.2 Liquid Release Summary by Mode

Liquid releases by mode for the Fermi-2 Plant are summarized in Table C2.1. No continuous liquid releases were made from the Fermi-1 Plant.

D. Solid Waste

D.1 The volume, activity, and disposition of solid waste shipments during the reporting period are summarized in Table D1.1.

E. Radiation Dose to the Public

E.1 Doses to members of the public from liquid effluents from the Fermi-2 Plant during the reporting period are summarized in Table E1.1. The maximum exposed individual for the purpose of this calculation is one who consumes fish caught 1770 meters northeast of the Fermi-2 plant.

E.2 Doses to members of the public from gaseous effluents from the Fermi-2 Plant during the reporting period are summarized in Table E2.1. Air doses and individual doses due to noble gases are computed at the site boundary, in the northeast sector. For the purpose of organ dose calculations, the maximally exposed individual is an infant in the west-northwest sector exposed via the inhalation, ground plane, and grass/goat/milk pathways.

E.3 Doses calculations for members of the public onsite are not applicable at Fermi-2.

E.4 No new locations were identified by the land use census for environmental monitoring and dose calculations.

F. Meteorological Data

F.1 First Quarter Summary

The joint frequency tables of wind speed and direction with atmospheric stability for the first calendar quarter of the reporting period are given in Table F1.1 for the 10 meter level and in Table F2.1 for the 60 meter level.

F.2 Second Quarter Summary

The joint frequency tables wind speed and direction with atmospheric stability for the second calendar quarter of the reporting period are given in Table F2.1 for the 10 meter level and Table F2.2 for the 60 meter level.

F.3 Third Quarter Summary

The joint frequency tables of wind speed and direction with atmospheric stability for the third calendar quarter of the reporting period are given in Table F3.1 for the 10 meter level and Table F3.2 for the 60 meter level.

F.4 Fourth Quarter Summary

The joint frequency tables wind speed and direction with atmospheric stability for the fourth calendar quarter are given in Table F4.1 for the 10 meter level and Table F4.2 for the 60 meter level.

F.5 Annual Summary

The joint frequency tables wind speed and direction with atmospheric stability for the calendar year 1985 are given in Table F5.1 for the 10 meter level and Table F5.2 for the 60 meter level.

F.6 Atmospheric Stability

Criteria used to classify atmospheric stability in the compilation of the joint frequency tables are given in Table F6.1 of this report.

G. Notification of Changes

G.1 Changes to the Process Control Program (PCP)

The PCP was changed as summarized in Table G1.1, effective November 11, 1985.

G.2 Changes to the Offsite Dose Calculation Manual (ODCM).

The ODCM was changed as summarized in Table G2.1, effective November 27, 1985.

TABLE A 4.1

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

Liquid Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection (LLD)[a] (μCi/ml)
A. Batch Waste Release[b] Sample Tanks (3)	P Each Batch	P Each Batch	Principal Gamma Emitters[c]	$5x10^{-7}$
			I-131	$1x10^{-6}$
	P One Batch/M	M	Dissolved and Entrained Gases (Gamma Emitters)	$1x10^{-5}$
	P Each Batch	M Composite[d]	H-3	$1x10^{-5}$
			Gross Alpha	$1x10^{-7}$
	P Each Batch	Q Composite[d]	Sr-89, Sr-90	$5x10^{-8}$
			Fe-55	$1x10^{-6}$
B. Continuous Releases[e] General Service Water System (GSW) (If Contaminated)	NA	M Composite[d]	Principal Gamma Emitters[c]	$5 x10^{-7}$
			I-131	$1x10^{-6}$
	W Grab Sample	M	Dissolved and Entrained Gases (Gamma Emitters)	$1x10^{-5}$
	NA	M Composite[d]	H-3	$1x10^{-5}$
			Gross Alpha	$1x10^{-7}$
	NA	Q Composite[d]	Sr-89, Sr-90	$5x10^{-8}$
			Fe-55	$1x10^{-6}$

TABLE A 4.1 (Continued)

TABLE NOTATION

[a]The LLD is defined, for purposes of these specifications, as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66\ s_b}{E \cdot V \cdot 2.22 \times 10^6 \cdot Y \cdot \exp(-\lambda \Delta t)}$$

Where:

LLD is the "a priori" lower limit of detection as defined above, as microcuries per unit mass or volume,

s_b is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate, as counts per minute,

E is the counting efficiency, as counts per disintegration,

V is the sample size in units of mass or volume,

2.22×10^6 is the number of disintegrations per minute per microcurie,

Y is the fractional radiochemical yield, when applicable,

λ is the radioactive decay constant for the particular radionuclide, and

Δt for plant effluents is the elapsed time between the midpoint of sample collection and time of counting.

Typical values of E, V, Y, and Δt should be used in the calculation.

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement.

[b]A batch release is the discharge of liquid wastes of a discrete volume. Prior to sampling for analyses, each batch shall be isolated, and then thoroughly mixed by a method described in the ODCM to assure representative sampling.

TABLE A 4.1 (Continued)

TABLE NOTATION

[c]The principal gamma emitters for which the LLD specification applies exclusively are: Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141, and Ce-144. This does not mean that only these nuclides are to be considered. Other peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Semiannual Radioactive Effluent Release Report pursuant to Specification 6.9.1.8.

[d]A composite sample is one in which the quantity of liquid samples is proportional to the quantity of liquid waste discharged and in which the method of sampling employed results in a specimen that is representative of the liquids released. This may be accomplished through composites of grab samples obtained prior to discharge after the tanks have been recirculated.

[e]A continuous release is the discharge of liquid wastes of a nondiscrete volume; e.g., from a volume of a system that has an input flow during the continuous release.

TABLE A 4.2

RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS PROGRAM

Gaseous Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection (LLD)[a] (μCi/ml)
A. Containment PURGE (Pre treatment)	P, S[i] Each PURGE Grab Sample	P, S[i] Each PURGE P	Principal Gamma Emitters[b] H-3	1×10^{-4} 1×10^{-6}
B. Reactor Building Exhaust Plenum Standby Gas Treatment System[h]	M[c,d,e] Grab Sample	M[c] M[c]	Principal Gamma Emitters[b] H-3	1×10^{-4} 1×10^{-6}
C. Radwaste Building Turbine Building Service Building On-site Storage Facility	M Grab Sample	M M	Principal Gamma Emitters[b] H-3	1×10^{-4} 1×10^{-6}
D. All Release Types as listed in B and C above.	Continuous[f]	W[g] Adsorbent Sample	I-131 I-133	1×10^{-12} 1×10^{-10}
	Continuous[f]	W[g] Particulate Sample	Principal Gamma Emitters[b] (I-131, others)	1×10^{-11}
	Continuous[f]	M Composite Particulate Sample	Gross Alpha	1×10^{-11}
	Continuous[f]	Q Composite Particulate Sample	Sr-89, Sr-90	1×10^{-11}
	Continuous[f]	Noble Gas Monitor	Noble Gases Gross Beta or Gamma	1×10^{-6}

TABLE A 4.2 (Continued)

TABLE NOTATION

[a]The LLD is defined, for purposes of these specifications, as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66\ s_b}{E \cdot V \cdot 2.22 \times 10^6 \cdot Y \cdot \exp(-\lambda\Delta t)}$$

Where:

LLD is the "a priori" lower limit of detection as defined above, as microcuries per unit mass or volume,

s_b is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate, as counts per minute,

E is the counting efficiency, as counts per disintegration,

V is the sample size in units of mass or volume,

2.22×10^6 is the number of disintegrations per minute per microcurie,

Y is the fractional radiochemical yield, when applicable,

λ is the radioactive decay constant for the particular radionuclide, and

Δt for plant effluents is the elapsed time between the midpoint of sample collection and time of counting.

Typical values of E, V, Y, and Δt should be used in the calculation.

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement.

TABLE A 4.2 (Continued)

TABLE NOTATIONS

[b]The principal gamma emitters for which the LLD specification applies exclusively are the following radionuclides: Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, and Xe-138 in noble gas releases and Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, I-131, Cs-134, Cs-137, Ce-141 and Ce-144 in iodine and particulate releases. This list does not mean that only these nuclides are to be considered. Other gamma peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Semiannual Radioactive Effluent Release Report pursuant to Specification 6.9.1.8.

[c]Sampling and analysis shall also be performed following shutdown, startup, or a THERMAL POWER change exceeding 15% of RATED THERMAL POWER within a 1-hour period. This requirement does not apply if (1) analysis shows that the DOSE EQUIVALENT I-131 concentration in the primary coolant has not increased more than a factor of 3; and (2) the noble gas monitor shows that effluent activity has not increased more than a factor of 3.

[d]Tritium grab samples shall be taken at least once per 24 hours when either the reactor well or the dryer-separator storage pool is flooded.

[e]Tritium grab samples shall be taken at least once per 7 days from the ventilation exhaust from the spent fuel pool area, whenever spent fuel is in the spent fuel pool.

[f]The ratio of the sample flow rate to the sampled stream flow rate shall be known for the time period covered by each dose or dose rate calculation made in accordance with Specifications 3.11.2.1, 3.11.2.2, and 3.11.2.3.

[g]Samples shall be changed at least once per 7 days and analyses shall be completed within 48 hours after changing, or after removal from sampler. Sampling shall also be performed at least once per 24 hours for at least 7 days following each shutdown, startup or THERMAL POWER change exceeding 15% of RATED THERMAL POWER in 1 hour and analyses shall be completed within 48 hours of changing. When samples collected for 24 hours are analyzed, the corresponding LLDs may be increased by a factor of 10. This requirement does not apply if (1) analysis shows that the DOSE EQUIVALENT I-131 concentration in the primary coolant has not increased more than a factor of 3; and (2) the noble gas monitor shows that effluent activity has not increased more than a factor of 3.

[h]Required when the SGTS is in operation.

[i]The containment shall be sampled and analyzed within 8 hours prior to the start of any VENTING or PURGING and at least once per 12 hours during VENTING or PURGING of the drywell through other than the SGTS.

REPORT CATEGORY	:	BATCH RELEASE SUMMARY
RELEASE POINT	:	ALL
TYPE OF RELEASE	:	BATCH LIQUID AND GASEOUS
PERIOD START TIME	:	4344:00 HRS = 12:00AM JULY 1, 1985
PERIOD END TIME	:	8759:59 HRS = 11:59PM DECEMBER 31, 1985

LIQUID RELEASES

NUMBER OF RELEASES	:	47	
TOTAL TIME FOR ALL RELEASES	:	21312.0	MINUTES
MAXIMUM TIME FOR A RELEASE	:	538.0	MINUTES
AVERAGE TIME FOR A RELEASE	:	453.4	MINUTES
MINIMUM TIME FOR A RELEASE	:	239.0	MINUTES
AVERAGE STREAM FLOW		N/A	GPM

NOTE: Stream flow data do not apply since Fermi 2 effluents pass directly into Lake Erie.

GASEOUS RELEASES

NUMBER OF RELEASES	:	0	
TOTAL TIME FOR ALL RELEASES	:	0.0	MINUTES
MAXIMUM TIME FOR A RELEASE	:	0.0	MINUTES
AVERAGE TIME FOR A RELEASE	:	0.0	MINUTES
MINIMUM TIME FOR A RELEASE	:	0.0	MINUTES

TABLE A5.1

REPORT CATEGORY : SEMIANNUAL SUMMATION OF ALL RELEASES BY QUARTER
TYPE OF ACTIVITY : ALL AIRBORNE EFFLUENTS
REPORTING PERIOD : QUARTER # 3 AND QUARTER # 4

TYPE OF EFFLUENT	UNIT	QUARTER 3 HOURS 4345-6552	QUARTER 4 HOURS 6553-8760
A. FISSION AND ACTIVATION PRODUCTS			
1. TOTAL RELEASE	CURIES	0.00E-01	0.00E-01
2. AVERAGE RELEASE RATE FOR PERIOD	UCI/SEC	0.00E-01	0.00E-01
3. PERCENT OF TECH SPEC LIMIT	%	0.00E-01	0.00E-01
B. RADIOIODINES			
1. TOTAL IODINE-131	CURIES	0.00E-01	0.00E-01
2. AVERAGE RELEASE RATE FOR PERIOD	UCI/SEC	0.00E-01	0.00E-01
3. PERCENT OF TECH SPEC LIMIT	%	0.00E-01	0.00E-01
C. PARTICULATES			
1. PARTICULATES(HALF-LIVES>8 DAYS)	CURIES	0.00E-01	0.00E-01
2. AVERAGE RELEASE RATE FOR PERIOD	UCI/SEC	0.00E-01	0.00E-01
3. PERCENT OF TECH SPEC LIMITS	%	0.00E-01	0.00E-01
4. GROSS ALPHA RADIOACTIVITY	CURIES	0.00E-01	0.00E-01
D. TRITIUM			
1. TOTAL RELEASE	CURIES	0.00E-01	0.00E-01
2. AVERAGE RELEASE RATE FOR PERIOD	UCI/SEC	0.00E-01	0.00E-01
3. PERCENT OF TECH SPEC LIMIT	%	0.00E-01	0.00E-01

NOTE: Zero curies indicates activity was not detected, per Table A4.

NOTE: Disregard "% of Tech Spec limit" lines A.3, B.3, C.3, D.3. No such release rate limits apply.

REPORT CATEGORY : SEMIANNUAL AIRBORNE CONTINUOUS ELEVATED AND GROUND : LEVEL RELEASES. TOTALS FOR EACH NUCLIDE RELEASED.
TYPE OF ACTIVITY : FISSION GASES, IODINES, AND PARTICULATES
REPORTING PERIOD : QUARTER # 3 AND QUARTER # 4

NUCLIDE	UNIT	ELEVATED RELEASES QUARTER 3 HOURS 4345-6552	ELEVATED RELEASES QUARTER 4 HOURS 6553-8760	GROUND RELEASES QUARTER 3 HOURS 4345-6552	GROUND RELEASES QUARTER 4 HOURS 6553-8760
FISSION GASES					
KR-83M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
KR-85M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
KR-85	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
KR-87	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
KR-88	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
KR-89	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
KR-90	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
XE-131M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
XE-133M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
XE-133	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
XE-135M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
XE-135	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
XE-137	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
XE-138	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
AR-41	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TOTAL FOR PERIOD	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
IODI.					
I-130	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
I-131	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
I-132	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
I-133	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
I-134	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
I-135	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TOTAL FOR PERIOD	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01

NOTE: Zero curies indicates activity was not detected, per Table A4.

REPORT CATEGORY : SEMIANNUAL AIRBORNE CONTINUOUS ELEVATED AND GROUND
: LEVEL RELEASES. TOTALS FOR EACH NUCLIDE RELEASED.
TYPE OF ACTIVITY : FISSION GASES, IODINES, AND PARTICULATES
REPORTING PERIOD : QUARTER # 3 AND QUARTER # 4

NUCLIDE	UNIT	ELEVATED RELEASES QUARTER 3 HOURS 4345-6552	ELEVATED RELEASES QUARTER 4 HOURS 6553-8760	GROUND RELEASES QUARTER 3 HOURS 4345-6552	GROUND RELEASES QUARTER 4 HOURS 6553-8760
PARTICULATES					
H-3	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
C-14	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
NA-24	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
P-32	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CR-51	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
MN-54	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
MN-56	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
FE-55	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
FE-59	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CO-58	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CO-60	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
NI-63	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
NI-65	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CU-64	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZN-65	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZN-69	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
BR-83	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
BR-84	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
BR-85	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
RB-86	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
RB-88	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
RB-89	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SR-89	CURIES	0.00E-01	0.00E-01	0.00 E-01	0.00 E-01
SR-91	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SR-92	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Y-90	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Y-91M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Y-91	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01

NOTE: Zero curies indicates activity was not detected, per Table A4.

REPORT CATEGORY : SEMIANNUAL AIRBORNE CONTINUOUS ELEVATED AND GROUND
: LEVEL RELEASES. TOTALS FOR EACH NUCLIDE RELEASED.
TYPE OF ACTIVITY : FISSION GASES, IODINES, AND PARTICULATES
REPORTING PERIOD : QUARTER # 3 AND QUARTER # 4

NUCLIDE	UNIT	ELEVATED RELEASES QUARTER 3 HOURS 4345-6552	ELEVATED RELEASES QUARTER 4 HOURS 6553-8760	GROUND RELEASES QUARTER 3 HOURS 4345-6552	GROUND RELEASES QUARTER 4 HOURS 6553-8760
PARTICULATES CONTINUED					
Y-92	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Y-93	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZR-95	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZR-97	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
NB-95	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
MO-99	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TC-99M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TC-101	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
RU-103	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
RU-105	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
RU-106	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
AG-110M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TE-125M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TE-127M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TE-127	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TE-129M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TE-129	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TE-131M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TE-131	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TE-132	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
I-130	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
I-131	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
I-132	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
I-133	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
I-134	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
I-135	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CS-134	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CS-136	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01

NOTE: Zero curies indicates activity was not detected, per Table A4.

TABLE B2.1 (continued)

REPORT CATEGORY	: SEMIANNUAL AIRBORNE CONTINUOUS ELEVATED AND GROUND
	: LEVEL RELEASES. TOTALS FOR EACH NUCLIDE RELEASED.
TYPE OF ACTIVITY	: FISSION GASES, IODINES, AND PARTICULATES
REPORTING PERIOD	: QUARTER # 3 AND QUARTER # 4

NUCLIDE	UNIT	ELEVATED RELEASES QUARTER 3 HOURS 4345-6552	ELEVATED RELEASES QUARTER 4 HOURS 6553-8760	GROUND RELEASES QUARTER 3 HOURS 4345-6552	GROUND RELEASES QUARTER 4 HOURS 6553-8760
PARTICULATES CONTINUED					
CS-137	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CS-138	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
BA-139	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
BA-140	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00 E-01
BA-141	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
BA-142	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
LA-140	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
LA-142	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CE-141	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CE-143	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CE-144	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
PR-143	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
PR-144	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ND-147	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
W-187	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
NP-239	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SR-90	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
G ALPHA	CURIES	0.00E-01	0.00E-01	0.00 E-01	0.00 E-01
TOTAL FOR PERIOD	CURIES	0.00E-01	0.00E-01	0.00 E-01	0.00 E-01

NOTE: Zero curies indicates activity was not detected, per Table A4.

TABLE C1.1

REPORT CATEGORY : SEMIANNUAL SUMMATION OF ALL RELEASES BY QUARTER
TYPE OF ACTIVITY : ALL LIQUID EFFLUENTS
REPORTING PERIOD : QUARTER # 3 AND QUARTER # 4

TYPE OF EFFLUENT	UNIT	QUARTER 3 HOURS 4345-6552	QUARTER 4 HOURS 6553-8760
A. FISSION AND ACTIVATION PRODUCTS			
1. TOTAL RELEASE(NOT INCLUDING TRITIUM, GASES, ALPHA)	CURIES	0.00E-01	4.75E-05
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	UCI/ML	0.00E-01	2.85E-10
3. PERCENT OF APPLICABLE LIMIT	%	0.00E-01	NA
B. TRITIUM			
1. TOTAL RELEASE	CURIES	0.00E-01	9.91E-03
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	UCI/ML	0.00E-01	6.26E-08
3. PERCENT OF APPLICABLE LIMIT	%	0.00E-01	2.09E-05
C. DISSOLVED AND ENTRAINED GASES			
1. TOTAL RELEASE	CURIES	0.00E-01	0.00E-01
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	UCI/ML	0.00E-01	0.00E-01
3. PERCENT OF APPLICABLE LIMIT	%	0.00E-01	0.00E-01
D. GROSS ALPHA RADIOACTIVITY			
1. TOTAL RELEASE	CURIES	0.00E-01	0.00E-01
E. WASTE VOL RELEASED(PRE-DILUTION)	GAL	0.00E-01	4.11E 05
F. VOLUME OF DILUTION WATER USED	GAL	0.00E-01	1.33E 08

NOTE: Zero curies indicates activity was not detected, per Table A4.

NOTE: Disregard "% of applicable limit" in line A.3. No limit applies.

REPORT CATEGORY : SEMIANNUAL LIQUID CONTINUOUS AND BATCH RELEASES
: TOTALS FOR EACH NUCLIDE RELEASED.
TYPE OF ACTIVITY : ALL RADIONUCLIDES
REPORTING PERIOD : QUARTER # 3 AND QUARTER # 4

		CONTINUOUS RELEASES		BATCH RELEASES	
NUCLIDE	UNIT	QUARTER 3 HOURS 4345-6552	QUARTER 4 HOURS 6553-8760	QUARTER 3 HOURS 4345-6552	QUARTER 4 HOURS 6553-8760
ALL NUCLIDES					
H-3	CURIES	0.00E-01	0.00E-01	0.00E-01	9.91E-03
C-14	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
NA-24	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
P-32	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CR-51	CURIES	0.00E-01	0.00E-01	0.00E-01	1.88E-05
MN-54	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
MN-56	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
FE-55	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
FE-59	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CO-58	CURIES	0.00E-01	0.00E-01	0.00E-01	2.87E-05
CO-60	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
NI-63	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
NI-65	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CU-64	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZN-65	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZN-69	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
BR-83	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
BR-84	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
BR-85	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
RB-86	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
RB-88	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
RB-89	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SR-89	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SR-91	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SR-92	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Y-90	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Y-91M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Y-91	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01

NOTE: Measurement of P-32 and C-14 is not required per Table A4.

NOTE: Zero curies indicates activity was not detected, per Table A4.

REPORT CATEGORY : SEMIANNUAL LIQUID CONTINUOUS AND BATCH RELEASES
: TOTALS FOR EACH NUCLIDE RELEASED.
TYPE OF ACTIVITY : ALL RADIONUCLIDES
REPORTING PERIOD : QUARTER # 3 AND QUARTER # 4

		CONTINUOUS RELEASES		BATCH RELEASES	
NUCLIDE	UNIT	QUARTER 3 HOURS 4345-6552	QUARTER 4 HOURS 6553-8760	QUARTER 3 HOURS 4345-6552	QUARTER 4 HOURS 6553-8760
ALL NUCLIDES CONTINUED					
Y-92	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Y-93	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZR-95	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZR-97	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
NB-95	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
MO-99	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TC-99M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TC-101	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
RU-103	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
RU-105	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
RU-106	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
AG-110M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TE-125M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TE-127M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TE-127	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TE-129M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TE-129	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TE-131M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TE-131	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TE-132	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
I-130	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
I-131	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
I-132	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
I-133	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
I-134	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
I-135	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CS-134	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CS-136	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01

NOTE: Zero curies indicates activity was not detected, per Table A4.

EPORT CATEGORY : SEMIANNUAL LIQUID CONTINUOUS AND BATCH RELEASES
: TOTALS FOR EACH NUCLIDE RELEASED.
YPE OF ACTIVITY : ALL RADIONUCLIDES
EPORTING PERIOD : QUARTER # 3 AND QUARTER # 4

		CONTINUOUS RELEASES		BATCH RELEASES	
UCLIDE	UNIT	QUARTER 3 HOURS 4345-6552	QUARTER 4 HOURS 6553-8760	QUARTER 3 HOURS 4345-6552	QUARTER 4 HOURS 6553-8760
LL NUCLIDES CONTINUED					
S-137	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
S-138	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
A-139	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
A-140	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
A-141	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
A-142	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
A-140	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
A-142	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
E-141	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
E-143	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
E-144	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
R-143	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
R-144	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
D-147	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
-187	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
P-[illegible]9	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
R-83M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
R-85M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
R-85	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
R-87	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
R-88	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
R-89	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
R-90	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
E-131M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
E-133M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
E-133	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
E-135M	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
E-135	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01

NOTE: Zero curies indicates activity was not detected, per Table A4.

REPORT CATEGORY : SEMIANNUAL LIQUID CONTINUOUS AND BATCH RELEASES
: TOTALS FOR EACH NUCLIDE RELEASED.
TYPE OF ACTIVITY : ALL RADIONUCLIDES
REPORTING PERIOD : QUARTER # 3 AND QUARTER # 4

		CONTINUOUS RELEASES		BATCH RELEASES	
NUCLIDE	UNIT	QUARTER 3 HOURS 4345-6552	QUARTER 4 HOURS 6553-8760	QUARTER 3 HOURS 4345-6552	QUARTER 4 HOURS 6553-8760
ALL NUCLIDES CONTINUED					
XE-137	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
XE-138	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
AR-41	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SR-90	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
G ALPHA	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
OTHER	CURIES	0.00E-01	0.00E-01	0.00E-01	0.00E-01
TOTAL FOR PERIOD	CURIES	0.00E-01	0.00E-01	0.00E-01	9.96E-03

NOTE: Zero curies indicates activity was not detected, per Table A4.

B. Ralph Sylvia
Senior Vice President

Detroit Edison

6400 North Dixie Highway
Newport, Michigan 48166
(313) 586-4150

March 1, 1990
NRC-90-0028

Action Req'd	Y___ N ✓
Action by (Ind)	
Lan No(s)	
Action Due to Licensing	
Response Req'd	Y___ N ✓
Lic Contact	
File No	

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

References: (1) Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

(2) Appendix A, Facility Operating License No. NPF-43, Technical Specification 6.9.1.8

Subject: <u>Semi-Annual Radiological Effluent Release Report</u>

The Semi-Annual Effluent Release Report for Fermi 2 is attached. This report is being transmitted in compliance with Reference 2 and Regulatory Guide 1.21, Revision 1. The attached report covers the period from July 1, through December 31, 1989.

Due to improved methods for determining noble gas releases from Fermi 2, the reported noble gas releases and doses for July 1, 1988, through December 1, 1988, have been recalculated, and are contained within the report.

During this reporting period there were no instances of unmonitored or unplanned radioactive releases from the site.

Please direct any questions or requests for additional information to Joseph Pendergast at (313) 586-1682.

Sincerely,

B Ralph Sylvia

cc: A. B. Davis
R. C. Knop
W. G. Rogers
J. F. Stang
Region III

DETROIT EDISON COMPANY

FERMI 2 NUCLEAR POWER PLANT

OPERATING LICENSE NO. NPF. - 43

SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

for the period of

July 1, 1989 through December 31, 1989

TABLE OF CONTENTS

1. INTRODUCTION

The Detroit Edison Fermi 2 Nuclear Power Plant is designed and operated to strictly control and monitor the release of radioactive effluents to the environment in accordance with Nuclear Regulatory Commission (NRC) and Detroit Edison Company requirements. This Semiannual Radioactive Effluent Release Report is submitted in accordance with Fermi-2 Technical Specification 6.9.1.8 and NRC Regulatory Guide 1.21. This report provides the following information required by those references:

1. Summation of the quantities of radioactive material (in the form of gases and liquids) released from the plant and analysis of the radiological impact of these releases

2. Summation of quantities of radioactive material contained in solid waste packaged and shipped for off-site disposal

3. Changes to the Process Control Program (PCP)

4. Changes to the Offsite Dose Calculation Manual (ODCM)

This report covers the period of July 1 through December 31, 1989.

During 1989, the total gaseous and liquid radioactive effluent releases and resulting dose to the public were maintained As Low As Reasonably Achievable (ALARA). A summary of the dose due to radioactive effluents in comparison to NRC limits is shown below:

NRC DOSE LIMITS (10CFR50 APPENDIX I)	FERMI-2 ESTIMATED DOSE IN 1989	PERCENT OF ALLOWABLE LIMITS
GASEOUS EFFLUENTS		
Noble Gases (Unrestricted Area)		
≤10 gamma mrad/year to air	1.36 E-1 mrad	1.36%
≤20 beta mrad/year to air	1.69 E-1 mrad	0.85%
Dose to an individual from I-131, 133, Tritium and Particulates		
≤15 mrem/year to any organ	5.03 E-2 mrem	0.34%
LIQUID EFFLUENTS		
≤3 mrem/year to total body	3.33 E-2 mrem	1.11%
≤10 mrem/year to any organ	7.51 E-2 mrem	0.75%

Section 11 of this report presents the supporting data behind the summation.

2. REGULATORY LIMITS

The Nuclear Regulatory Commission limits on liquid and gaseous effluents are incorporated in the Fermi 2 Technical Specifications. These limits prescribe the maximum quantities and rates of release for radioactive effluents resulting from normal operation of Fermi 2. The limits are defined in several ways to limit the overall impact on persons living near the plant. The limits are described below:

A. Gaseous Effluents

1. Dose rate due to radioactive materials released in gaseous effluents from the site to areas at and beyond the site boundary shall be limited to the following:

   a. Noble gases

      Less than or equal to 500 mrem/year to the total body
      Less than or equal to 3000 mrem/year to the skin

   b. Iodine 131, 133, tritium, and for all radionuclides in particulate form with half lives greater than 8 days.
      Less than or equal to 1500 mrem/year to any organ.

2. Air dose due to noble gases released in gaseous effluents from the reactor to areas at and beyond the site boundary shall be limited to the following:

   a. Less than or equal to 5 mrads for gamma radiation
      Less than or equal to 10 mrads for beta radiation
      -During any calendar quarter

   b. Less than or equal to 10 mrads for gamma radiation
      Less than or equal to 20 mrads for beta radiation
      -During any calendar year

3. Dose to a member of the public from Iodine-131, 133, tritium, and all radionuclides in particulate form with half lives greater than 8 days in gaseous effluents released from the reactor to areas at and beyond the site boundary shall be limited to the following:

   a. Less than or equal to 7.5 mrems to any organ
      -During any calendar quarter

   b. Less than or equal to 15 mrems to any organ
      -During any calendar year

B. Liquid Effluents

1. The concentration of radioactive material released in liquid effluents to unrestricted areas shall be limited to the concentrations specified in Title 10 of the Code of Federal Regulations Part 20 (Standards for Protection Against Radiation), Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 2x10-4 (.0002) microcuries/ml total activity.

2. The dose or dose commitment to a member of the public from radioactive materials in liqu?d effluents released from the reactor to unrestricted areas shall be limited to:

   a. Less than or equal to 1.5 mrem to the total body
   Less than or equal to 5 mrem to any organ
   -During any calender quarter

   b. Less than or equal to 3 mrem to the total body
   Less than or equal to 10 mrem to any organ
   -During any calender year

3. MAXIMUM PERMISSIBLE CONCENTRATION (MPC)

As required by NRC Regulatory Guide 1.21, the MPC's used to calculate permissible release rates and concentrations are described below:

A. Gases

The dose rate due to gaseous effluents is calculated in accordance with the Fermi 2 Offsite Dose Calculation Manual (ODCM). The maximum permissible dose rates for gaseous releases are defined in Fermi 2 Technical Specifications:

Technical Specification 3.11.2.1.a (Dose rate at the site boundary from gaseous effluents in the the form of noble gases):

-Less than or equal to 500 mrem/year to the total body
-Less than or equal to 3000 mrem/year to the skin

Technical Specification 3.11.2.1.b (Iodine-131, 133, tritium and particulates with half-lives greater than 8 days):

-Less than or equal to 1500 mrem/year to any organ

B. **Liquids**

Allowable liquid release rates are calculated in accordance with the Fermi-2 Offsite Dose Calculation Manual (ODCM). The maximum permissible concentration (MPC) for liquids used for these calculations are taken from 10CFR20, Appendix B, Table II, Column 2. The most restrictive MPC is used in all cases. For dissolved and entrained gases the MPC of 2E-4 microcuries/ml is applied. This MPC is based on the Xe-135 MPC in air (submersion dose) converted to an equivalent concentration in water as discussed in the International Commission on Radiological Protection (ICRP) Publication 2.

4. AVERAGE ENERGY

The calculated site boundary dose rates for Fermi 2 are based on identification of individual isotopes and on use of dose factors specific to each identified isotope or a highly conservative dose factor. Average energy values are not used in these calculations, and therefore need not be reported.

5. MEASUREMENTS AND APPROXIMATIONS OF TOTAL ACTIVITY

As required by NRC Regulatory Guide 1.21, this section describes the methods used to measure the total radioactivity in effluent releases and to estimate the overall errors associated with these measurements. The effluent monitoring systems are described in Chapter 11.4 of the Fermi-2 Updated Final Safety Analysis Report (UFSAR).

A. **Gaseous Effluents**

1. **Fission and Activation Gases**

Samples are obtained from each of the seven plant radiation monitors which continuously monitor the six ventilation exhaust points and from the Offgas Vent Pipe which carries the gland seal condenser exhaust, mechanical vacuum pump exhaust, and treated offgas streams. The fission and activation gases are quantified by gamma spectroscopy analysis of periodic samples. The following are typical fission and activation gases that are quantified for dose calculations:

Krypton (Kr)-85m	Xenon (Xe)-133	Xenon (Xe)-135
Xenon (Xe)-135m	Xenon (Xe)-137	Xenon (Xe)-138
Argon (Ar)-41		

The values reported in Section 9 are the sums of all fission and activation gases quantified at all monitored release points.

Considering the inherent variability in radiation measurement and the uncertainties in sample volume, flow rate, and pressure measurements, Detroit Edison estimates that the total uncertainty of its fission and activation gas measurements is 7 percent low and 50 percent high.

2. Radioiodines

Samples are obtained from each of the seven plant radiation monitors, which continuously monitor the six ventilation exhaust points. The radioiodines are entrained on charcoal and then quantified by gamma spectroscopy analysis. For each sample the duration of sampling and continuous flow rate through the charcoal are used in determining the concentration of radioiodines. From the flow rate of the ventilation system a rate of release can be determined. The radioiodines usually quantified for dose calculations are the following:

Iodine (I)-131	Iodine (I)-132
Iodine (I)-133	Iodine (I)-135

The values reported in Section 9 are the sums of all radioiodines quantified at all continuously monitored release points.

Considering the inherent variability in radiation measurements and the uncertainties in sample volume, flow rate, and pressure measurements, Detroit Edison estimates that the total uncertainty of these measurements is 23 percent low and 55 percent high.

3. Particulates

Samples are obtained from each of the seven plant effluent radiation monitors, which continuously monitor the six ventilation exhaust points. The particulates are collected on a filter and then quantified by gamma spectroscopy analysis. For each sample the duration of sampling and continuous flow rate through the filter are used in determining the concentration of particulates. From the flow rate of the ventilation system a rate of release can be determined. Radioactive activation and fission products that are typically found include the following:

Manganese (Mn)-54	Iron (Fe)-59	Cobalt (Co)-58
Cobalt (Co)-60	Zinc (Zn)-65	Chromium (Cr-51)
Barium (Ba)-139	Barium (Ba)-140	Lanthanum (La)-140
Yttrium (Y)-91m	Strontium (Sr)-91	Rubidium (Rb)-89
Cesium (Cs)-138	Technetium (Tc)-99m	

A composite of the filters from each ventilation release point are analyzed monthly for gross alpha radioactivity using gas proportional counting methods. Quarterly the filters are radiochemically separated and analyzed for Strontium (Sr)-89/90 using various analytical methods. If found these radionuclides are reported as total particulate activity.

The values reported in Section 9 are the sums of all particulates quantified at all monitored release points.

Considering the inherent variability in radiation measurements and the uncertainties in sample volume, flow rate, and pressure measurements, Detroit Edison estimates that the total uncertainty of these measurements is 23 percent low and 55 percent high.

4. Tritium

Samples are obtained for each of the seven plant effluent radiation monitors which continuously monitor the six ventilation exhaust points. The sample is passed through a bottle containing water and the tritium is "washed" out to the collecting water. Portions of the collecting water are analyzed for tritium using liquid scintillation counting techniques. For each sample, the duration of sample and sample flow rate is used to determine the concentration. From the flow rate of the ventilation system a release rate can be determined.

The values reported in Section 9 are the sums of all tritium quantified at all monitored release points.

Considering the inherent variability in radiation measurement and the uncertainties in sample volume, flow rate, and pressure measurements, Detroit Edison estimates that the total uncertainty of these measurements is 12 percent low and 51 percent high.

B. Liquid Effluents

The liquid radwaste processing system and the liquid effluent monitoring system are described in the Fermi-2 UFSAR.

1. Fission and activation products

Before the contents of each holding tank is discharged to the environment, a representative sample of the tank's contents is taken and retained. The sample allows for the determination of radioactive material concentrations and establishes the rate at which the radioactive material can be discharged to the environment. Radioactive activation and fission products that are typically found include the following:

Manganese (Mn)-54	Iron (Fe)-59	Chromium (Cr)-51
Cobalt (Co)-58	Cobalt (Co)-60	Silver (Ag)-110m
Zinc (Zn)-65	Barium (Ba)-131	Technetium (Tc)-99m

At the end of the calendar quarter a composite sample is made of all discharge samples taken during the quarter. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for Iron (Fe)-55 and Strontium (Sr)-89/90. Radiochemical separations and various analytical methods are used to quantify the amounts of Sr-89/90 and Fe-55.

The values reported in Section 8 are the sums of all fission and activation products found in all batch releases.

Considering the inherent variability in radiation measurement and the uncertainties in sample flow rate and volume measurements, Detroit Edison estimates that the total uncertainty in liquid fission and activation product measurements is less than 14 percent.

2. **Tritium**

Before the contents of each holding tank is discharged to the environment, a representative sample of the tank contents is taken and retained. At the end of the calendar month a composite sample is made of all discharge samples taken during the month. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for tritium by liquid scintillation counting.

The values reported in Section 8 sums all tritium quantified from all batch releases.

Considering the inherent variability in radiation measurement and the uncertainties in flow rate and volume measurement, Detroit Edison estimates the total uncertainty in Tritium measurements is less than 14 percent.

3. **Dissolved and Entrained Gases**

Prior to releasing liquid radioactive waste to the environment a sample is taken from the radwaste holding tank. This sample is representative of the tank's contents. The sample is examined using gamma spectroscopy to determine the dissolved and entrained noble gases. The following radiogases are typical of those which may be found:

Xenon (Xe)-133 Xenon (Xe)-135

The values reported in Section 8 are the sums of all radiogases found for all batch releases.

Considering the inherent variability in radiation measurement and the uncertainties in flow rate and volume measurements, Detroit Edison estimates that the total uncertainty in dissolved and entrained gases measurements is less than 15 percent.

4. **Gross Alpha**

Before the contents of each holding tank is discharged to the environment, a representative sample of the tank's contents is taken and retained. At the end of the calendar month a composite sample is made of all discharge samples taken during the month. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for gross alpha radioactivity by gas proportional counting.

The values reported in Section 8 are the sums of the gross alpha radioactivity from all batch releases.

Considering the inherent variability in radiation measurement and the uncertainty in flow rate and volume measurements Detroit Edison estimates that the total uncertainty in liquid gross alpha activity measurements is less than 23 percent.

6. ABNORMAL RELEASES

For the purpose of this report, an abnormal release is any release of radioactive material not performed in accordance with the Fermi 2 license and implementing procedures. No abnormal releases occurred during the reporting period.

7. BATCH RELEASES

As required by Regulatory Guide 1.21, a summary of data for batch releases is provided below. The following batch liquid releases from radwaste holding tanks to the Circulating Water Decant Line occurred between July 1, 1989 and December 31, 1989:

Number of releases:	39
Total time for all releases:	17221 minutes
Maximum time for a release:	1152 minutes
Average time for a release:	442 minutes
Minimum time for a release:	251 minutes

The only batch gaseous releases from Fermi 2 are the venting or purging of the primary containment (drywell) atmosphere. These venting or purging releases pass through the reactor building ventilation or standby gas treatment system and are monitored by the final effluent monitors for these pathways. Separate data on these venting or purging releases are not reported because the associated data are already included in the gaseous effluent release data (Section 5.A and Section 9).

8. LIQUID EFFLUENT SUMMARY

REPORT CATEGORY	: SEMIANNUAL SUMMMATION OF ALL RELEASES BY QUARTER
TYPE OF ACTIVITY	: ALL LIQUID EFFLUENTS
REPORTING PERIOD	: QUARTER 3 AND QUARTER 4

TYPE OF EFFLUENT	: UNIT	: QUARTER 3	: QUARTER 4
A. FISSION AND ACTIVATION PRODUCTS			
1. TOTAL RELEASE (NOT INCLUDING TRITIUM, GASES, ALPHA)	: CURIES	: 5.43E-02	: 8.16E-02
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	: uCi/ml	: 6.24E-09	: 8.52E-09
B. TRITIUM			
1. TOTAL RELEASE	: CURIES	: 2.15E-01	: 8.90E-01
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	: uCi/ml	: 2.47E-08	: 9.29E-08
C. DISSOLVED AND ENTRAINED GASES			
1. TOTAL RELEASE	: CURIES	: 3.03E-05	: 0.00E+00
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	: uCi/ml	: 3.48E-12	: 0.00E+00
D. GROSS ALPHA RADIOACTIVITY			
1. TOTAL RELEASE	: CURIES	: 0.00E+00	: 0.00E+00
E. WASTE VOL RELEASED (PRE-DILUTION)	: LITERS	: 3.95E+05	: 2.02E+06
F. TOTAL VOLUME DILUTION DISCHARGED	: LITERS	: 8.70E+09	: 9.[illegible]8E+09

8. LIQUID EFFLUENT SUMMARY (continued)

REPORT CATEGORY	: SEMIANNUAL LIQUID BATCH RELEASES
TYPE OF ACTIVITY	: TOTALS FOR EACH NUCLIDE RELEASED
	: ALL RADIONUCLIDES
REPORTING PERIOD	: QUARTER 3 AND QUARTER 4

		BATCH RELEASES	
NUCLIDE	UNIT	QUARTER 3	QUARTER 4
ALL NUCLIDES			
H-3	CURIES	2.15E-01	8.90E-01
Na-24	CURIES	4.10E-03	*<5.7E-08
Cr-51	CURIES	3.47E-02	9.68E-03
Mn-54	CURIES	2.80E-03	2.01E-02
Co-58	CURIES	3.17E-03	1.21E-02
Co-60	CURIES	1.41E-03	1.58E-02
Zn-65	CURIES	2.67E-03	1.46E-02
Mo-99	CURIES	2.03E-04	*<3.1E-07
Tc-99m	CURIES	2.04E-03	*<3.7E-08
I-131	CURIES	2.58E-05	*<4.0E-08
I-133	CURIES	7.18E-05	*<5.8E-08
Xe-135	CURIES	3.03E-05	*<2.8E-08
Sr-89	CURIES	1.49E-04	1.33E-05
Sr-90	CURIES	8.69E-07	9.19E-06
Fe-55	CURIES	5.02E-05	3.45E-03
Ba-131	CURIES	2.39E-03	1.45E-03
Ba-133	CURIES	*<1.7E-07	3.32E-05
Ba-135m	CURIES	4.55E-05	*<2.2E-07
Co-57	CURIES	4.17E-06	*<3.1E-08
Ag-110m	CURIES	1.50E-04	4.48E-04
W-187	CURIES	3.42E-05	*<1.4E-07
Re-188	CURIES	1.09E-04	*<2.2E-07
As-76	CURIES	3.30E-04	*<1.1E-07
Fe-59	CURIES	6.24E-05	3.82E-03
Sb-124	CURIES	*<5.1E-08	1.31E-04
Sb-125	CURIES	*<1.2E-07	6.45E-05
Cs-134	CURIES	*<5.3E-08	*<5.3E-08
Cs-137	CURIES	*<5.7E-08	*<5.7E-08
Ce-141	CURIES	*<4.8E-08	*<4.8E-08
Ce-144	CURIES	*<2.1E-07	*<2.1E-07
Total for Period	CURIES	2.69E-01	9.71E-01

* Less than Lower Limit of Detection (LLD), i.e. the maximum sensitivity of measurement, in units of microcuries per milliliter (uCi/ml).

9. GASEOUS EFFLUENT SUMMARY

REPORT CATEGORY : SEMIANNUAL SUMMMATION OF ALL RELEASES BY QUARTER
TYPE OF ACTIVITY : ALL AIRBORNE EFFLUENTS
REPORTING PERIOD : QUARTER 3 AND QUARTER 4

TYPE OF EFFLUENT	UNIT	QUARTER 3	QUARTER 4
A. FISSION AND ACTIVATION GASES			
1. TOTAL RELEASE	CURIES	4.40E+01	2.22E+01
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	5.54E+00	2.79E+00
B. RADIOIODINES			
1. TOTAL IODINE - 131	CURIES	6.55E-04	1.60E-05
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	8.24E-05	2.01E-06
C. PARTICULATES			
1. PARTICULATES (HALF-LIVES>8 DAYS)	CURIES	6.90E-03	8.13E-04
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	8.68E-04	1.02E-04
3. GROSS ALPHA RADIOACTIVITY	CURIES	6.03E-07	1.42E-06
D. TRITIUM			
1. TOTAL RELEASE	CURIES	0.00E+00	0.00E+00
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	0.00E+00	0.00E+00

9. GASEOUS EFFLUENT SUMMARY (continued)

REPORT CATEGORY :SEMIANNUAL AIRBORNE CONTINUOUS RELEASES
TYPE OF ACTIVITY :FISSION GASES, IODINES, AND PARTICULATES
REPORTING PERIOD :QUARTER 3 AND QUARTER 4

		GROUND RELEASES	
NUCLIDE	UNIT	QUARTER 3	QUARTER 4
PARTICULATES			
Cr-51	CURIES	6.20E-03	1.82E-04
Mn-54	CURIES	4.77E-05	1.63E-04
Fe-59	CURIES	2.51E-06	7.95E-05
Co-58	CURIES	1.44E-04	4.82E-05
Co-60	CURIES	4.93E-05	1.51E-04
Cu-64	CURIES	3.55E-02	*<4.2E-11
Na-24	CURIES	4.31E-03	1.79E-04
Zn-65	CURIES	1.73E-04	1.16E-04
Mo-99	CURIES	2.85E-05	*<1.2E-12
Tc-99m	CURIES	2.01E-02	1.58E-04
Ba-139	CURIES	2.01E-01	6.40E-02
Ba-140	CURIES	8.78E-05	1.93E-05
La-140	CURIES	5.54E-05	1.15E-05
Co-57	CURIES	3.53E-06	3.59E-07
Y-91m	CURIES	2.79E-03	2.12E-04
Sr-91	CURIES	2.56E-03	3.90E-04
Ba-131	CURIES	5.40E-05	*<3.1E-13
Ba-135m	CURIES	2.23E-05	*<6.2E-13
As-76	CURIES	5.65E-04	*<3.7E-13
Rb-89	CURIES	4.67E-01	1.50E-01
Cs-138	CURIES	1.20E-01	1.28E-01
Mn-56	CURIES	2.20E-03	*<2.5E-13
Ag-110m	CURIES	4.08E-05	*<5.9E-13
Se-75	CURIES	4.71E-07	1.55E-06
Re-188	CURIES	8.83E-05	*<5.2E-13
Tc-101	CURIES	2.68E-02	*<9.4E-13
Zn-69m	CURIES	4.50E-05	*<1.1E-13
W-187	CURIES	4.60E-05	*<5.8E-13
Sr-92	CURIES	1.40E-04	*<2.3E-13
Sb-124	CURIES	*<1.4E-13	1.62E-06
Sr-89	CURIES	8.06E-05	4.93E-05
Sr-90	CURIES	2.12E-05	1.33E-06
Cs-134	CURIES	*<1.3E-13	*<1.3E-13
Cs-137	CURIES	*<1.6E-13	*<1.6E-13
Ce-141	CURIES	*<1.5E-13	*<1.5E-13
Ce-144	CURIES	*<9.3E-13	*<9.3E-13
Total for Period	CURIES	8.90E-01	3.44E-01

* Less than the Lower Limit of Detection (LLD), i.e. the maximum sensitivity of measurement in units of microcuries per milliliter (uCi/ml)

9. GASEOUS EFFLUENT SUMMARY (continued)

REPORT CATEGORY : SEMIANNUAL AIRBORNE CONTINUOUS RELEASES
TYPE OF ACTIVITY : FISSION GASES, IODINES, AND PARTICULATES
REPORTING PERIOD : QUARTER 3 AND QUARTER 4

		GROUND RELEASES	
NUCLIDE	UNIT	QUARTER 3	QUARTER 4
FISSION GASES			
Ar-41	CURIES	1.01E+01	2.10E+01
Xe-135m	CURIES	1.52E+00	*<4.9E-08
Xe-138	CURIES	4.70E+00	9.20E-01
Xe-135	CURIES	9.18E-01	*<1.5E-08
Kr-85m	CURIES	1.60E+00	3.16E-01
Xe-129m	CURIES	8.86E+00	*<2.8E-07
Xe-137	CURIES	1.63E+01	*<3.6E-07
Kr-87	CURIES	*<4.8E-08	*<4.8E-08
Kr-88	CURIES	*<4.9E-08	*<4.9E-08
Xe-133	CURIES	*<3.2E-08	*<3.2E-08
Xe-133m	CURIES	*<1.4E-07	*<1.4E-07
Total for Period	CURIES	4.40E+01	2.22E+01
IODINES			
I-131	CURIES	6.55E-04	1.60E-05
I-132	CURIES	5.07E-03	6.60E-05
I-133	CURIES	4.64E-03	1.71E-04
I-134	CURIES	3.29E-03	*<1.5E-13
I-135	CURIES	5.42E-03	2.89E-05
Total for Period	CURIES	1.91E-02	2.82E-04

* Less than the Lower Limit of Detection (LLD), i.e. the maximum sensitivity of measurement in units of microcuries per milliliter (uCi/ml)

10. SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. Solid Waste Shipped Offsite for burial or disposal (not irradiated fuel)

1. Type of Waste	Unit	6 month period	Est. Total Error %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m^3 Curies	1.56E+02 3.06E+02	$\pm$5 $\pm$25
b. Dry compressible waste, contaminated equipment, etc.	m^3 Curies	5.47E+01 1.97E-03	$\pm$5 $\pm$25
c. Irradiated components, control rods, etc.		0	
d. Other		0	

2. Estimate of major nuclide composition (by type of waste)

a. Spent resins, filter sludges, evaporator bottoms, etc.

Nuclide	Percent of Total Activity	Curies
Cr-51	63.7	1.95E+02
Mn-54	2.9	8.92E+00
Fe-55	11.6	3.55E+01
Co-58	5.3	1.61E+01
Co-60	3.9	1.19E+01
Fe-59	<0.1	9.28E-02
Zn-65	11.0	3.36E+01
H-3	<0.1	4.96E-02
C-14	<0.1	1.07E-01
Zr-95	<0.1	1.25E-02
Ag-110m	1.2	3.70E+00
Nb-95	<0.1	1.50E-02
Tc-99	<0.1	4.48E-04
I-129	<0.1	4.15E-04
Sn-113	0.3	1.07E+00
Ce-144	<0.1	3.42E-02

b. Dry compressible waste, contaminated equipment, etc.

Nuclide	Percent of Total Activity	Curies
Cr-51	3.1	6 17E-05
Mn-54	9.0	1.78E-04
Fe-55	66.5	1.31E-03
Co-58	2.6	5.10E-05
Co-60	12.4	2.44E-04
Zn-65	1.0	1.89E-05
Ni-63	0.8	1.57E-05
C-14	3.1	6.15E-05
Fe-59	1.6	3.22E-05

Note: Activities of all principal radionuclides were determined by measurement.

3. Solid Waste Disposition (All waste was Class A and was shipped in LSA containers)

Type of shipment/ solidification process	Number of shipments	Mode of Transport.	Destination
Dewatered resin	19	truck	Barnwell, SC
Dry active waste	1	truck	Oak Ridge, TN
	2	truck	Channahon, IL

4. Irradiated Fuel Shipments:

None

11. RADIOLOGICAL IMPACT ON MAN

A Dose Due to Liquid Effluents

As discussed in Section 2.5.1 of the Fermi 2 Offsite Dose Calculation Manual, the maximum potential dose to an individual due to liquid effluents is based on the combined pathways of fish consumption and water consumption. The following are the maximum individual organ doses for all of 1989 calculated according to Section 2 5 1 of the ODCM:

Organ	1989 Liquid Effluent Dose
Bone	2.27 E-2 mrem
Liver	7.51 E-2 mrem
Total body	3.33 E-2 mrem
Thyroid	7.48 E-4 mrem
Kidney	4.78 E-2 mrem
Lung	4.69 E-4 mrem
GI/LLI	6.94 E-2 mrem

B. Dose Due to Gaseous Effluents

Section 3.8.1 of the Fermi 2 Offsite Dose Calculation Manual prescribes the method for calculation of the maximum potential dose to an individual exposed to gaseous effluents by the inhalation, ingestion, and ground plane pathways. The following are the maximum individual organ doses for all of 1989 calculated according the Section 3.8.1 of the ODCM:

Organ	1989 Gaseous Effluent Dose
Bone	8.27 E-4 mrem
Liver	8.37 E-4 mrem
Thyroid	5.03 E-2 mrem
Kidney	7.19 E-4 mrem
Lung	4.89 E-4 mrem
GI/LLI	1.03 E-3 mrem
Total body	6.26 E-4 mrem

C. Dose Due to Direct Radiation and Compliance with 40CFR190

Title 40, Part 190 of the Code of Federal Regulations requires that dose to an individual from the uranium fuel cycle be limited to 25 mrem/yr to the total body and 75 mrem/yr to the thyroid. The sources of fuel cycle dose not analyzed above are due to other fuel cycle facilities and dose due to direct radiation. As discussed in Section 4.2 of the Fermi 2 Offsite Dose Calculation Manual, no other fuel cycle facilities contribute significantly to dose in the vicinity of Fermi 2. With respect to direct radiation, none of the offsite TLD locations listed in Table 6.0-1 of the ODCM showed 1989 TLD readings which were consistently greater than the TLD readings at the control locations. Since other facilities and direct radiation did not contribute significantly to offsite dose, and since the preceding sections of this report show compliance with the more restrictive requirements of 10CFR50 Appendix I, Fermi 2 was in compliance with 40CFR190 in 1989.

D. Dose to Visitors on Site

As discussed in Section 4.0 of the Fermi 2 Offsite Dose Calculation Manual, "visitors" to the Fermi 2 site may receive dose due to their activities within the site boundary. For purposes of this analysis, visitors are members of the public who spend time with the site boundary, and whose work is not associated with the operation of Fermi 2. The ODCM considers two categories of visitors: persons ice fishing on Lake Erie and persons spending time in the Fermi 2 Visitors Center.

The ODCM lists the maximum amount of time an individual is likely to spend in these activities and the dispersion factors and exposure pathways which apply: Exposure by direct radiation from noble gases and by inhalation of radioactive particulates, iodines, and tritium are considered. (These pathways are in addition to those already considered, such as fish consumption in the case of ice fishermen.)

Based on these assumptions, the maximum dose in 1989 to a visitor at the Visitors Center is 7.91 E-5 mrem to the total body and 8.47 E-5 mrem to the maximally exposed organ (thyroid). There was no ice fishing activity within the site boundary in 1989.

12. RADIATION INSTRUMENTATION

Fermi 2 Technical Specifications 3.3.7.11, Radioactive Liquid Effluent Monitoring Instrumentation, and 3.3.7.12, Radioactive Gaseous Effluent Monitoring Instrumentation, require that those monitors which exceed the time specified for out of service be reported in the next Semiannual Effluent Release Report. During this reporting period, July through December of 1989, the time specified in the action statements for these monitors was not exceeded.

William S. Orser
Senior Vice President

Detroit Edison

Fermi 2

August 28, 1990
NRC-90-0117

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

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References: 1) Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

2) Appendix A, Facility Operating License No. NPF-43, Technical Specification 6.9.1.8

Subject: Semi-Annual Radiological Effluent Release Report

The Semi-Annual Effluent Release Report for Fermi 2 is attached. This report is being transmitted in compliance with Reference 2 and Regulatory Guide 1.21, Revision 1. The attached report covers the period from January 1 through June 30, 1990.

During this reporting period there were no instances of unmonitored or unplanned radioactive releases from the site.

Please direct any questions or requests for additional information to Joseph Pendergast at (313) 586-1682.

Sincerely,

cc: A. B. Davis
R. W. DeFayette
W. G. Rogers
J. F. Stang
Region III

IE48
1/2

DETROIT EDISON COMPANY

FERMI 2 NUCLEAR POWER PLANT

OPERATING LICENSE NO. NPF. - 43

SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

for the period of

January 1, 1990 through June 30, 1990

TABLE OF CONTENTS

1. INTRODUCTION

The Detroit Edison Fermi 2 Nuclear Power Plant is designed and operated to strictly control and monitor the release of radioactive effluents to the environment in accordance with Nuclear Regulatory Commission (NRC) and Detroit Edison Company requirements. This Semiannual Radioactive Effluent Release Report is submitted in accordance with Fermi 2 Technical Specification 6.9.1.8 and NRC Regulatory Guide 1.21. This report provides the following information required by those references:

1. Summation of the quantities of radioactive material (in the form of gases and liquids) released from the plant and analysis of the radiological impact of these releases

2. Summation of quantities of radioactive material contained in solid waste packaged and shipped for off-site disposal

3. Changes to the Process Control Program (PCP)

4. Changes to the Offsite Dose Calculation Manual (ODCM)

This report covers the period of January 1 through June 30, 1990.

During the first half of 1990, the total gaseous and liquid radioactive effluent releases and resulting dose to the public were maintained As Low As Reasonably Achievable (ALARA). In accordance with Fermi 2 Technical Specification 6.9.1.8, the next Semiannual Radioactive Effluent Release Report--the one to be submitted within 60 days after January 1, 1991--will contain dose assessments for all of 1990.

2. REGULATORY LIMITS

The Nuclear Regulatory Commission limits on liquid and gaseous effluents are incorporated in the Fermi 2 Technical Specifications. These limits prescribe the maximum quantities and rates of release for radioactive effluents resulting from normal operation of Fermi 2. The limits are defined in several ways to limit the overall impact on persons living near the plant. The limits are described below:

A. Gaseous Effluents

1. Dose rate due to radioactive materials released in gaseous effluents from the site to areas at and beyond the site boundary shall be limited to the following:

   a. Noble gases

      Less than or equal to 500 mrem/year to the total body
      Less than or equal to 3000 mrem/year to the skin

   b. Iodine 131, 133, tritium, and for all radionuclides in particulate form with half lives greater than 8 days

      Less than or equal to 1500 mrem/year to any organ.

2. Air dose due to noble gases released in gaseous effluents from the reactor to areas at and beyond the site boundary shall be limited to the following:

   a. Less than or equal to 5 mrads for gamma radiation
   Less than or equal to 10 mrads for beta radiation
   -During any calendar quarter

   b. Less than or equal to 10 mrads for gamma radiation
   Less than or equal to 20 mrads for beta radiation
   -During any calendar year

3. Dose to a member of the public from Iodine-131, 133, tritium, and all radionuclides in particulate form with half lives greater than 8 days in gaseous effluents released from the reactor to areas at and beyond the site boundary shall be limited to the following:

   a. Less than or equal to 7.5 mrems to any organ
   -During any calendar quarter

   b. Less than or equal to 15 mrems to any organ
   -During any calendar year

B. *Liquid Effluents*

1. The concentration of radioactive material released in liquid effluents to unrestricted areas shall be limited to the concentrations specified in Title 10 of the Code of Federal Regulations Part 20 (Standards for Protection Against Radiation), Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 2E-4 (.0002) microcuries/ml total activity.

2. The dose or dose commitment to a member of the public from radioactive materials in liquid effluents released from the reactor to unrestricted areas shall be limited to:

   a. Less than or equal to 1.5 mrem to the total body
   Less than or equal to 5 mrem to any organ
   -During any calender quarter

   b. Less than or equal to 3 mrem to the total body
   Less than or equal to 10 mrem to any organ
   -During any calender year

3. MAXIMUM PERMISSIBLE CONCENTRATION (MPC)

Fermi 2 Technical Specifications implement the MPC requirements of 10 CFR 20 and NRC Regulatory Guide 1.21 by means of the following dose rate limits:

A. Gases

The dose rate due to gaseous effluents is calculated in accordance with the Fermi 2 Offsite Dose Calculation Manual (ODCM). The maximum permissible dose rates for gaseous releases are defined in Fermi 2 Technical Specifications:

Technical Specification 3.11.2.1.a (Dose rate at the site boundary from noble gases):

-Less than or equal to 500 mrem/year to the total body
-Less than or equal to 3000 mrem/year to the skin

Technical Specification 3.11.2.1.b (Dose rate at the site boundary from I-131, I-133, and particulates with half lives greater than 8 days):

-Less than or equal to 1500 mrem/year to any organ

B. Liquids

Allowable liquid release rates are calculated in accordance with the Fermi 2 Offsite Dose Calculation Manual (ODCM). The maximum permissible concentration (MPC) for liquids used for these calculations are taken from 10 CFR 20, Appendix B, Table II, Column 2. The most restrictive MPC is used in all cases. For dissolved and entrained gases the MPC of 2E-4 microcuries/ml is applied. This MPC is based on the Xe-135 MPC in air (submersion dose) converted to an equivalent concentration in water as discussed in the International Commission on Radiological Protection (ICRP) Publication 2.

4. AVERAGE ENERGY

The calculated site boundary dose rates for Fermi 2 are based on identification of individual isotopes and on use of dose factors specific to each identified isotope or a highly conservative dose factor. Average energy values are not used in these calculations, and therefore need not be reported.

5. MEASUREMENTS AND APPROXIMATIONS OF TOTAL ACTIVITY

As required by NRC Regulatory Guide 1.21, this section describes the methods used to measure the total radioactivity in effluent releases and to estimate the overall errors associated with these measurements. The effluent monitoring systems are described in Chapter 11.4 of the Fermi 2 Updated Final Safety Analysis Report (UFSAR).

A. Gaseous Effluents

1. Fission and Activation Gases

Samples are obtained from each of the seven plant radiation monitors which continuously monitor the six ventilation exhaust points and from the Offgas Vent Pipe which carries the gland seal condenser exhaust, mechanical vacuum pump exhaust, and treated offgas streams. The fission and activation gases are quantified by gamma spectroscopy analysis of periodic samples. The following are typical fission and activation gases that are quantified for dose calculations:

Krypton (Kr)-85m	Xenon (Xe)-133	Xenon (Xe)-135
Xenon (Xe)-135m	Xenon (Xe)-137	Xenon (Xe)-138
Argon (Ar)-41		

The values reported in Section 9 are the sums of all fission and activation gases quantified at all monitored release points.

Considering the inherent variability in radiation measurement, the variability in effluent stream composition, and the uncertainties in effluent flow rate and instrument calibration, Detroit Edison estimates that the uncertainty of the fission and activation gas total release figures is less than plus or minus 8 percent.

2. Radioiodines

Samples are obtained from each of the seven plant radiation monitors, which continuously monitor the six ventilation exhaust points. The radioiodines are entrained on charcoal and then quantified by gamma spectroscopy analysis. For each sample the duration of sampling and continuous flow rate through the charcoal are used in determining the concentration of radioiodines. From the flow rate of the ventilation system a rate of release can be determined. The radioiodines usually quantified for dose calculations are the following:

Iodine (I)-131	Iodine (I)-132
Iodine (I)-133	Iodine (I)-135

The values reported in Section 9 are the sums of all radioiodines quantified at all continuously monitored release points.

Considering the inherent variability in radiation measurements, the variability in effluent stream composition, and the uncertainty in sample and effluent flow rates, Detroit Edison estimates that the uncertainty of the total radioiodine release figures is less than plus or minus 5 percent.

3. Particulates

Samples are obtained from each of the seven plant effluent radiation monitors, which continuously monitor the six ventilation exhaust points. The particulates are collected on a filter and then quantified by gamma spectroscopy analysis. For each sample the duration of sampling and continuous flow rate through the filter are used in determining the concentration of particulates. From the flow rate of the ventilation system a rate of release can be determined. Radioactive activation and fission products that are typically found include the following:

Manganese (Mn)-54	Iron (Fe)-59	Cobalt (Co)-58
Cobalt (Co)-60	Zinc (Zn)-65	Chromium (Cr)-51
Barium (Ba)-139	Barium (Ba)-140	Lanthanum (La)-140
Yttrium (Y)-91m	Strontium (Sr)-91	Rubidium (Rb)-89
Cesium (Cs)-138	Technetium (Tc)-99m	

A composite of the filters from each ventilation release point are analyzed monthly for gross alpha radioactivity using gas proportional counting methods. Quarterly the filters are radiochemically separated and analyzed for Strontium (Sr)-89/90 using various analytical methods. If found these radionuclides are reported as total particulate activity.

The values reported in Section 9 are the sums of all particulates quantified at all monitored release points.

Considering the inherent variability in radiation measurements, the variability in effluent stream composition, and the uncertainties in instrument calibration and in sample and effluent flow rates, Detroit Edison estimates that the the uncertainty of the total particulate release figures is less than plus or minus 3 percent.

4. Tritium

Samples are obtained for each of the seven plant effluent radiation monitors which continuously monitor the six ventilation exhaust points. The sample is passed through a bottle containing water and the tritium is "washed" out to the collecting water. Portions of the collecting water are analyzed for tritium using liquid scintillation counting techniques. For each sample, the duration of sample and sample flow rate is used to determine the concentration. From the flow rate of the ventilation system a release rate can be determined.

The values reported in Section 9 are the sums of all tritium quantified at all monitored release points.

Considering the inherent variability in radiation measurement, the variability in effluent stream composition, and the uncertainties in instrument calibration, sample and effluent flow rates, and collection efficiency, Detroit Edison estimates that the uncertainty of total gaseous tritium release figures is less than plus or minus 34 percent.

5. Gross Alpha

The gaseous particulate filters from the seven plant effluent radiation monitors are stored for one week to allow for decay of naturally occurring alpha emitters. These filters are then analyzed for gross alpha radioactivity by gas proportional counting, and any such radioactivity found is assumed to be plant related. The quantity of alpha emitters released can then be determined from sample flow rate, sample duration, and stack flow rate.

The values reported in Section 9 are the sums of all alpha emitters quantified at all monitored release points.

Considering the inherent variability in radiation measurements, the variability in effluent stream composition, and the uncertainties in instrument calibration and in sample and effluent flow rates, Detroit Edison estimates that the uncertainty of the total gaseous gross alpha release figures is less than plus or minus 10 percent.

B. Liquid Effluents

The liquid radwaste processing system and the liquid effluent monitoring system are described in the Fermi-2 UFSAR.

1. Fission and activation products

Before the contents of each holding tank is discharged to the environment, a representative sample of the tank's contents is taken and retained. The sample allows for the determination of radioactive material concentrations and establishes the rate at which the radioactive material can be discharged to the environment. Radioactive activation and fission products that are typically found include the following:

Manganese (Mn)-54	Iron (Fe)-59	Chromium (Cr)-51
Cobalt (Co)-58	Cobalt (Co)-60	Silver (Ag)-110m
Zinc (Zn)-65	Barium (Ba)-131	Technetium (Tc)-99m

At the end of the calendar quarter a composite sample is made of all discharge samples taken during the quarter. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for Iron (Fe)-55 and Strontium (Sr)-89/90. Radiochemical separations and various analytical methods are used to quantify the amounts of Sr-89/90 and Fe-55.

The values reported in Section 8 are the sums of all fission and activation products found in all batch releases.

Considering the inherent variability in radiation measurement and the uncertainties in volume measurements and instrument calibration, Detroit Edison estimates that the uncertainty in total liquid fission and activation product release figures is less than plus or minus 5 percent.

2. Tritium

Before the contents of each holding tank is discharged to the environment, a representative sample of the tank contents is taken and retained. At the end of the calendar month a composite sample is made of all discharge samples taken during the month. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for tritium by liquid scintillation counting.

The values reported in Section 8 sums all tritium quantified from all batch releases.

Considering the inherent variability in radiation measurement and the uncertainties in volume measurement and instrument calibration, Detroit Edison estimates the uncertainty in total tritium release figures is less than plus or minus 15 percent.

3. Dissolved and Entrained Gases

Prior to releasing liquid radioactive waste to the environment a sample is taken from the radwaste holding tank. This sample is representative of the tank's contents. The sample is examined using gamma spectroscopy to determine the dissolved and entrained noble gases. The following radiogases are typical of those which may be found:

Xenon (Xe)-133	Xenon (Xe)-135

The values reported in Section 8 are the sums of all radiogases found for all batch releases.

Considering the inherent variability in radiation measurement and the uncertainties in instrument calibration and volume measurements, Detroit Edison estimates that the uncertainty in total dissolved and entrained gas release figures is less than plus or minus 15 percent.

4. Gross Alpha

Before the contents of each holding tank is discharged to the environment, a representative sample of the tank's contents is taken and retained. At the end of the calendar month a composite sample is made of all discharge samples taken during the month. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for gross alpha radioactivity by gas proportional counting.

The values reported in Section 8 are the sums of the gross alpha radioactivity from all batch releases.

Considering the inherent variability in radiation measurement and the uncertainty in volume measurements and instrument calibration, Detroit Edison estimates that the uncertainty in total liquid gross alpha release figures is less than plus or minus 43 percent.

6. ABNORMAL RELEASES

For the purpose of this report, an abnormal release is any release of radioactive material not performed in accordance with the Fermi 2 license and implementing procedures. No abnormal releases occurred during the reporting period.

7. BATCH RELEASES

As required by Regulatory Guide 1.21, a summary of da[illegible] for batch releases is provided below. The following batch liquid releases from radwaste holding tanks to the Circulating Water Decant Line occurred between January 1, 1990 and June 30, 1990:

Number of releases:	12
Total time for all releases:	5549 minutes
Maximum time for a release:	563 minutes
Average time for a release:	462 minutes
Minimum time for a release:	427 minutes

The only batch gaseous releases from Fermi 2 are the venting or purging of the primary containment (drywell) atmosphere. These venting or purging releases pass through the reactor building ventilation or standby gas treatment system and are monitored by the final effluent monitors for these pathways. Separate data on these venting or purging releases are not reported because the associated data are already included in the gaseous effluent release data (Section 5.A and Section 9).

8. LIQUID EFFLUENT SUMMARY

REPORT CATEGORY	: SEMIANNUAL SUMMMATION OF ALL RELEASES BY QUARTER
TYPE OF ACTIVITY	: ALL LIQUID EFFLUENTS
REPORTING PERIOD	: QUARTER 1 AND QUARTER 2

TYPE OF EFFLUENT	: UNIT	: QUARTER 1	: QUARTER 2
A. FISSION AND ACTIVATION PRODUCTS			
1. TOTAL RELEASE (NOT INCLUDING TRITIUM, GASES, ALPHA)	: CURIES	: 1.92E-01	: 2.65E-02
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	: uCi/ml	: 2.21E-08	: 3.01E-09
B. TRITIUM			
1. TOTAL RELEASE	: CURIES	: 6.91E-01	: 5.56E-02
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	: uCi/ml	: 7.95E-08	: 6.33E-09
C. DISSOLVED AND ENTRAINED GASES			
1. TOTAL RELEASE	: CURIES	: 2.09E-04	: 1.02E-04
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	: uCi/ml	: 2.41E-11	: 1.16E-11
D. GROSS ALPHA RADIOACTIVITY			
1. TOTAL RELEASE	: CURIES	: 0.00E+00	: 0.00E+00
E. WASTE VOL RELEASED (PRE-DILUTION)	: LITERS	: 7.69E+05	: 8.48E+04
F. TOTAL VOLUME DILUTION DISCHARGED	: LITERS	: 8.69E+09	: 8.79E+09

8. LIQUID EFFLUENT SUMMARY (continued)

REPORT CATEGORY : SEMIANNUAL LIQUID BATCH RELEASES
TYPE OF ACTIVITY : TOTALS FOR EACH NUCLIDE RELEASED
: ALL RADIONUCLIDES
REPORTING PERIOD : QUARTER 1 AND QUARTER 2

NUCLIDE	UNIT	BATCH RELEASES QUARTER 1	BATCH RELEASES QUARTER 2
ALL NUCLIDES			
H-3	CURIES	8.01E-01	5.56E-02
Na-24	CURIES	4.48E-02	8.23E-03
Cr-51	CURIES	1.27E-01	1.59E-02
Mn-54	CURIES	7.09E-04	8.62E-05
Co-58	CURIES	1.38E-03	1.93E-04
Co-60	CURIES	1.03E-03	1.51E-04
Zn-65	CURIES	2.34E-03	* <1.7E-08
Mo-99	CURIES	2.87E-03	4.15E-04
Tc-99m	CURIES	7.42E-03	1.03E-03
I-131	CURIES	2.43E-04	4.15E-05
I-133	CURIES	5.49E-04	1.44E-04
Xe-135	CURIES	2.09E-04	1.02E-04
Sr-89	CURIES	1.04E-04	3.20E-06
Sr-90	CURIES	5.45E-07	* <6.5E-09
Fe-55	CURIES	6.47E-05	* <8.7E-07
Ba-131	CURIES	1.61E-04	* <8.6E-07
Ag-110m	CURIES	9.28E-06	* <1.7E-08
W-187	CURIES	2.76E-04	* <1.4E-06
As-76	CURIES	2.42E-03	2.81E-04
Sb-122	CURIES	1.84E-04	* <4.9E-07
Cs-134	CURIES	* <3.8E-07	* <3.8E-07
Cs-137	CURIES	* <4.5E-07	* <4.5E-07
Ce-141	CURIES	* <4.9E-07	* <4.9E-07
Ce-144	CURIES	* <2.3E-08	* <2.3E-08
Total for Period	CURIES	8.83E-01	8.21E-02

* Less than Lower Limit of Detection (LLD), i.e. the maximum sensitivity of measurement, in units of microcuries per milliliter (uCi/ml).

9. GASEOUS EFFLUENT SUMMARY

REPORT CATEGORY : SEMIANNUAL SUMMMATION OF ALL RELEASES BY QUARTER
TYPE OF ACTIVITY : ALL AIRBORNE EFFLUENTS
REPORTING PERIOD : QUARTER 1 AND QUARTER 2

TYPE OF EFFLUENT	UNIT	QUARTER 1	QUARTER 2
A. FISSION AND ACTIVATION GASES			
1. TOTAL RELEASE	CURIES	2.91E+01	8.47E+01
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	3.74E+00	1.08E+01
B. RADIOIODINES			
1. TOTAL IODINE - 131	CURIES	9.52E-04	1.35E-03
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	1.22E-04	1.72E-04
C. PARTICULATES			
1. PARTICULATES (HALF-LIVES>8 DAYS)	CURIES	4.17E-03	2.44E-03
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	5.36E-04	3.10E-04
3. GROSS ALPHA RADIOACTIVITY	CURIES	6.59E-07	8.20E-07
D. TRITIUM			
1. TOTAL RELEASE	CURIES	0.00E+00	0.00E+00
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	0.00E+00	0.00E+00

9. GASEOUS EFFLUENT SUMMARY (continued)

REPORT CATEGORY :SEMIANNUAL AIRBORNE CONTINUOUS RELEASES
TYPE OF ACTIVITY :FISSION GASES, IODINES, AND PARTICULATES
REPORTING PERIOD :QUARTER 1 AND QUARTER 2

	MIXED MODE RELEASES		
NUCLIDE	UNIT	QUARTER 1	QUARTER 2
PARTICULATES			
Cr-51	CURIES	3.30E-03	1.77E-03
Mn-54	CURIES	1.02E-05	3.02E-05
Fe-59	CURIES	*<1.5E-13	7.82E-06
Co-58	CURIES	2.77E-05	4.44E-05
Co-60	CURIES	1.70E-05	5.67E-05
Na-24	CURIES	6.49E-03	1.69E-03
Zn-65	CURIES	2.88E-05	7.78E-05
Tc-99m	CURIES	1.10E-02	5.07E-03
Ba-139	CURIES	7.69E-01	6.30E-01
Ba-140	CURIES	5.50E-04	2.77E-04
La-140	CURIES	3.66E-04	1.90E-04
Y-91m	CURIES	4.54E-03	3.26E-03
Sr-91	CURIES	7.93E-03	5.18E-03
Ba-131	CURIES	*<1.2E-13	1.11E-06
As-76	CURIES	5.87E-05	1.03E-04
Rb-89	CURIES	2.76E-01	6.79E-01
Cs-138	CURIES	4.17E-01	3.03E-01
Mn-56	CURIES	3.58E-04	1.24E-03
Ag-110m	CURIES	*<1.6E-13	3.29E-05
Se-75	CURIES	*<5.8E-14	5.11E-07
Zn-69m	CURIES	1.66E-05	1.17E-05
W-187	CURIES	*<1.6E-13	4.14E-05
Sr-89	CURIES	2.41E-04	1.38E-04
Sr-90	CURIES	3.10E-06	1.34E-06
Cs-134	CURIES	*<5.1E-14	*<5.1E-14
Cs-137	CURIES	*<6.4E-14	*<6.4E-14
Ce-141	CURIES	*<6.9E-14	*<6.9E-14
Ce-144	CURIES	*<2.9E-13	*<2.9E-13
Total for Period	CURIES	1.50E+00	1.63E+00

* Less than the Lower Limit of Detection (LLD), i.e. the maximum sensitivity of measurement in units of microcuries per milliliter (uCi/ml)

9. GASEOUS EFFLUENT SUMMARY (continued)

REPORT CATEGORY : SEMIANNUAL AIRBORNE CONTINUOUS RELEASES
TYPE OF ACTIVITY : FISSION GASES, IODINES, AND PARTICULATES
REPORTING PERIOD : QUARTER 1 AND QUARTER 2

	MIXED MODE RELEASES		
NUCLIDE	UNIT	QUARTER 1	QUARTER 2
FISSION GASES			
Ar-41	CURIES	1.60E+01	7.11E+01
Xe-135m	CURIES	9.72E-01	1.03E+00
Xe-138	CURIES	2.38E+00	2.29E+00
Xe-135	CURIES	1.10E-01	1.82E-01
Kr-85m	CURIES	6.55E-01	9.59E-01
Xe-137	CURIES	7.01E+00	6.43E+00
Kr-87	CURIES	*<5.3E-08	1.18E-01
Kr-88	CURIES	3.87E-01	8.99E-01
Kr-89	CURIES	1.25E+00	1.31E+00
Xe-133	CURIES	3.17E-01	3.41E-01
Total for Period	CURIES	2.91E+01	8.47E+01
IODINES			
I-131	CURIES	9.52E-04	1.35E-03
I-132	CURIES	1.66E-03	1.33E-02
I-133	CURIES	4.20E-03	1.12E-02
I-134	CURIES	*<2.0E-13	2.84E-03
I-135	CURIES	2.64E-03	1.63E-02
Total for Period	CURIES	9.45E-03	4.50E-02

* Less than the Lower Limit of Detection (LLD), i.e. the maximum sensitivity of measurement in units of microcuries per milliliter (uCi/ml)

10. SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. Solid Waste Shipped Offsite for burial or disposal (not irradiated fuel)

1. Type of Waste	Unit	6 month period	Est. Total Error %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m^3 Curies	1.58E+02 7.12E+02	±25 ±25
b. Dry compressible waste, contaminated equipment, etc.	m^3 Curies	1.85E+02 1.33E+01	±25 ±25
c. Irradiated components, control rods, etc.		0	
d. Other		0	

2. Estimate of major nuclide composition (by type of waste)

a. Spent resins, filter sludges, evaporator bottoms, etc.

Nuclide	Percent of Total Activity	Curies
Cr-51	4.5	3.21E+01
Mn-54	10.5	7.47E+01
Fe-55	53.5	3.81E+02
Co-58	3.1	2.21E+01
Co-60	12.4	8.83E+01
Fe-59	0.4	3.18E+00
Ni-63	0.4	3.04E+00
Zn-65	14.2	1.01E+02
Ba-131	<0.1	1.18E-01
H-3	0.1	7.96E-01
C-14	0.2	1.73E+00
Ag-110m	0.5	3.87E+00
Tc-99	<0.1	1.16E-03
I-129	<0.1	4.68E-04
Ce-144	<0.1	1.56E-01
Cm-243/244	<0.1	3.29E-03

b. Dry compressible waste, contaminated equipment, etc.

Nuclide	Percent of Total Activity	Curies
Cr-51	2.6	3.52E-01
Mn-54	6.8	9.04E-01
Fe-55	76.7	1.02E+01
Co-58	1.8	2.44E-01
Co-60	10.2	1.35E+00
Ni-63	0.3	3.40E-02
Tc-99	<0.1	5.19E-04
C-14	<0.1	1.45E-03
Fe-59	1.2	1.64E-01
I-129	<0.1	5.85E-04

Note: Activities of all principal radionuclides were determined by measurement.

3. Solid Waste Disposition (All waste was Class A and was shipped in LSA containers)

Type of shipment/ solidification process	Number of shipments	Mode of Transport.	Destination
Dewatered resin	20	truck	Barnwell, SC
Dry active waste and contaminated equipment	3	truck	Oak Ridge, TN
	2	truck	Channahon, IL
	1	truck	Barnwell, SC

4. Irradiated Fuel Shipments:

None

11. RADIATION INSTRUMENTATION

Fermi 2 Technical Specifications 3.3.7.11, Radioactive Liquid Effluent Monitoring Instrumentation, and 3.3.7.12, Radioactive Gaseous Effluent Monitoring Instrumentation, require that those monitors which exceed the time specified for out of service be reported in the next Semiannual Effluent Release Report. During this reporting period, January through June of 1990, the time specified in the action statements for these monitors was not exceeded.

12. CHANGES TO THE PROCESS CONTROL PROGRAM (PCP)

As required by the Fermi 2 license the operator (Detroit Edison) is required to establish a program that will reasonably assure the complete processing of radioactive wastes. This program assures processed wastes are completely solidified and are free of standing water. Changes to the PCP Manual are provided to document changes to established conditions and to ensure that controls are in place to assure that the radioactive waste is solidified.

During this reporting period, January through June of 1990, there were no changes to the PCP.

13. CHANGES TO DOSE CALCULATION AND ENVIRONMENTAL MONITORING LOCATIONS

During March 1990, the milk sampling control location at 7512 N. Custer Rd. (Doty Farm) dropped out of the Radiological Environmental Monitoring Program. In April 1990, a new milk sampling control location at 9334 Finzel Rd. (Calder Farm) was added to the program. This location is 15.74 km from the reactor and is in the WNW sector at 287 degrees. The ODCM page reflecting this change is shown as Appendix A as it will appear in the next ODCM revision.

14. CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL (ODCM)

During this reporting period, January through June of 1990, there were no changes to the ODCM.

15. MAJOR CHANGES TO RADIOACTIVE WASTE SYSTEMS

During this reporting period, January through June of 1990, there were no major changes to the liquid, gaseous or solid radioactive waste treatment systems.

William S. Orser
Senior Vice President

Detroit Edison

Fermi 2
6400 North Dixie Highway
Newport, Michigan 48166
(313) 586-5201

Nuclear Operations

March 1, 1991
NRC-91-0026

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

References: 1) Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

2) Appendix A, Facility Operating License No. NPF-43, Technical Specification 6.9.1.8

Subject: Semi-Annual Radiological Effluent Release Report

The Semi-Annual Effluent Release Report for Fermi 2 is attached. This report is being transmitted in compliance with Reference 2 and Regulatory Guide 1.21, Revision 1. The attached report covers the period from July 1 through December 31, 1990. In addition, a correction of a typographical error on page 14 of the February 1989 Semi-Annual Effluent Release Report is provided for the record.

During this reporting period there were no instances of unmonitored or unplanned radioactive releases from the site.

Please direct any questions or requests for additional information to Joseph Pendergast, Compliance Engineer, at (313) 586-1682.

Sincerely,

WSOrser

cc: A. B. Davis
R. W. DeFayette
W. G. Rogers
J. F. Stang
Region III

ACTION REQ'D DATE 8/16/91
RESPONSIBLE PERSON(S) T [illegible]
RESPONSE REQ'D DATE ~~8/16/91~~ 4/3 c/11 to NRC
DATE DUE TO LICENSING 8/16/91
RACTS NO(S) 3726

TQR 3/4/91

DER NO. N/A
LICENSING CONTACT JPendergast
FILE

Terry L. Riley

DETROIT EDISON COMPANY

FERMI 2 NUCLEAR POWER PLANT

OPERATING LICENSE NO. NPF. - 43

SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

for the period of

July 1, 1990 through December 31, 1990

PREFACE

The Fermi 2 Nuclear Power Plant maintains a comprehensive program of monitoring and controlling the release of radioactive material from the site. The releases covered in this report are of three types: liquid releases, gaseous releases, and radioactive waste shipments.

In a liquid release, a tank containing radioactive water is sampled prior to discharge. Based on the analysis of this sample, both the amount of radioactivity in the tank and the potential radiation dose to a member of the public are determined, and these figures are compared to federal limits. In calculating the radiation dose, very conservative assumptions are used. For example, it is assumed that an individual eats 46 pounds of fish per year from Lake Erie directly offshore of the Fermi 2 plant. The tank may be released only after it is determined that no federal limits are exceeded. As it is released, the contents of the tank are diluted by clean water in a ratio of about 400 gallons of clean water to one gallon of tank water, and the release is continuously monitored by radiation detectors. Fermi 2 is actively trying to eliminate all liquid releases, and none occurred the second half of 1990.

Gaseous releases occur at Fermi 2 in conjunction with building ventilation systems. There are six ventilation system release points, or "stacks", each of which is monitored by a sophisticated radiation monitor which continuously extracts a sample from the stack effluent. Since any gaseous radioactive material is diluted by building ventilation, the stack concentrations are small. In fact, radioactive material is not detected in most stack samples. Of course, all sample results are compared with federal limits to ensure compliance. If the amount of radioactivity in the effluent of any stack would get close to a federal limit, an alarm would be received in the Fermi 2 control room so that operators can evaluate the situation, order increased sampling, shut down building ventilation, or divert the effluent stream to a special standby treatment system so that federal limits are not exceeded.

Radioactive shipments of solid waste from the Fermi 2 site consist of waste generated in the process of cleaning plant water, radioactive trash, and irradiated components. Federal regulations and limits governing these shipments are extensive, and Fermi 2 also complies with internal, sometimes more restrictive, procedures. Shipment destinations are either licensed burial sites or intermediate processing facilities.

This report also contains data on potential radiation doses due to liquid and gaseous releases. These doses are calculated according to methods approved by the Nuclear Regulatory Commission, and many conservative assumptions are used in the calculations. As mentioned above, in calculating dose due to liquid releases it is assumed that an individual consumes 46 pounds of fish per year caught just offshore of Fermi 2. To calculate a maximum dose due to gaseous releases, it is assumed that a hypothetical infant drinks 87 gallons per year of milk from a milk animal which is fed exclusively from feed grown at the same location at which the infant lives. Most dose calculations assume that the individual receiving dose spends the entire year at a given location, and that he is not protected by shelters such as houses. Because of assumptions such as these, it is likely that the radiation doses listed in this report are overestimates of the doses actually received. Even so, no calculated dose exceeds 1% of any federal limit.

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1. INTRODUCTION

The Detroit Edison Fermi 2 Nuclear Power Plant is designed and operated to strictly control and monitor the release of radioactive effluents to the environment in accordance with Nuclear Regulatory Commission (NRC) and Detroit Edison Company requirements. This Semiannual Radioactive Effluent Release Report is submitted in accordance with Fermi 2 Technical Specification 6.9.1.8 and NRC Regulatory Guide 1.21. This report provides the following information required by those references:

1. Summation of the quantities of radioactive material (in the form of gases and liquids) released from the plant and analysis of the radiological impact of these releases
2. Summation of quantities of radioactive material contained in solid waste packaged and shipped for off-site disposal
3. Changes to the Process Control Program (PCP)
4. Changes to the Offsite Dose Calculation Manual (ODCM)

This report covers the period of July 1 through December 31, 1990.

During 1990, the total gaseous and liquid radioactive effluent releases and resulting dose to the public were maintained As Low As Reasonably Achievable (ALARA). A summary of the dose due to radioactive effluents in comparison to NRC limits is shown below:

NRC DOSE LIMITS (10CFR50 APPENDIX I)	FERMI 2 ESTIMATED DOSE IN 1990	PERCENT OF ALLOWABLE LIMITS
A. GASEOUS EFFLUENTS		
Noble Gas Dose to Air (Site Boundary)		
≤10 mrad/year gamma	4.58 E-2 mrad	0.46%
≤20 mrad/year beta	2.76 E-2 mrad	0.14%
I-131, I-133, Tritium, and Particulates with half lives > 8 days		
≤15 mrem/year to any organ	5.69 E-2 mrem	0.38%
B. LIQUID EFFLUENTS		
≤3 mrem/year to total body	5.13 E-3 mrem	0.17%
≤10 mrem/year to any organ	1.11 E-2 mrem	0.11%

Section 11 of this report presents data supporting this summary.

2. REGULATORY LIMITS

The Nuclear Regulatory Commission limits on liquid and gaseous effluents are incorporated in the Fermi 2 Technical Specifications. These limits prescribe the maximum quantities and rates of release for radioactive effluents resulting from normal operation of Fermi 2. The limits are defined in several ways to limit the overall impact on persons living near the plant. The limits are described below:

A. Gaseous Effluents

1. Dose rate due to radioactive materials released in gaseous effluents from the site to areas at and beyond the site boundary shall be limited to the following:

   a. Noble gases

      Less than or equal to 500 mrem/year to the total body
      Less than or equal to 3000 mrem/year to the skin

   b. Iodine 131, 133, tritium, and for all radionuclides in particulate form with half lives greater than 8 days

      Less than or equal to 1500 mrem/year to any organ.

2. Air dose due to noble gases released in gaseous effluents from the reactor to areas at and beyond the site boundary shall be limited to the following:

   a. Less than or equal to 5 mrads for gamma radiation
      Less than or equal to 10 mrads for beta radiation
      -During any calendar quarter

   b. Less than or equal to 10 mrads for gamma radiation
      Less than or equal to 20 mrads for beta radiation
      -During any calendar year

3. Dose to a member of the public from Iodine-131, 133, tritium, and all radionuclides in particulate form with half lives greater than 8 days in gaseous effluents released from the reactor to areas at and beyond the site boundary shall be limited to the following:

   a. Less than or equal to 7.5 mrems to any organ
      -During any calendar quarter

   b. Less than or equal to 15 mrems to any organ
      -During any calendar year

B. Liquid Effluents

1. The concentration of radioactive material released in liquid effluents to unrestricted areas shall be limited to the concentrations specified in Title 10 of the Code of Federal Regulations Part 20 (Standards for Protection Against Radiation), Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 2E-4 (.0002) microcuries/ml total activity.

2. The dose or dose commitment to a member of the public from radioactive materials in liquid effluents released from the reactor to unrestricted areas shall be limited to:

a. Less than or equal to 1.5 mrem to the total body
Less than or equal to 5 mrem to any organ
-During any calender quarter

b. Less than or equal to 3 mrem to the total body
Less than or equal to 10 mrem to any organ
-During any calender year

3. MAXIMUM PERMISSIBLE CONCENTRATION (MPC)

Fermi 2 Technical Specifications implement the MPC requirements of 10 CFR 20 and NRC Regulatory Guide 1.21 by means of the following dose rate limits:

A. Gases

The dose rate due to gaseous effluents is calculated in accordance with the Fermi 2 Offsite Dose Calculation Manual (ODCM). The maximum permissible dose rates for gaseous releases are defined in Fermi 2 Technical Specifications:

Technical Specification 3.11.2.1.a (Dose rate at the site boundary from noble gases):

-Less than or equal to 500 mrem/year to the total body
-Less than or equal to 3000 mrem/year to the skin

Technical Specification 3.11.2.1.b (Dose rate at the site boundary from I-131, I-133, and particulates with half lives greater than 8 days):

-Less than or equal to 1500 mrem/year to any organ

B. Liquids

Allowable liquid release rates are calculated in accordance with the Fermi 2 Offsite Dose Calculation Manual (ODCM). The maximum permissible concentration (MPC) for liquids used for these calculations are taken from 10 CFR 20, Appendix B, Table II, Column 2. The most restrictive MPC is used in all cases. For dissolved and entrained gases the MPC of 2E-4 microcuries/ml is applied. This MPC is based on the Xe-135 MPC in air (submersion dose) converted to an equivalent concentration in water as discussed in the International Commission on Radiological Protection (ICRP) Publication 2.

4. AVERAGE ENERGY

The calculated site boundary dose rates for Fermi 2 are based on identification of individual isotopes and on use of dose factors specific to each identified isotope or a highly conservative dose factor. Average energy values are not used in these calculations, and therefore need not be reported.

5. MEASUREMENTS AND APPROXIMATIONS OF TOTAL ACTIVITY

As required by NRC Regulatory Guide 1.21, this section describes the methods used to measure the total radioactivity in effluent releases and to estimate the overall errors associated with these measurements. The effluent monitoring systems are described in Chapter 11.4 of the Fermi 2 Updated Final Safety Analysis Report (UFSAR).

A. Gaseous Effluents

1. Fission and Activation Gases

Samples are obtained from each of the seven plant radiation monitors which continuously monitor the six ventilation exhaust points and from the Offgas Vent Pipe which carries the gland seal condenser exhaust, mechanical vacuum pump exhaust, and treated offgas streams. The fission and activation gases are quantified by gamma spectroscopy analysis of periodic samples. The following are typical fission and activation gases that are quantified for dose calculations:

Krypton (Kr)-85m	Xenon (Xe)-133	Xenon (Xe)-135
Xenon (Xe)-135m	Xenon (Xe)-137	Xenon (Xe)-138
Argon (Ar)-41		

The values reported in Section 9 are the sums of all fission and activation gases quantified at all monitored release points.

Considering the inherent variability in radiation measurement, the variability in effluent stream composition, and the uncertainties in effluent flow rate and instrument calibration, Detroit Edison estimates that the uncertainty of the fission and activation gas total release figures is less than plus or minus 8 percent.

2. Radioiodines

Samples are obtained from each of the seven plant radiation monitors, which continuously monitor the six ventilation exhaust points. The radioiodines are entrained on charcoal and then quantified by gamma spectroscopy analysis. For each sample the duration of sampling and continuous flow rate through the charcoal are used in determining the concentration of radioiodines. From the flow rate of the ventilation system a rate of release can be determined. The radioiodines usually quantified for dose calculations are the following:

Iodine (I)-131	Iodine (I)-132
Iodine (I)-133	Iodine (I)-135

The values reported in Section 9 are the sums of all radioiodines quantified at all continuously monitored release points.

Considering the inherent variability in radiation measurements, the variability in effluent stream composition, and the uncertainty in sample and effluent flow rates, Detroit Edison estimates that the uncertainty of the total radioiodine release figures is less than plus or minus 5 percent.

3. **Particulates**

Samples are obtained from each of the seven plant effluent radiation monitors, which continuously monitor the six ventilation exhaust points. The particulates are collected on a filter and then quantified by gamma spectroscopy analysis. For each sample the duration of sampling and continuous flow rate through the filter are used in determining the concentration of particulates. From the flow rate of the ventilation system a rate of release can be determined. Radioactive activation and fission products that are typically found include the following:

Manganese (Mn)-54	Iron (Fe)-59	Cobalt (Co)-58
Cobalt (Co)-60	Zinc (Zn)-65	Chromium (Cr)-51
Barium (Ba)-139	Barium (Ba)-140	Lanthanum (La)-140
Yttrium (Y)-91m	Strontium (Sr)-91	Rubidium (Rb)-89
Cesium (Cs)-138	Technetium (Tc)-99m	

A composite of the filters from each ventilation release point are analyzed monthly for gross alpha radioactivity using gas proportional counting methods. Quarterly the filters are radiochemically separated and analyzed for Strontium (Sr)-89/90 using various analytical methods. If found these radionuclides are reported as total particulate activity.

The values reported in Section 9 are the sums of all particulates quantified at all monitored release points.

Considering the inherent variability in radiation measurements, the variability in effluent stream composition, and the uncertainties in instrument calibration and in sample and effluent flow rates, Detroit Edison estimates that the the uncertainty of the total particulate release figures is less than plus or minus 3 percent.

4. Tritium

Samples are obtained for each of the seven plant effluent radiation monitors which continuously monitor the six ventilation exhaust points. The sample is passed through a bottle containing water and the tritium is "washed" out to the collecting water. Portions of the collecting water are analyzed for tritium using liquid scintillation counting techniques. For each sample, the duration of sample and sample flow rate are used to determine the concentration. From the flow rate of the ventilation system a release rate can be determined.

The values reported in Section 9 are the sums of all tritium quantified at all monitored release points.

Considering the inherent variability in radiation measurement, the variability in effluent stream composition, and the uncertainties in instrument calibration, sample and effluent flow rates, and collection efficiency, Detroit Edison estimates that the uncertainty of total gaseous tritium release figures is less than plus or minus 34 percent.

5. Gross Alpha

The gaseous particulate filters from the seven plant effluent radiation monitors are stored for one week to allow for decay of naturally occurring alpha emitters. These filters are then analyzed for gross alpha radioactivity by gas proportional counting, and any such radioactivity found is assumed to be plant related. The quantity of alpha emitters released can then be determined from sample flow rate, sample duration, and stack flow rate.

The values reported in Section 9 are the sums of all alpha emitters quantified at all monitored release points.

Considering the inherent variability in radiation measurements, the variability in effluent stream composition, and the uncertainties in instrument calibration and in sample and effluent flow rates, Detroit Edison estimates that the uncertainty of the total gaseous gross alpha release figures is less than plus or minus 10 percent.

B. Liquid Effluents

The liquid radwaste processing system and the liquid effluent monitoring system are described in the Fermi-2 UFSAR.

1. Fission and activation products

Before the contents of each holding tank is discharged to the environment, a representative sample of the tank's contents is taken and retained. The sample allows for the determination of radioactive material concentrations and establishes the rate at which the radioactive material can be discharged to the environment. Radioactive activation and fission products that are typically found include the following:

Manganese (Mn)-54	Iron (Fe)-59	Chromium (Cr)-51
Cobalt (Co)-58	Cobalt (Co)-60	Silver (Ag)-110m
Zinc (Zn)-65	Barium (Ba)-131	Technetium (Tc)-99m

At the end of the calendar quarter a composite sample is made of all discharge samples taken during the quarter. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for Iron (Fe)-55 and Strontium (Sr)-89/90. Radiochemical separations and various analytical methods are used to quantify the amounts of Sr-89/90 and Fe-55.

The values reported in Section 8 are the sums of all fission and activation products found in all batch releases.

Considering the inherent variability in radiation measurement and the uncertainties in volume measurements and instrument calibration, Detroit Edison estimates that the uncertainty in total liquid fission and activation product release figures is less than plus or minus 5 percent.

2. Tritium

Before the contents of each holding tank is discharged to the environment, a representative sample of the tank contents is taken and retained. At the end of the calendar month a composite sample is made of all discharge samples taken during the month. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for tritium by liquid scintillation counting.

The values reported in Section 8 are the sums of all tritium quantified from all batch releases.

Considering the inherent variability in radiation measurement and the uncertainties in volume measurement and instrument calibration, Detroit Edison estimates the uncertainty in total tritium release figures is less than plus or minus 15 percent.

3. Dissolved and Entrained Gases

Prior to releasing liquid radioactive waste to the environment a sample is taken from the radwaste holding tank. This sample is representative of the tank's contents. The sample is examined using gamma spectroscopy to determine the dissolved and entrained noble gases. The following radiogases are typical of those which may be found:

Xenon (Xe)-133	Xenon (Xe)-135

The values reported in Section 8 are the sums of all radiogases found for all batch releases.

Considering the inherent variability in radiation measurement and the uncertainties in instrument calibration and volume measurements, Detroit Edison estimates that the uncertainty in total dissolved and entrained gas release figures is less than plus or minus 15 percent.

4. Gross Alpha

Before the contents of each holding tank is discharged to the environment, a representative sample of the tank's contents is taken and retained. At the end of the calendar month a composite sample is made of all discharge samples taken during the month. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for gross alpha radioactivity by gas proportional counting.

The values reported in Section 8 are the sums of the gross alpha radioactivity from all batch releases.

Considering the inherent variability in radiation measurement and the uncertainty in volume measurements and instrument calibration, Detroit Edison estimates that the uncertainty in total liquid gross alpha release figures is less than plus or minus 43 percent.

6. ABNORMAL RELEASES

For the purpose of this report, an abnormal release is any release of radioactive material not performed in accordance with the Fermi 2 license and implementing procedures. No abnormal releases occurred during the reporting period.

7. BATCH RELEASES

No batch liquid releases occurred between July 1, 1990 and December 31, 1990.

The only batch gaseous releases from Fermi 2 are the venting or purging of the primary containment (drywell) atmosphere. These venting or purging releases pass through the reactor building ventilation or standby gas treatment system and are monitored by the final effluent monitors for these pathways. Separate data on these venting or purging releases are not reported because the associated data are already included in the gaseous effluent release data (Section 5.A and Section 9).

8. LIQUID EFFLUENT SUMMARY

REPORT CATEGORY	: SEMIANNUAL SUMMMATION OF ALL RELEASES BY QUARTER
TYPE OF ACTIVITY	: ALL LIQUID EFFLUENTS
REPORTING PERIOD	: QUARTER 3 AND QUARTER 4

During the third and fourth quarters of 1990, there were no liquid releases.

William S. Orser
Senior Vice President

Detroit
Edison

Fermi 2
6400 North Dixie Highway
Newport, Michigan 48166
(313) 586-5201

Nuclear Operations

August 30, 1991
NRC-91-0107

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

References: 1) Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

2) Appendix A, Facility Operating License No. NPF-43, Technical Specification 6.9.1.8

Subject: Semi-Annual Radioactive Effluent Release Report

The Semi-Annual Radioactive Effluent Release Report for Fermi 2 is attached. This report is being transmitted in compliance with Reference 2 and Regulatory Guide 1.21, Revision 1. The attached report covers the period from January 1 through June 30, 1991.

During this reporting period there were no instances of unmonitored or unplanned radioactive releases from the site.

Please direct any questions or requests for additional information to Joseph Pendergast, Compliance Engineer, at (313) 586-1682.

Sincerely,

WSOrser

cc: A. B. Davis
R. W. DeFayette
J. F. Stang
S. Stasek
Region III

DETROIT EDISON COMPANY

FERMI 2 NUCLEAR POWER PLANT

OPERATING LICENSE NO. NPF – 43

SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

for the period of

January 1, 1991 through June 30, 1991

TABLE OF CONTENTS

Fermi 2 Semiannual Radioactive Effluent Release Report
January 1, 1991 through June 30, 1991

PREFACE

The purpose of the Fermi 2 Nuclear Power Plant is to provide safe, economic and reliable electrical energy to the people of Southeastern Michigan. In 1990, Fermi 2 generated over 7 million Megawatt-hours (net) of electricity, which is 15% of the total electricity generated by the Detroit Edison Company in 1990.

Fermi 2 is designed, constructed and operated in accordance with the standards and requirements established by the U.S. Nuclear Regulatory Commission (USNRC) to ensure that any potential radiation doses to members of the public will be "as low as reasonably achievable" (ALARA).

The USNRC defines the term "as low as reasonably achievable" to mean "as low as reasonably achievable taking into account the state of technology, and the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to the utilization of atomic energy in the public interest".

The Semiannual Effluent Release Report contains data and information regarding radioactivity which was released in gaseous and liquid effluents and as solid radioactive waste from the Fermi 2 Nuclear Power Plant from January 1, 1991 through June 30, 1991.

This preface includes a perspective on radioactive effluent releases and annual radiation doses to members of the public which are calculated from the radioactive effluent release data, covering the entire period of Fermi 2 operation (1985–1991).

The radiation dose data which are contained in this report are calculated by using conservative methods and models, which are required and approved by the USNRC. This ensures that any assessment of compliance with USNRC standards and requirements will be based upon calculated values which represent the maximum potential radiation doses to members of the public. Actual radiation doses to a member of the public from Fermi 2 radioactive effluents may be much less than the calculated values in this report.

Figure 1 shows that over the six years that Fermi 2 has operated, no member of the public has received annual radiation doses exceeding 2/10ths of one millirem (0.2 millirem) to the total body due to radioactive effluents from the plant.

Table 1 shows that the highest calculated annual total body exposures from noble gas and liquid radioactive effluents (in 1989) are each less than 2% of the limits approved by the USNRC in the Fermi 2 Technical Specifications. For all other years of Fermi 2 operation, each of the calculated annual total body exposures from radioactive gaseous and liquid effluents are less than 1% of the limits.

The calculated radiation exposure from radioactive noble gases shown in Table 1 for 1989 is approximately three times the value for 1990. The difference in the calculated radiation exposure values is due to a revision made in 1990 to the calculation method to more accurately reflect the actual release characteristics. The calculated radiation exposure value for 1990 (0.046 millirad) is conservative, but it is more realistic than the value calculated in 1989 (0.136 millirad) using the original calculation method.

Figure 2a shows the quantities of radioactivity which were released annually in radioactive gaseous effluents from Fermi 2. Most (99%) of the radioactive gaseous effluents consist of short-lived noble gases which decay away in minutes or hours. The noble gases are inert, which means that they do not concentrate in the environment or in the human body. The increase in gaseous radioactive effluents after 1988, when compared to the data for 1985-1988, is due to the fact that the plant first achieved full power c mmercial operation in 1988.

Figure 2b shows the annual wastewater volumes and radioactivity which were released in 1985-1991. The decrease in wastewater volumes released annually since 1985-1987 is due to improved plant operation and water management practices. The higher wastewater volumes and radioactivity released in 1989 and 1991 compared to the lesser amounts released in 1990 are due to the increased usage and processing of water within plant systems during the first and second refueling outages in 1989 and 1991. There was no refueling outage in 1990.

The National Council on Radiation Protection (NCRP) estimates that the average person in the U.S. receives approximately 300 millirems per year from sources of natural background radiation. Also, the NCRP estimates that an additional 60 millirems per year is received from sources of medical radiation exposure and from consumer products. By these NCRP estimates, the average person in the U.S. receives approximately 360 millirems per year from natural and man made sources of radiation exposure, other than commercial nuclear power.[1]

The NCRP estimate of 360 millirems per year is more than 1,800 times the maximum calculated annual radiation dose of less than 2/10ths of one millirem to the total body from Fermi 2 radioactive effluents, which occurred in 1989. The annual calculated radiation exposure from Fermi 2 radioactive effluents contributes less than 6/100ths of one per cent (< 0.06%) of the average total body radiation exposure received per year by a member of the public from natural and other man-made sources of exposure.

[1] National Council on Radiati n Protection and Measurements Report No. 93, "Ionizing Radiation Exposure of the Population of the United States", published in 1987.

Maximum Calculated Total Body Dose to a Member of the Public from Fermi 2 Radioactive Airborne and Liquid Effluents 1985 – 1991

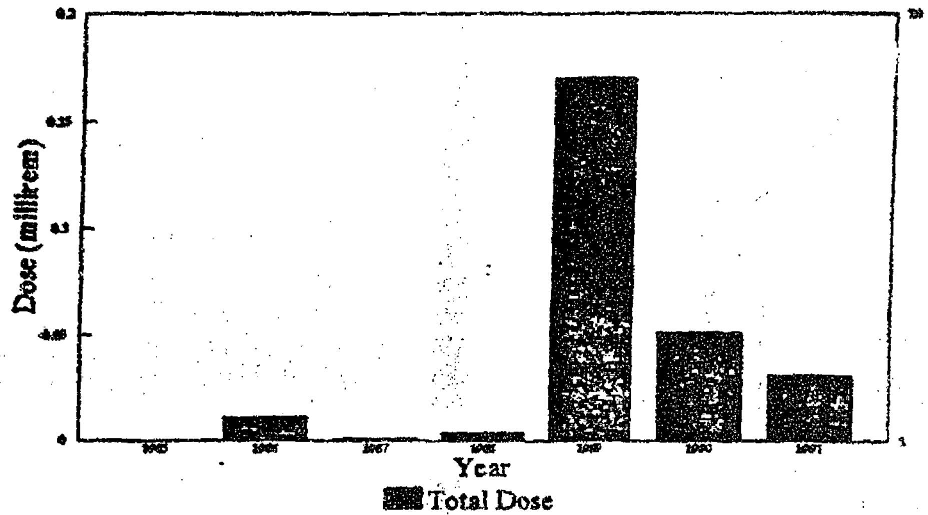


Figure 1

Data Summary Table

Radiation Dose (millirems)

Year	Airborne Effluents	Liquid Effluents	Total
*1985	N.D.	<0.001	<0.001
1986	N.D.	0.011	0.011
1987	<0.001	0.001	0.001
1988	<0.001	0.004	0.004
1989	0.137	0.033	0.170
1990	0.046	0.005	0.051
*1991	0.015	0.016	0.031

N.D.= No radioactivity was detected.

* Data for 1991 is for January – June 1991 only

Table 1

Comparison of Fermi 2 Calculated Radioactive Effluent Exposure Data (Total Body) to Fermi 2 Technical Specification Annual Limits

Year	Calculated Total Body Exposure: Due to Noble Gas (mrad) (Limit = 10 mrad/yr)	Calculated Total Body Exposure: Due to Liquid Effluents (mrem) (Limit = 3 mrem/yr)
1985	N.D.	<0.001 (<0.01%)
1986	N.D.	0.011 (0.37%)
1987	N.D.	0.001 (0.03%)
1988	<0.001 (<0.01%)	0.004 (0.13%)
1989	0.136 (1.36%)	0.033 (1.10%)
1990	0.046 (0.46%)	0.005 (0.17%)
*1991	0.015 (0.15%)	0.016 (0.53%)

N.D. = No radioactive noble gases were detected.

* Data for 1991 is for January – June 1991 only

Fermi 2 Radioactive Airborne Effluent
Summary Data 1985 – 1991

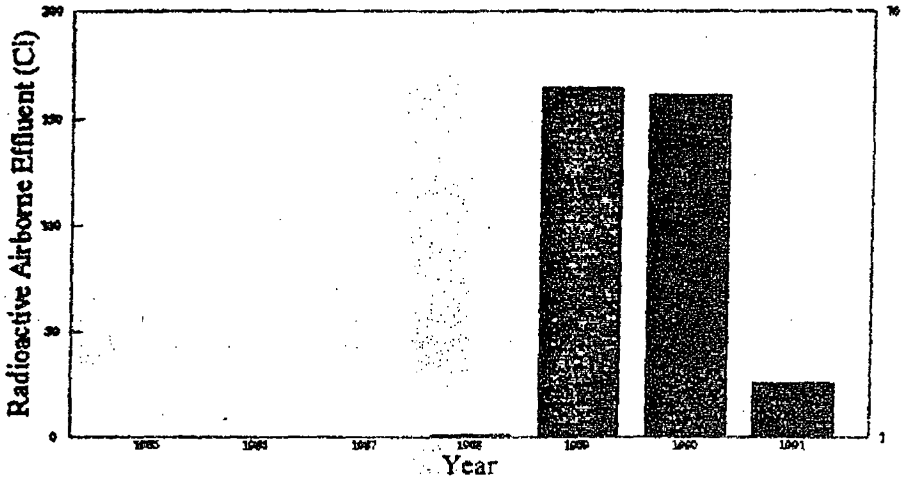


Figure 2a

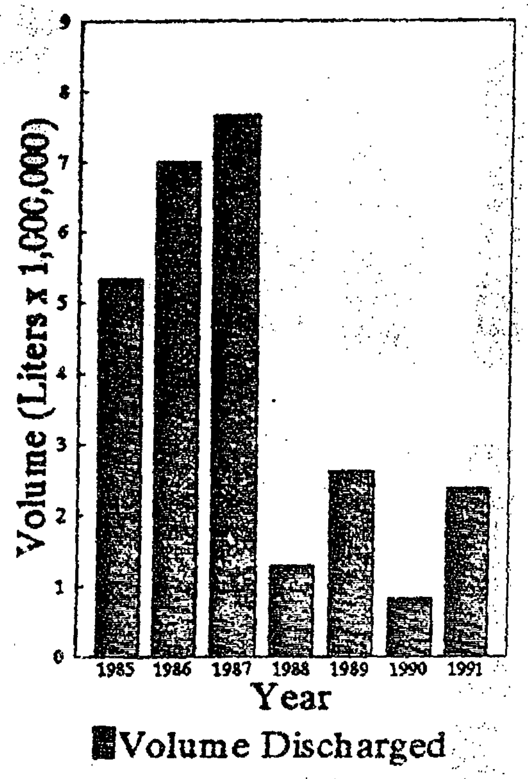
Data Summary Table

Year	Radioactivity Released (Curies) Gases	Radioiodines	Particulates
1985	N.D.	N.D.	N.D.
1986	N.D.	N.D.	N.D.
1987	N.D.	N.D.	0.009
1988	1.11	<0.001	0.002
1989	164	0.002	0.015
1990	161	0.003	0.012
*1991	25.4	0.001	0.001

N.D. = No radioactivity was detected

* Data for 1991 is for January – June 1991 only

Fermi 2 Radioactive Liquid Effluent
Summary Data 1985 – 1991



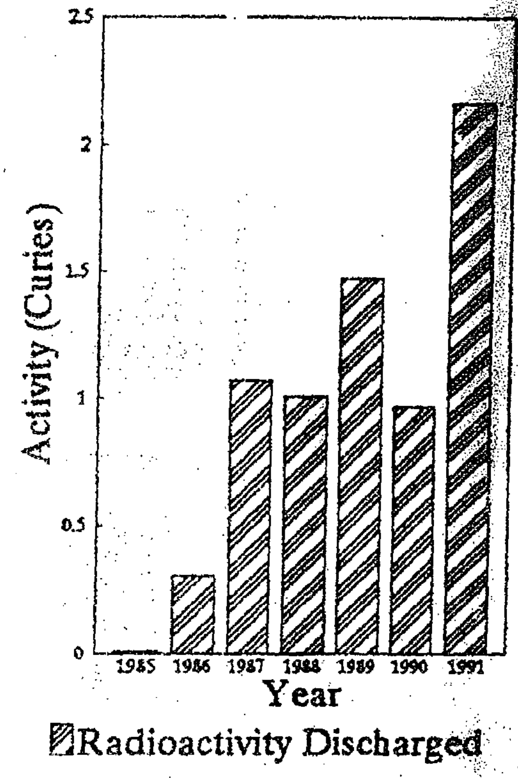


Figure 2b

Data Summary Table

Year	Volume Discharged (Liter X 1000000)	Radioactivity (Curies)
1985	5.33	0.010
1986	7.01	0.304
1987	7.67	1.067
1988	1.29	1.007
1989	2.61	1.472
1990	0.83	0.966
*1991	2.36	2.164

*Data for 1991 is for January – June 1991 only

1. INTRODUCTION

The Detroit Edison Fermi 2 Nuclear Power Plant is designed and operated in a manner which strictly controls and monitors the release of radioactive effluents to the environment in accordance with Nuclear Regulatory Commission (NRC) and Detroit Edison Company requirements. This Semiannual Radioactive Effluent Release Report is submitted in accordance with Fermi 2 Technical Specification 6.9.1.8 and NRC Regulatory Guide 1.21. This report provides the following information required by those references:

1. Summation of the quantities of radioactive material (in the form of gases and liquids) released from the plant (Sections 8 and 9)
2. Summation of quantities of radioactive material contained in solid waste packaged and shipped for off-site disposal (Section 10)
3. Changes to the Process Control Program (PCP) (Section 12)
4. Changes to the Offsite Dose Calculation Manual (ODCM) (Section 14)
5. A list and description of any unplanned releases of radioactive materials to unrestricted areas (Section 6)
6. A listing of any new locations for dose calculation or environmental monitoring identified by the land use census (Section 13)
7. A listing of effluent monitors which were inoperable for a period longer than that specified in Technical Specifications 3.3.7.11 and 3.3.7.12, and an explanation of why the time limit was exceeded (Section 11)
8. A description of events leading up to any liquid holdup tanks exceeding the limit of Technical Specification 3.11.1.4 (Section 16)
9. A description of any major changes to radioactive waste treatment systems (Section 15)

This report covers the period of January 1 through June 30, 1991.

During the first half of 1991, the total gaseous and liquid radioactive effluent releases and resulting dose to the public were maintained As Low As Reasonably Achievable (ALARA). In accordance with Fermi 2 Technical Specification 6.9.1.8, the next Semiannual Radioactive Effluent Release Report--the one to be submitted within 60 days after January 1, 1992--will contain dose assessments for all of 1991.

2. REGULATORY LIMITS

The Nuclear Regulatory Commission limits on liquid and gaseous effluents are incorporated in the Fermi 2 Technical Specifications. These limits prescribe the maximum quantities and rates of release for radioactive effluents resulting from normal operation of Fermi 2. The limits are defined in several ways to limit the overall impact on persons living near the plant. The limits are described in the following sections.

A. Gaseous Effluents

1. Dose rate due to radioactive materials released in gaseous effluents from the site to areas at and beyond the site boundary shall be limited to the following:

   a. Noble gases

      Less than or equal to 500 mrem/year to the total body
      Less than or equal to 3000 mrem/year to the skin

   b. Iodine 131, 133, tritium, and for all radionuclides in particulate form with half lives greater than 8 days

      Less than or equal to 1500 mrem/year to any organ.

2. Air dose due to noble gases released in gaseous effluents from the reactor to areas at and beyond the site boundary shall be limited to the following:

   a. Less than or equal to 5 mrads for gamma radiation
      Less than or equal to 10 mrads for beta radiation
      –During any calendar quarter

   b. Less than or equal to 10 mrads for gamma radiation
      Less than or equal to 20 mrads for beta radiation
      –During any calendar year

3. Dose to a member of the public from iodine-131, 133, tritium, and all radionuclides in particulate form with half lives greater than 8 days in gaseous effluents released from the reactor to areas at and beyond the site boundary shall be limited to the following:

   a. Less than or equal to 7.5 mrems to any organ
      –During any calendar quarter

   b. Less than or equal to 15 mrems to any organ
      –During any calendar year

B. Liquid Effluents

1. The concentration of radioactive material released in liquid effluents to unrestricted areas shall be limited to the concentrations specified in Title 10 of the Code of Federal Regulations Part 20 (Standards for Protection Against Radiation), Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 2E-4 (.0002) microcuries/ml total activity.

2. The dose or dose commitment to a member of the public from radioactive materials in liquid effluents released from the reactor to unrestricted areas shall be limited to the values in the following sections.

a. Less than or equal to 1.5 mrem to the total body
Less than or equal to 5 mrem to any organ
-During any calender quarter

b. Less than or equal to 3 mrem to the total body
Less than or equal to 10 mrem to any organ
-During any calender year

3. **MAXIMUM PERMISSIBLE CONCENTRATION (MPC)**

Fermi 2 Technical Specifications implement the MPC requirements of 10 CFR 20 and NRC Regulatory Guide 1.21 by means of the following dose rate limits:

A. **Gases**

The dose rate due to gaseous effluents is calculated in accordance with the Fermi 2 Offsite Dose Calculation Manual (ODCM). The maximum permissible dose rates for gaseous releases are defined in Fermi 2 Technical Specifications:

Technical Specification 3.11.2.1.a (Dose rate at the site boundary from noble gases):

-Less than or equal to 500 mrem/year to the total body
-Less than or equal to 3000 mrem/year to the skin

Technical Specification 3.11.2.1.b (Dose rate at the site boundary from I-131, I-133, and particulates with half lives greater than 8 days):

-Less than or equal to 1500 mrem/year to any organ

B. **Liquids**

Allowable liquid release rates are calculated in accordance with the Fermi 2 Offsite Dose Calculation Manual (ODCM). The maximum permissible concentration (MPC) for liquids used for these calculations are taken from 10 CFR 20, Appendix B, Table II, Column 2. The most restrictive MPC is used in all cases. For dissolved and entrained gases the MPC of 2E-4 microcuries/ml is applied. This MPC is based on the Xe-135 MPC in air (submersion dose) converted to an equivalent concentration in water as discussed in the International Commission on Radiological Protection (ICRP) Publication 2.

4. **AVERAGE ENERGY**

The calculated site boundary dose rates for Fermi 2 are based on identification of individual isotopes and on use of dose factors specific to each identified isotope or a highly conservative dose factor. Average energy values are not used in these calculations, and therefore need not be reported.

5. MEASUREMENTS AND APPROXIMATIONS OF TOTAL ACTIVITY

As required by NRC Regulatory Guide 1.21, this section describes the methods used to measure the total radioactivity in effluent releases and to estimate the overall errors associated with these measurements. The effluent monitoring systems are described in Chapter 11.4 of the Fermi 2 Updated Final Safety Analysis Report (UFSAR).

A. Gaseous Effluents

1. Fission and Activation Gases

Samples are obtained from each of the seven plant radiation monitors which continuously monitor the six ventilation exhaust points and from the Offgas Vent Pipe which carries the gland seal condenser exhaust, mechanical vacuum pump exhaust, and treated offgas streams. The Offgas Vent Pipe effluent is released through one of the six ventilation exhaust points (the reactor building exhaust plenum). The fission and activation gases are quantified by gamma spectroscopy analysis of periodic samples.

The values reported in Section 9 are the sums of all fission and activation gases quantified at all monitored release points.

Considering the inherent variability in radiation measurement, the variability in effluent stream composition, and the uncertainties in effluent flow rate and instrument calibration, Detroit Edison estimates that the uncertainty of the fission and activation gas total release figures is less than plus or minus 8 percent.

2. Radioiodines

Samples are obtained from each of the seven plant radiation monitors, which continuously monitor the six ventilation exhaust points. The radioiodines are entrained on charcoal and then quantified by gamma spectroscopy analysis. For each sample the duration of sampling and continuous flow rate through the charcoal are used in determining the concentration of radioiodines. From the flow rate of the ventilation system a rate of release can be determined.

The values reported in Section 9 are the sums of all radioiodines quantified at all continuously monitored release points.

Considering the inherent variability in radiation measurements, the variability in effluent stream composition, and the uncertainty in sample and effluent flow rates, Detroit Edison estimates that the uncertainty of the total radioiodine release figures is less than plus or minus 5 percent.

3. **Particulates**

Samples are obtained from each of the seven plant effluent radiation monitors, which continuously monitor the six ventilation exhaust points. The particulates are collected on a filter and then quantified by gamma spectroscopy analysis. For each sample the duration of sampling and continuous flow rate through the filter are used in determining the concentration of particulates. From the flow rate of the ventilation system a rate of release can be determined.

A composite of the filters from each ventilation release point is analyzed monthly for gross alpha radioactivity using gas proportional counting methods. Quarterly the filters are radiochemically separated and analyzed for Strontium (Sr)-89/90 using various analytical methods. If found these radionuclides are reported as total particulate activity.

The values reported in Section 9 are the sums of all particulates quantified at all monitored release points.

Considering the inherent variability in radiation measurements, the variability in effluent stream composition, and the uncertainties in instrument calibration and in sample and effluent flow rates, Detroit Edison estimates that the the uncertainty of the total particulate release figures is less than plus or minus 3 percent.

4. **Tritium**

Samples are obtained for each of the seven plant effluent radiation monitors which continuously monitor the six ventilation exhaust points. The sample is passed through a bottle containing water and the tritium is "washed" out to the collecting water. Portions of the collecting water are analyzed for tritium using liquid scintillation counting techniques. For each sample, the duration of sample and sample flow rate is used to determine the concentration. From the flow rate of the ventilation system a release rate can be determined.

The values reported in Section 9 are the sums of all tritium quantified at all monitored release points.

Considering the inherent variability in radiation measurement, the variability in effluent stream composition, and the uncertainties in instrument calibration, sample and effluent flow rates, and collection efficiency, Detroit Edison estimates that the uncertainty of total gaseous tritium release figures is less than plus or minus 34 percent.

5. Gross Alpha

The gaseous particulate filters from the seven plant effluent radiation monitors are stored for one week to allow for decay of naturally occurring alpha emitters. These filters are then analyzed for gross alpha radioactivity by gas proportional counting, and any such radioactivity found is assumed to be plant related. The quantity of alpha emitters released can then be determined from sample flow rate, sample duration, and stack flow rate.

The values reported in Section 9 are the sums of all alpha emitters quantified at all monitored release points.

Considering the inherent variability in radiation measurements, the variability in effluent stream composition, and the uncertainties in instrument calibration and in sample and effluent flow rates, Detroit Edison estimates that the uncertainty of the total gaseous gross alpha release figures is less than plus or minus 10 percent.

B. Liquid Effluents

The liquid radwaste processing system and the liquid effluent monitoring system are described in the Fermi-2 UFSAR.

1. Fission and activation products

Before the contents of each holding tank is discharged to the environment, a representative sample of the tank's contents is taken and retained. The sample allows for the determination of radioactive material concentrations and establishes the rate at which the radioactive material can be discharged to the environment.

At the end of the calendar quarter a composite sample is made of all discharge samples taken during the quarter. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for Iron (Fe)-55 and Strontium (Sr)-89/90. Radiochemical separations and various analytical methods are used to quantify the amounts of Sr-89/90 and Fe-55.

The values reported in Section 8 are the sums of all fission and activation products found in all batch releases.

Considering the inherent variability in radiation measurement and the uncertainties in volume measurements and instrument calibration, Detroit Edison estimates that the uncertainty in total liquid fission and activation product release figures is less than plus or minus 5 percent.

2. **Tritium**

Before the contents of each holding tank is discharged to the environment, a representative sample of the tank contents is taken and retained. At the end of the calendar month a composite sample is made of all discharge samples taken during the month. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for tritium by liquid scintillation counting.

The values reported in Section 8 sums all tritium quantified from all batch releases.

Considering the inherent variability in radiation measurement and the uncertainties in volume measurement and instrument calibration, Detroit Edison estimates the uncertainty in total tritium release figures is less than plus or minus 15 percent.

3. **Dissolved and Entrained Gases**

Prior to releasing liquid radioactive waste to the environment a sample is taken from the radwaste holding tank. This sample is representative of the tank's contents. The sample is examined using gamma spectroscopy to determine the dissolved and entrained noble gases.

The values reported in Section 8 are the sums of all radioactive gases found for all batch releases.

Considering the inherent variability in radiation measurement and the uncertainties in instrument calibration and volume measurements, Detroit Edison estimates that the uncertainty in total dissolved and entrained gas release figures is less than plus or minus 15 percent.

4. **Gross Alpha**

Before the contents of each holding tank is discharged to the environment, a representative sample of the tank's contents is taken and retained. At the end of the calendar month a composite sample is made of all discharge samples taken during the month. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for gross alpha radioactivity by gas proportional counting.

The values reported in Section 8 are the sums of the gross alpha radioactivity from all batch releases.

Considering the inherent variability in radiation measurement and the uncertainty in volume measurements and instrument calibration, Detroit Edison estimates that the uncertainty in total liquid gross alpha release figures is less than plus or minus 43 percent.

6. ABNORMAL RELEASES

For the purpose of this report, an abnormal release is any release of radioactive material not performed in accordance with the Fermi 2 license and implementing procedures. No abnormal releases occurred during the reporting period.

7. BATCH RELEASES

As required by Regulatory Guide 1.21, a summary of data for batch releases is provided below. The following batch liquid releases from radwaste holding tanks to the Circulating Water Decant Line occurred between January 1, 1991 and June 30, 1991:

Number of releases:	30
Total time for all releases:	13,126 minutes
Maximum time for a release:	490 minutes
Average time for a release:	438 minutes
Minimum time for a release:	380 minutes

The only batch gaseous releases from Fermi 2 are the venting or purging of the primary containment (drywell) atmosphere. These venting or purging releases pass through the reactor building ventilation or standby gas treatment system and are monitored by the final effluent monitors for these pathways. Separate data on these venting or purging releases are not reported because the associated data are already included in the gaseous effluent release data (Section 5.A and Section 9).

8. LIQUID EFFLUENT SUMMARY

REPORT CATEGORY : SEMIANNUAL SUMMMATION OF A'L RELEASES BY QUARTER
TYPE OF ACTIVITY : ALL LIQUID EFFLUENTS
REPORTING PERIOD : QUARTER 1 AND QUARTER 2

TYPE OF EFFLUENT	UNIT	QUARTER 1	QUARTER 2
A. FISSION AND ACTIVATION PRODUCTS			
1. TOTAL RELEASE (NOT INCLUDING TRITIUM, GASES, ALPHA)	CURIES	6.01E-02	1.46E-01
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ml	6.87E-09	1.81E-08
3. MAXIMUM PERCENT OF TECHNICAL SPECIFICATION LIMIT FOR A SINGLE RELEASE	%	8.79E-01	7.03E-01
B. TRITIUM			
1. TOTAL RELEASE	CURIES	6.98E-01	1.26E+00
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ml	7.98E-08	1.56E-07
3. PERCENT OF TECHNICAL SPECIFICATION LIMIT	%	9.54E-02	6.58E-02
C. DISSOLVED AND ENTRAINED GASES			
1. TOTAL RELEASE	CURIES	6.82E-05	1.83E-06
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ml	7.79E-12	2.27E-13
3. PERCENT OF TECHNICAL SPECIFICATION LIMIT	%	1.40E-04	1.43E-06
D. GROSS ALPHA RADIOACTIVITY (Note: N.D. = No activity detected)			
1. TOTAL RELEASE	CURIES	N.D.	N.D.
E. WASTE VOL RELEASED (PRE-DILUTION)	LITERS	6.46E+05	1.71E+06
F. TOTAL VOLUME DILUTION DISCHARGED	LITERS	8.75E+09	8.07E+09

8. LIQUID EFFLUENT SUMMARY (continued)

REPORT CATEGORY : SEMIANNUAL LIQUID BATCH RELEASES
TYPE OF ACTIVITY : TOTALS FOR EACH NUCLIDE RELEASE
: ALL RADIONUCLIDES
REPORTING PERIOD : QUARTER 1 AND QUARTER 2

NUCLIDE	UNIT	BATCH RELEASES QUARTER 1	BATCH RELEASES QUARTER 2
ALL NUCLIDES			
H-3	CURIES	6.98E-01	1.26E+00
Na-24	CURIES	6.55E-03	1.52E-03
Cr-51	CURIES	3.14E-02	9.16E-02
Mn-54	CURIES	2.44E-03	8.88E-03
Co-58	CURIES	3.20E-03	7.01E-03
Co-60	CURIES	3.85E-03	1.05E-02
Zn-65	CURIES	2.50E-03	5.69E-03
Fe-59	CURIES	*<5.2E-08	4.48E-04
Tc-99m	CURIES	1.86E-03	6.79E-04
I-131	CURIES	1.03E-04	*<2.7E-08
I-133	CURIES	2.08E-04	*<1.8E-08
Xe-133	CURIES	1.34E-05	*<7.3E-08
Xe-135	CURIES	5.48E-05	1.83E-06
Sr-89	CURIES	1.29E-04	9.92E-05
Sr-90	CURIES	*<7.0E-09	*<5.0E-09
Fe-55	CURIES	7.11E-03	1.88E-02
Ba-131	CURIES	*<6.8E-08	1.04E-04
Ba-133m	CURIES	*<9.9E-08	2.50E-05
Ru-103	CURIES	*<2.3E-08	1.58E-05
Ag-110m	CURIES	*<1.5E-07	7.10E-06
As-76	CURIES	5.45E-04	1.02E-03
Re-188	CURIES	1.37E-04	*<1.3E-07
Ni-65	CURIES	6.27E-05	*<2.1E-07
Cs-134	CURIES	*<2.5E-08	*<2.5E-08
Cs-137	CURIES	*<3.1E-08	*<3.1E-08
Ce-141	CURIES	*<2.8E-08	*<2.8E-08
Ce-144	CURIES	*<1.5E-07	*<1.5E-07
Total for Period	CURIES	7.58E-01	1.41E+00

* Less than Lower Limit of Detection (LLD), i.e. the maximum sensitivity of measurement, in units of microcuries per milliliter (uCi/ml).

9. GASEOUS EFFLUENT SUMMARY

REPORT CATEGORY : SEMIANNUAL SUMMMATION OF ALL RELEASES BY QUARTER
TYPE OF ACTIVITY : ALL AIRBORNE EFFLUENTS
REPORTING PERIOD : QUARTER 1 AND QUARTER 2

TYPE OF EFFLUENT	UNIT	QUARTER 1	QUARTER 2
A. FISSION AND ACTIVATION GASES			
1. TOTAL RELEASE	CURIES	2.20E+01	3.42E+00
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	2.83E+00	4.35E-01
B. RADIOIODINES			
1. TOTAL IODINE - 131	CURIES	7.00E-04	2.32E-04
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	9.00E-05	2.95E-05
C. PARTICULATES			
1. PARTICULATES (HALF-LIVES>8 DAYS)	CURIES	7.59E-04	3.52E-04
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	9.76E-05	4.48E-05
3. GROSS ALPHA RADIOACTIVITY	CURIES	4.50E-07	1.47E-06
D. TRITIUM (Note: N.D. = No activity detected)			
1. TOTAL RELEASE	CURIES	N.D.	N.D.
2. AVERAGE RELEASE RATE FOR PERIOD	uCi/sec	N.A.	N.A.

9. GASEOUS EFFLUENT SUMMARY (continued)

REPORT CATEGORY :SEMIANNUAL AIRBORNE CONTINUOUS RELEASES
TYPE OF ACTIVITY :FISSION GASES, IODINES, AND PARTICULATES
REPORTING PERIOD :QUARTER 1 AND QUARTER 2

	MIXED MODE RELEASES		
NUCLIDE	UNIT	QUARTER 1	QUARTER 2
PARTICULATES			
Cr-51	CURIES	3.07E-04	5.78E-05
Mn-54	CURIES	1.08E-05	6.97E-05
Fe-59	CURIES	*< 1.8E-13	3.49E-05
Co-58	CURIES	5.42E-06	1.65E-05
Co-60	CURIES	2.14E-05	9.98E-05
Na-24	CURIES	7.07E-04	9.66E-05
Zn-65	CURIES	4.87E-06	3.18E-05
Tc-99m	CURIES	2.36E-03	3.87E-05
Ba-139	CURIES	3.23E-01	4.37E-02
Ba-140	CURIES	3.19E-04	1.91E-05
La-140	CURIES	2.15E-04	6.89E-05
Y-91m	CURIES	1.92E-03	1.47E-04
Sr-91	CURIES	3.06E-03	2.78E-04
Rb-89	CURIES	3.65E-01	4.86E-02
Cs-138	CURIES	1.72E-01	2.03E-02
Re-188	CURIES	7.32E-05	*< 9.8E-14
Br-82	CURIES	1.47E-05	*< 5.1E-14
Se-75	CURIES	*< 2.5E-14	8.00E-06
Rb-88	CURIES	2.33E-04	*< 2.3E-11
Sr-89	CURIES	8.97E-05	1.36E-05
Sr-90	CURIES	4.89E-07	3.26E-07
Cs-134	CURIES	*< 3.6E-14	*< 3.6E-14
Cs-137	CURIES	*< 4.7E-14	*< 4.7E-14
Ce-141	CURIES	*< 3.1E-14	*< 3.1E-14
Ce-144	CURIES	*< 1.2E-13	*< 1.2E-13
Total for Period	CURIES	8.69E-01	1.14E-01

* Less than the Lower Limit of Detection (LLD), i.e. the maximum sensitivity of measurement in units of microcuries per milliliter (uCi/ml)

9. GASEOUS EFFLUENT SUMMARY (continued)

REPORT CATEGORY : SEMIANNUAL AIRBORNE CONTINUOUS RELEASES
TYPE OF ACTIVITY : FISSION GASES, IODINES, AND PARTICULATES
REPORTING PERIOD : QUARTER 1 AND QUARTER 2

		MIXED MODE RELEASES	
NUCLIDE	UNIT	QUARTER 1	QUARTER 2
FISSION GASES			
Ar-41	CURIES	2.20E+00	1.37E+00
Xe-135m	CURIES	1.25E+00	1.06E-01
Xe-138	CURIES	2.71E+00	3.46E-01
Xe-135	CURIES	2.04E-01	*<2.7E-08
Kr-85m	CURIES	1.77E+00	2.97E-01
Xe-137	CURIES	8.17E+00	1.09E+00
Kr-88	CURIES	1.72E+00	2.10E-01
Kr-89	CURIES	3.54E+00	*<2.0E-06
Xe-133	CURIES	3.93E-01	*<4.1E-08
Total for Period	CURIES	2.20E+01	3.42E+00
IODINES			
I-131	CURIES	7.00E-04	2.32E-04
I-132	CURIES	6.28E-04	1.42E-04
I-133	CURIES	3.64E-03	7.38E-04
I-134	CURIES	2.91E-04	*<1.6E-13
I-135	CURIES	1.17E-03	7.46E-04
Total for Period	CURIES	6.43E-03	1.86E-03

* Less than the Lower Limit of Detection (LLD), i.e. the maximum sensitivity of measurement in units of microcuries per milliliter (uCi/ml)

10. SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. Solid Waste Shipped Offsite for burial or disposal (not irradiated fuel)

1. Type of Waste	Unit	6 month period	Est. Total Error %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m^3 Curies	0.00E+00 0.00E+00	NA NA
b. Dry compressible waste, contaminated equipment, etc.	m^3 Curies	2.16E+01 2.02E+00	$\pm$25 $\pm$25
c. Irradiated components, control rods, etc.		0	NA
d. Other		0	NA

2. Estimate of major nuclide composition (by type of waste)

Dry active waste:

Nuclide	Percent of Total Activity	Curies
Mn-54	5.6	1.13E-01
Fe-55	81.0	1.64E+00
Co-60	8.5	1.73E-01
Zn-65	4.6	9.28E-02
C-14	0.2	4.27E-03
Tc-99	<0.1	2.35E-04
I-129	<0.1	1.56E-04
H-3	N.A.	Not detected

Note: Activities of all principal radionuclides were determined by measurement.

3. Solid Waste Disposition (All waste was Class A and was shipped in LSA containers.)

Type of shipment/ solidification process	Number of shipments	Mode of Transport	Destination
Dry active waste	1	truck	Chem-Nuclear Systems, Inc. Channahon, IL

4. Irradiated Fuel Shipments:

None

11. RADIATION INSTRUMENTATION

Fermi 2 Technical Specifications 3.3.7.11, Radioactive Liquid Effluent Monitoring Instrumentation, and 3.3.7.12, Radioactive Gaseous Effluent Monitoring Instrumentation, require that those monitors which exceed the time specified for out of service be reported in the next Semiannual Effluent Release Report. During this reporting period, January through June of 1991, the time specified in the action statements for these monitors was not exceeded.

12. CHANGES TO THE PROCESS CONTROL PROGRAM (PCP)

As required by the Fermi 2 license the operator (Detroit Edison) is required to establish a program that will reasonably assure the complete processing of radioactive wastes. This program assures processed wastes are completely solidified and are free of standing water. Changes to the PCP Manual are provided to document changes to established conditions and to ensure that controls are in place to assure that the radioactive waste is solidified.

During this reporting period, January through June of 1991, there were no changes to the PCP.

13. CHANGES TO DOSE CALCULATION AND ENVIRONMENTAL MONITORING LOCATIONS

In June, 1991, a new milk sampling location (the Roelant farm, M-4) was added. However, after 3 scheduled samples were obtained, the milk animal was sold. This location has been dropped as a milk sample location but is retained as a vegetation sample location.

14. CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL (ODCM)

During this reporting period, January through June of 1991, there were no changes to the ODCM.

15. MAJOR CHANGES TO RADIOACTIVE WASTE SYSTEMS

During this reporting period, January through June of 1991, there were no major changes to the liquid, gaseous or solid radioactive waste treatment systems.

16. LIQUID HOLDUP TANKS EXCEEDING LIMITS

Fermi 2 Technical Specification 3.11.1.4 requires that the quantity of radioactive material contained in any outside temporary tank shall be limited to 10 curies, excluding tritium and dissolved or entrained noble gases. During this reporting period, January through June of 1991, this activity limit for such tanks was not exceeded.

William S. Orser
Senior Vice President

Detroit Edison

Fermi 2
6400 North Dixie Highway
Newport, Michigan 48166
(313) 586-5201

Nuclear Operations

February 28, 1992
NRC-92-0010

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

References: 1) Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

2) Appendix A, Facility Operating License No. NPF-43, Technical Specification 6.9.1.8

Subject: Semi-Annual Radioactive Effluent Release Report

The Semi-Annual Radioactive Effluent Release Report for Fermi 2 is attached. This report is being transmitted in compliance with Reference 2 and Regulatory Guide 1.21, Revision 1. The attached report covers the period from July 1 through December 31, 1991.

During this reporting period there were no instances of unmonitored or unplanned radioactive releases from the site.

Please direct any questions or requests for additional information to Joseph Pendergast, Compliance Engineer, at (313) 586-1682.

Sincerely,

WSOrser

cc: T. G. Colburn
A. B. Davis
R. W. DeFayette
S. Stasek
Region III

DETROIT EDISON COMPANY

FERMI 2 NUCLEAR POWER PLANT

OPERATING LICENSE NO. NPF - 43

SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

for the period of

July 1, 1991 through December 31, 1991

PREFACE

The Fermi 2 Nuclear Power Plant maintains a comprehensive program of monitoring and controlling the release of radioactive material from the site. The releases covered in this report are of three types: liquid releases, gaseous releases, and radioactive waste shipments.

In a liquid release, a tank containing radioactive water is sampled prior to discharge. Based on the analysis of this sample, both the amount of radioactivity in the tank and the potential radiation dose to a member of the public are determined, and these figures are compared to federal limits. In calculating the radiation dose, very conservative assumptions are used. For example, it is assumed that an individual eats 46 pounds of fish per year from Lake Erie directly offshore of the Fermi 2 plant. The tank may be released only after it is determined that no federal limits are exceeded. As the tank is released, the contents of the tank are diluted by clean water in a ratio of approximately 400 gallons of clean water to one gallon of tank water. The release is continuously monitored by radiation detectors. In the second half of 1991, there were three liquid releases, down significantly from previous years. This small number is due to the plant operating in a steady state condition since the second refueling ending in June 1991.

Radioactive gaseous releases occur as part of the normal operation of Fermi 2. There are six ventilation system release points, or "stacks", each of which is monitored by a sophisticated radiation monitor which continuously extracts a sample from the stack effluent. Since any gaseous radioactive material is diluted by the building ventilation air flow, the stack concentrations are small. In fact, radioactive material is not detected in most stack samples. All sample results are compared with federal limits to ensure they are not exceeded. If the amount of radioactivity in the effluent of any stack approaches a federal limit, an alarm will be activated in the Fermi 2 control room to alert operations personnel. After evaluating the situation, the operators may choose to order increased sampling, shut down building ventilation, or divert the effluent stream to a special gaseous treatment system so that federal limits are not exceeded. In the second half of 1991, gaseous releases were comparable to levels seen in previous non-outage periods, reflecting stable operating conditions.

Radioactive shipments of solid waste from the Fermi 2 site consist of waste generated during water treatment, radioactive trash, and irradiated components. Federal regulations governing these shipments are extensive, and Fermi 2 also complies with internal procedures. Shipment destinations are either licensed burial sites or intermediate processing facilities. In the second half of 1991, Fermi 2 did not ship any radioactive waste due to the exclusion of Michigan licensees from the burial sites.

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1. INTRODUCTION

The Detroit Edison Fermi 2 Nuclear Power Plant is designed and operated in a manner which strictly controls and monitors the release of radioactive material to the environment in accordance with Nuclear Regulatory Commission (NRC) and Detroit Edison Company requirements. This Semiannual Radioactive Effluent Release Report, for the July through December 1991 period, is submitted in accordance with Fermi 2 Technical Specification 6.9.1.8 and NRC Regulatory Guide 1.21. This report provides the following information required by those references:

1. Summation of the quantities of radioactive material (in the form of gases and liquids) released from the plant (Sections 8 and 9)

2. Summation of quantities of radioactive material contained in solid waste packaged and shipped for off-site disposal (Section 10)

3. Changes to the Process Control Program (PCP) (Section 14)

4. Changes to the Offsite Dose Calculation Manual (ODCM) (Section 16)

5. A list and description of any unplanned releases of radioactive materials to unrestricted areas (Section 6)

6. A list of any new locations for dose calculation or environmental monitoring identified by the land use census (Section 15)

7. A list of effluent monitors which were inoperable for a period longer than that specified in Technical Specifications 3.3.7.11 and 3.3.7.12, and an explanation of why the time limit was exceeded (Section 12)

8. A description of events leading up to any liquid holdup tanks exceeding the limit of Technical Specification 3.11.1.4 (Section 18)

9. A description of any major changes to radioactive waste treatment systems (Section 17)

10. An assessment of the radiological impact on the public in terms of dose due to liquid and gaseous effluents, both to the maximally exposed individual and to the population with a 50 mile radius of the plant (Section 11)

11. A summary of 1991 meteorological data (wind speed and wind direction for different stability classes) which was used in calculating gaseous dispersion factors (Section 13)

2. REGULATORY LIMITS

The Nuclear Regulatory Commission limits on liquid and gaseous effluents are incorporated in the Fermi 2 Technical Specifications. These limits prescribe the maximum quantities and rates of release for radioactive effluents resulting from normal operation of Fermi 2. The limits are defined in several ways to limit the overall impact on persons living near the plant. The limits are described in the following sections.

A. Gaseous Effluents

1. Dose rate due to radioactive materials released in gaseous effluents from the site to areas at and beyond the site boundary shall be limited to the following:

   a. Noble gases

      Less than or equal to 500 mrem/year to the total body
      Less than or equal to 3000 mrem/year to the skin

   b. Iodine 131, 133, tritium, and for all radionuclides in particulate form with half lives greater than 8 days

      Less than or equal to 1500 mrem/year to any organ.

2. Air dose due to noble gases released in gaseous effluents to areas at and beyond the site boundary shall be limited to the following:

   a. Less than or equal to 5 mrads for gamma radiation
      Less than or equal to 10 mrads for beta radiation
      -During any calendar quarter

   b. Less than or equal to 10 mrads for gamma radiation
      Less than or equal to 20 mrads for beta radiation
      -During any calendar year

3. Dose to a member of the public from Iodine-131, 133, tritium, and all radionuclides in particulate form with half lives greater than 8 days in gaseous effluents released to areas at and beyond the site boundary shall be limited to the following:

   a. Less than or equal to 7.5 mrems to any organ
      -During any calendar quarter

   b. Less than or equal to 15 mrems to any organ
      -During any calendar year

B. Liquid Effluents

1. The concentration of radioactive material released in liquid effluents to unrestricted areas shall be limited to the concentrations specified in Title 10 of the Code of Federal Regulations Part 20 (Standards for Protection Against Radiation), Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 2E-4 (.0002) microcuries/ml total activity.

2. The dose or dose commitment to a member of the public from radioactive materials in liquid effluents released to unrestricted areas shall be limited to the values in the following sections.

a. Less than or equal to 1.5 mrem to the total body
Less than or equal to 5 mrem to any organ
–During any calender quarter

b. Less than or equal to 3 mrem to the total body
Less than or equal to 10 mrem to any organ
–During any calender year

3. MAXIMUM PERMISSIBLE CONCENTRATION (MPC)

Fermi 2 Technical Specifications implement the MPC requirements of 10 CFR 20 and NRC Regulatory Guide 1.21 by means of the following limits:

A. Gases

The dose rate due to gaseous effluents is calculated in accordance with the Fermi 2 Offsite Dose Calculation Manual (ODCM). The maximum permissible dose rates for gaseous releases are defined in Fermi 2 Technical Specifications:

Technical Specification 3.11.2.1.a (Dose rate at the site boundary from noble gases):

–Less than or equal to 500 mrem/year to the total body
–Less than or equal to 3000 mrem/year to the skin

Technical Specification 3.11.2.1.b (Dose rate at the site boundary from I-131, I-133, and particulates with half lives greater than 8 days):

–Less than or equal to 1500 mrem/year to any organ

B. Liquids

Allowable liquid release rates are calculated in accordance with the Fermi 2 Offsite Dose Calculation Manual (ODCM). As required by Technical Specification 3.11.1.1, the maximum permissible concentrations (MPC) for liquids used for these calculations are taken from 10 CFR 20, Appendix B, Table II, Column 2. The most restrictive MPC is used in all cases. For dissolved and entrained gases the MPC of 2E-4 microcuries/ml is applied. This MPC is based on the Xe-135 MPC in air (submersion dose) converted to an equivalent concentration in water as discussed in the International Commission on Radiological Protection (ICRP) Publication 2.

4. AVERAGE ENERGY

The calculated site boundary dose rates for Fermi 2 are based on identification of individual isotopes and on use of dose factors specific to each identified isotope or a highly conservative dose factor. Average energy values are not used in these calculations, and therefore need not be reported.

5. MEASUREMENTS AND APPROXIMATIONS OF TOTAL ACTIVITY

As required by NRC Regulatory Guide 1.21, this section describes the methods used to measure the total radioactivity in effluent releases and to estimate the overall errors associated with these measurements. The effluent monitoring systems are described in Chapter 11.4 of the Fermi 2 Updated Final Safety Analysis Report (UFSAR).

A. Gaseous Effluents

1. Fission and Activation Gases

Samples are obtained from each of the seven plant radiation monitors which continuously monitor the six ventilation exhaust points and from the Offgas Vent Pipe which carries the gland seal condenser exhaust, mechanical vacuum pump exhaust, and treated offgas streams. The Offgas Vent Pipe effluent is released through one of the six ventilation exhaust points (the reactor building exhaust plenum). The fission and activation gases are quantified by gamma spectroscopy analysis of periodic samples.

The values reported in Section 9 are the sums of all fission and activation gases quantified at all monitored release points.

Considering the inherent variability in radiation measurement, the variability in effluent stream composition, and the uncertainties in effluent flow rate and instrument calibration, Detroit Edison estimates that the uncertainty of the fission and activation gas total release figures is less than plus or minus 8 percent.

2. Radioiodines

Samples are obtained from each of the seven plant radiation monitors, which continuously monitor the six ventilation exhaust points. The radioiodines are entrained on charcoal and then quantified by gamma spectroscopy analysis. For each sample the duration of sampling and continuous flow rate through the charcoal are used in determining the concentration of radioiodines. From the flow rate of the ventilation system a rate of release can be determined.

The values reported in Section 9 are the sums of all radioiodines quantified at all continuously monitored release points.

Considering the inherent variability in radiation measurements, the variability in effluent stream composition, and the uncertainty in sample and effluent flow rates, Detroit Edison estimates that the uncertainty of the total radioiodine release figures is less than plus or minus 5 percent.

3. Particulates

Samples are obtained from each of the seven plant effluent radiation monitors, which continuously monitor the six ventilation exhaust points. The particulates are collected on a filter and then quantified by gamma spectroscopy analysis. For each sample the duration of sampling and continuous flow rate through the filter are used in determining the concentration of particulates. From the flow rate of the ventilation system a rate of release can be determined.

Quarterly the filters from each ventilation release point are composited and then radiochemically separated and analyzed for Strontium (Sr)-89/90 using various analytical methods. If found these radionuclides are reported as total particulate activity.

The values reported in Section 9 are the sums of all particulates quantified at all monitored release points.

Considering the inherent variability in radiation measurements, the variability in effluent stream composition, and the uncertainties in instrument calibration and in sample and effluent flow rates, Detroit Edison estimates that the the uncertainty of the total particulate release figures is less than plus or minus 3 percent.

4. Tritium

Samples are obtained for each of the seven plant effluent radiation monitors which continuously monitor the six ventilation exhaust points. The sample is passed through a bottle containing water and the tritium is "washed" out to the collecting water. Portions of the collecting water are analyzed for tritium using liquid scintillation counting techniques. For each sample, the duration of sample and sample flow rate is used to determine the concentration. From the flow rate of the ventilation system a release rate can be determined.

The values reported in Section 9 are the sums of all tritium quantified at all monitored release points.

Considering the inherent variability in radiation measurement, the variability in effluent stream composition, and the uncertainties in instrument calibration, sample and effluent flow rates, and collection efficiency, Detroit Edison estimates that the uncertainty of total gaseous tritium release figures is less than plus or minus 34 percent.

5. Gross Alpha

The gaseous particulate filters from the seven plant effluent radiation monitors are stored for one week to allow for decay of naturally occurring alpha emitters. These filters are then analyzed for gross alpha radioactivity by gas proportional counting, and any such radioactivity found is assumed to be plant related. The quantity of alpha emitters released can then be determined from sample flow rate, sample duration, and stack flow rate.

The values reported in Section 9 are the sums of all alpha emitters quantified at all monitored release points.

Considering the inherent variability in radiation measurements, the variability in effluent stream composition, and the uncertainties in instrument calibration and in sample and effluent flow rates, Detroit Edison estimates that the uncertainty of the total gaseous gross alpha release figures is less than plus or minus 10 percent.

B. Liquid Effluents

The liquid radwaste processing system and the liquid effluent monitoring system are described in the Fermi-2 UFSAR.

1. Fission and activation products

Before the contents of each holding tank is discharged to the environment, a representative sample of the tank's contents is taken and retained. The sample allows for the determination of radioactive material concentrations and establishes the rate at which the radioactive material can be discharged to the environment.

At the end of the calendar quarter a composite sample is made of all discharge samples taken during the quarter. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for Iron (Fe)-55 and Strontium (Sr)-89/90. Radiochemical separations and various analytical methods are used to quantify the amounts of Sr-89/90 and Fe-55.

The values reported in Section 8 are the sums of all fission and activation products found in all batch releases. Also reported in Section 8 are the pre-dilution waste volume (the total volume of waste sample tanks released), the post-dilution waste volume (the total tank volume released plus the volume of circulating water released while the tanks were being released), and the total dilution volume discharged (the total volume of circulating water released during the reporting period).

Considering the inherent variability in radiation measurement and the uncertainties in volume measurements and instrument calibration, Detroit Edison estimates that the uncertainty in total liquid fission and activation product release figures is less than plus or minus 5 percent.

2. Tritium

Before the contents of each holding tank is discharged to the environment, a representative sample of the tank contents is taken and retained. At the end of the calendar month a composite sample is made of all discharge samples taken during the month. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for tritium by liquid scintillation counting.

The values reported in Section 8 sums all tritium quantified from all batch releases.

Considering the inherent variability in radiation measurement and the uncertainties in volume measurement and instrument calibration, Detroit Edison estimates the uncertainty in total tritium release figures is less than plus or minus 15 percent.

3. Dissolved and Entrained Gases

Prior to releasing liquid radioactive waste to the environment a sample is taken from the radwaste holding tank. This sample is representative of the tank's contents. The sample is examined using gamma spectroscopy to determine the dissolved and entrained noble gases.

The values reported in Section 8 are the sums of all radioactive gases found for all batch releases.

Considering the inherent variability in radiation measurement and the uncertainties in instrument calibration and volume measurements, Detroit Edison estimates that the uncertainty in total dissolved and entrained gas release figures is less than plus or minus 15 percent.

4. Gross Alpha

Before the contents of each holding tank is discharged to the environment, a representative sample of the tank's contents is taken and retained. At the end of the calendar month a composite sample is made of all discharge samples taken during the month. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for gross alpha radioactivity by gas proportional counting.

The values reported in Section 8 are the sums of the gross alpha radioactivity from all batch releases.

Considering the inherent variability in radiation measurement and the uncertainty in volume measurements and instrument calibration, Detroit Edison estimates that the uncertainty in total liquid gross alpha release figures is less than plus or minus 43 percent.

6. ABNORMAL RELEASES

For the purpose of this report, an abnormal release is any release of radioactive material not performed in accordance with the Fermi 2 license and implementing procedures. No abnormal releases occurred during the reporting period.

7. BATCH RELEASES

As required by Regulatory Guide 1.21, a summary of data for batch releases is provided below. The following batch liquid releases from radwaste holding tanks to the Circulating Water Decant Line occurred between July 1, 1991 and December 31, 1991 (all these releases occurred during July 1991):

Number of releases:	3
Total time for all releases:	1042 minutes
Maximum time for a release:	482 minutes
Average time for a release:	347 minutes
Minimum time for a release:	81 minutes

The only batch gaseous releases from Fermi 2 are the venting or purging of the primary containment (drywell) atmosphere. These venting or purging releases pass through the reactor building ventilation or standby gas treatment system and are monitored by the final effluent monitors for these pathways. Separate data on these venting or purging releases are not reported because the associated data are already included in the gaseous effluent release data (Section 5.A and Section 9).

8. LIQUID EFFLUENT SUMMARY

REPORT CATEGORY : SEMIANNUAL SUMMATION OF ALL RELEASES BY QUARTER
TYPE OF ACTIVITY : ALL LIQUID EFFLUENTS
REPORTING PERIOD : QUARTER 3 AND QUARTER 4

TYPE OF EFFLUENT	UNIT	QUARTER 3	QUARTER 4
A. FISSION AND ACTIVATION PRODUCTS			
1. TOTAL RELEASE (NOT INCLUDING TRITIUM, GASES, ALPHA)	CURIES	8.33E-03	0.00E+00
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ml	6.36E-10	0.00E+00
3. MAXIMUM PERCENT OF TECHNICAL SPECIFICATION LIMIT FOR A SINGLE RELEASE	%	1.21E-01	0.00E+00
B. TRITIUM			
1. TOTAL RELEASE	CURIES	6.55E-02	0.00E+00
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ml	5.00E-09	0.00E+00
3. PERCENT OF TECHNICAL SPECIFICATION LIMIT	%	3.25E-02	0.00E+00
C. DISSOLVED AND ENTRAINED GASES			
1. TOTAL RELEASE	CURIES	6.01E-06	0.00E+00
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	uCi/ml	4.59E-13	0.00E+00
3. PERCENT OF TECHNICAL SPECIFICATION LIMIT	%	4.47E-05	0.00E+00
D. GROSS ALPHA RADIOACTIVITY (Note: N.D. = No activity detected)			
1. TOTAL RELEASE	CURIES	N.D.	N.D.
E. WASTE VOL RELEASED (PRE-DILUTION)	LITERS	1.82E+05	0.00E+00
F. WASTE VOL RELEASED (POST-DILUTION)	LITERS	6.72E+07	0.00E+00
G. TOTAL VOLUME DILUTION DISCHARGED	LITERS	1.31E+10	9.18E+09

8. LIQUID EFFLUENT SUMMARY (continued)

REPORT CATEGORY : SEMIANNUAL LIQUID BATCH RELEASES
TYPE OF ACTIVITY : TOTALS FOR EACH NUCLIDE RELEASED
: ALL RADIONUCLIDES
REPORTING PERIOD : QUARTER 3 AND QUARTER 4

		BATCH RELEASES	
NUCLIDE	UNIT	QUARTER 3	QUARTER 4
ALL NUCLIDES			
H-3	CURIES	6.55E-02	0.00E+00
Cr-51	CURIES	4.07E-03	0.00E+00
Mn-54	CURIES	6.57E-04	0.00E+00
Co-58	CURIES	2.80E-04	0.00E+00
Co-60	CURIES	8.09E-04	0.00E+00
Zn-65	CURIES	1.56E-04	0.00E+00
Fe-59	CURIES	2.50E-06	0.00E+00
Xe-133	CURIES	1.73E-06	0.00E+00
Xe-135	CURIES	4.28E-06	0.00E+00
Fe-55	CURIES	2.36E-03	0.00E+00
Cs-134	CURIES	*<2.5E-08	0.00E+00
Cs-137	CURIES	*<3.1E-08	0.00E+00
Ce-141	CURIES	*<2.8E-08	0.00E+00
Ce-144	CURIES	*<1.5E-07	0.00E+00
Total for Period	CURIES	7.38E-02	0.00E+00

* Less than Lower Limit of Detection (LLD), i.e. the maximum sensitivity of measurement, in units of microcuries per milliliter (uCi/ml).

9. GASEOUS EFFLUENT SUMMARY

REPORT CATEGORY : SEMIANNUAL SUMMATION OF ALL RELEASES BY QUARTER
TYPE OF ACTIVITY : ALL AIRBORNE EFFLUENTS
REPORTING PERIOD : QUARTER 3 AND QUARTER 4

TYPE OF EFFLUENT	: UNIT	: QUARTER 3	: QUARTER 4
A. FISSION AND ACTIVATION GASES			
1. TOTAL RELEASE	: CURIES	: 1.95E+01	: 1.74E+01
2. AVERAGE RELEASE RATE FOR PERIOD	: uCi/sec	: 2.45E+00	: 2.19E+00
B. RADIOIODINES			
1. TOTAL IODINE - 131	: CURIES	: 7.26E-04	: 7.74E-04
2. AVERAGE RELEASE RATE FOR PERIOD	: uCi/sec	: 9.13E-05	: 9.74E-05
C. PARTICULATES			
1. PARTICULATES (HALF-LIVES>8 DAYS)	: CURIES	: 1.21E-03	: 9.13E-04
2. AVERAGE RELEASE RATE FOR PERIOD	: uCi/sec	: 1.52E-04	: 1.15E-04
3. GROSS ALPHA RADIOACTIVITY	: CURIES	: 9.13E-07	: 5.03E-07
D. TRITIUM (Note: N.D. = No activity detected)			
1. TOTAL RELEASE	: CURIES	: N.D.	: N.D.
2. AVERAGE RELEASE RATE FOR PERIOD	: uCi/sec	: N.A.	: N.A.

9. GASEOUS EFFLUENT SUMMARY (continued)

REPORT CATEGORY :SEMIANNUAL AIRBORNE CONTINUOUS RELEASES
TYPE OF ACTIVITY :FISSION GASES, IODINES, AND PARTICULATES
REPORTING PERIOD :QUARTER 3 AND QUARTER 4

	GROUND LEVEL RELEASES		
NUCLIDE	:UNIT	:QUARTER 3	:QUARTER 4
PARTICULATES			
Cr-51	: CURIES	: 8.89E-04	: 5.90E-04
Mn-54	: CURIES	: 1.13E-05	: 1.00E-05
Co-58	: CURIES	: 2.06E-05	: 1.78E-05
Co-60	: CURIES	: 6.99E-05	: 4.23E-05
Na-24	: CURIES	: 1.64E-03	: 2.35E-04
Zn-65	: CURIES	: 1.27E-05	: 2.31E-05
Tc-99m	: CURIES	: 6.46E-03	: 1.05E-03
Ba-139	: CURIES	: 1.76E-01	: 1.84E-01
Ba-140	: CURIES	: 1.71E-04	: 1.53E-04
La-140	: CURIES	: 1.06E-04	: 2.03E-04
Y-91m	: CURIES	: 1.45E-03	: 1.48E-03
Sr-91	: CURIES	: 2.08E-03	: 2.11E-03
Rb-89	: CURIES	: 1.65E-01	: 3.00E-01
Cs-138	: CURIES	: 6.99E-02	: 9.84E-02
Ag-110m	: CURIES	:*< 1.6E-13	: 8.94E-07
Re-188	: CURIES	: 7.81E-05	:*<9.8E-14
Br-82	: CURIES	: 5.74E-05	: 5.38E-05
Sn-113	: CURIES	:*<6.0E-14	: 5.27E-06
Sr-89	: CURIES	: 3.33E-05	: 7.06E-05
Sr-90	: CURIES	: 8.62E-07	: 4.61E-07
Cs-134	: CURIES	:*<3.6E-14	:*<3.6E-14
Cs-137	: CURIES	:*<4.7E-14	:*<4.7E-14
Ce-141	: CURIES	:*<3.1E-14	:*<3.1E-14
Ce-144	: CURIES	:*< 1.2E-13	:*< 1.2E-13
Total for Period	: CURIES	: 4.24E-01	: 5.88E-01

* Less than the Lower Limit of Detection (LLD), i.e. the maximum sensitivity of measurement in units of microcuries per milliliter (uCi/ml)

9. GASEOUS EFFLUENT SUMMARY (continued)

REPORT CATEGORY : SEMIANNUAL AIRBORNE CONTINUOUS RELEASES
TYPE OF ACTIVITY : FISSION GASES, IODINES, AND PARTICULATES
REPORTING PERIOD : QUARTER 3 AND QUARTER 4

	GROUND LEVEL RELEASES		
NUCLIDE	UNIT	QUARTER 3	QUARTER 4
FISSION AND ACTIVATION GASES			
Ar-41	CURIES	4.08E+00	2.98E+00
Xe-135m	CURIES	1.31E+00	1.31E+00
Xe-138	CURIES	3.13E+00	3.84E+00
Xe-135	CURIES	*<2.7E-08	3.10E-01
Kr-85m	CURIES	2.72E+00	6.40E-01
Xe-137	CURIES	5.56E+00	3.58E+00
Kr-88	CURIES	1.46E+00	*<8.4E-08
Kr-89	CURIES	*<1.6E-06	4.38E+00
Xe-133	CURIES	1.22E+00	3.21E-01
Total for Period	CURIES	1.95E+01	1.74E+01
IODINES			
I-131	CURIES	7.26E-04	7.74E-04
I-132	CURIES	1.18E-03	4.73E-03
I-133	CURIES	3.78E-03	4.13E-03
I-134	CURIES	*<1.6E-13	7.41E-04
I-135	CURIES	2.13E-03	1.09E-03
Total for Period	CURIES	7.82E-03	1.15E-02

* Less than the Lower Limit of Detection (LLD), i.e. the maximum sensitivity of measurement in units of microcuries per milliliter (uCi/ml)

10. SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. Solid Waste Shipped Offsite for burial or disposal (not irradiated fuel): No shipments in this reporting period.

B. Irradiated Fuel Shipments: No shipments in this reporting period.

11. RADIOLOGICAL IMPACT ON THE PUBLIC

A. Dose Due to Liquid Effluents

As discussed in Section 2.5.1 of the Fermi 2 Offsite Dose Calculation Manual, compliance with Technical Specification 3.11.1.2, which limits dose to a member of the public to any organ and to the total body due to liquid effluents, is evaluated by calculating the dose to a hypothetical individual who both eats fish from Lake Erie and drinks water extracted from Lake Erie at the water intake for the city of Monroe. Conservative assumptions from Regulatory Guide 1.109 are made about the quantity of fish and water consumed. The individual organ and total body doses for 1991 to this hypothetical individual were calculated according to Section 2.5.1 of the ODCM and are listed below.

Organ	1991 Liquid Effluent Dose
Bone	1.18 E-2 mrem
Liver	3.66 E-2 mrem
Thyroid	8.40 E-4 mrem
Kidney	2.29 E-2 mrem
Lung	6.85 E-4 mrem
GI-LLI	3.72 E-2 mrem
Total body	1.63 E-2 mrem

The highest organ dose, 3.72 E-2 mrem to the GI-LLI tracts, is 0.37% of the Tech Spec 3.11.1.2 annual organ dose limit; the total body dose, 1.63 E-2 mrem, is 0.54% of the Technical Specification 3.11.1.2 annual total body dose limit.

B. Dose Due to Gaseous Effluents

As discussed in Section 3.8.1 of the Fermi 2 Offsite Dose Calculation Manual, compliance with Technical Specification 3.11.2.3, which limits dose due to I-131, I-133, H-3, and particulates with half lives greater than 8 days in gaseous effluents to any organ of a member of the public, is evaluated by calculating the dose to a hypothetical individual in an age group which would receive the highest single organ dose of any member of the public. This hypothetical individual is an infant who is assumed to live at an offsite location which is known, based on the Land Use Census, to have milk animals. This infant is assumed to drink milk from these animals, and to also be exposed by the inhalation and ground plane pathways. The individual organ and total body doses to this individual due to I-131, I-133, H-3, and particulates with half lives greater than 8 days were calculated according to Section 3.8.1 of the ODCM and are listed below.

Organ	1991 Gaseous Effluent Dose to Receptor with Highest Single Organ Dose
Bone	5.39 E-4 mrem
Liver	4.71 E-4 mrem
Thyroid	7.32 E-2 mrem
Kidney	4.97 E-4 mrem
Lung	2.26 E-4 mrem
GI-LLI	2.51 E-4 mrem
Total body	3.31 E-4 mrem

The highest single organ dose to the maximally exposed receptor, 7.32 E-2 mrem to the thyroid, is 0.49% of the Technical Specification 3.11.2.3 annual dose limit.

C. Dose Due to Direct Radiation and Compliance with 40CFR190

Title 40, Part 190 of the Code of Federal Regulations requires that dose to an individual from the uranium fuel cycle be limited to 25 mrem/yr to the total body and 75 mrem/yr to the thyroid. The sources of fuel cycle dose not analyzed above are due to other fuel cycle facilities and dose due to direct radiation. As discussed in Section 4.2 of the Fermi 2 Offsite Dose Calculation Manual, no other fuel cycle facilities contribute significantly to dose in the vicinity of Fermi 2. With respect to direct radiation, none of the offsite TLD locations listed in Table 6.0-1 of the ODCM showed 1991 TLD readings which were consistently greater than the TLD readings at the control locations. Since other facilities and direct radiation did not contribute significantly to offsite dose, and since the preceding sections of this report show compliance with the more restrictive requirements of 10CFR50 Appendix I, Fermi 2 was in compliance with 40CFR190 in 1991.

D. Dose to Visitors on Site

As discussed in Section 4.0 of the Fermi 2 Offsite Dose Calculation Manual, "visitors" to the Fermi 2 site may receive dose due to their activities within the site boundary. For purposes of this analysis, visitors are members of the public who spend time within the site boundary and who do not do work associated with the operation of Fermi 2. The ODCM considers two categories of visitors: persons ice fishing on Lake Erie and persons spending time in the Fermi 2 Visitors Center.

Table 4.0-1 of the ODCM lists the maximum amount of time an individual is likely to spend in these activities and the exposure pathways which apply: An individual is assumed to spend 240 hours per year ice fishing near the site and 4 hours per year at the Visitors Center. Exposure by direct radiation from noble gases and by inhalation of radioactive particulates, iodines, and tritium are considered. The doses given below do not include dose due to the pathways already considered in part A of this section, namely dose due to water and fish ingestion.

Based on these assumptions, the maximum dose in 1991 to a visitor at the Visitors Center is 7.54 E-6 mrem to total body and 8.92 E-6 mrem to the maximally exposed organ (thyroid). The maximum dose in 1991 to an ice fisherman is 1.15 E-3 mrem to the total body and 1.37 E-3 mrem to the maximally exposed organ (thyroid).

E. **Population Dose**

Dose to the population within a fifty mile radius of Fermi 2 due to 1991 gaseous and liquid effluents was calculated.

For liquid effluents, the fish ingestion and drinking water pathways were considered. Since there is no significant commercial fishery in the Michigan waters of Lake Erie, the dose due to fish ingestion was assumed to be due to ingestion by the local population of the entire sport fish catch in these waters. Parameters from Regulatory Guide 1.109 were used, as was the UFSAR dilution factor of 100. The dose due to water ingestion was determined by assuming that all residents served by the Monroe water intake drink at the average rate given by Regulatory Guide 1.109, and by using the UFSAR dilution factor to the intake of 77. The population total body dose due to drinking water was estimated to be 3 mrem, and the total body dose due to fish ingestion was estimated to be 27 mrem, for a total estimated population total body dose due to liquid effluents of 30 mrem.

For gaseous effluents, the code MICROAIRDOS was used to estimate the population dose. Inputs to the code were 1991 gaseous release data, wind direction and wind speed frequencies for each stability class, population in each of 10 segments of each of 16 sectors, stack release specifications, etc. The estimated 1991 collective effective dose due to gaseous effluents is 160 mrem.

F. **Site Boundary Air Dose**

Gamma and beta dose to air at the site boundary due to noble gases must be calculated to evaluate compliance with Technical Specification 3.11.2.2. In 1991, gamma air dose was 1.63 E-2 mrad, and beta air dose was 1.62 E-2 mrad. These doses represent 0.16% and 0.08% of the Technical Specification 3.11.2.2 gamma and beta annual air dose limits, respectively.

12. RADIATION INSTRUMENTATION

Fermi 2 Technical Specifications 3.3.7.11, Radioactive Liquid Effluent Monitoring Instrumentation, and 3.3.7.12, Radioactive Gaseous Effluent Monitoring Instrumentation, require that those monitors which exceed the time specified for out of service status be reported in the next Semiannual Effluent Release Report. During this reporting period, July through December of 1991, the time specified in the action statements for these monitors was not exceeded.

13. METEOROLOGICAL DATA SUMMARY

The meteorological monitoring system is described in the Fermi 2 UFSAR. In accordance with Regulatory Guide 1.21, data recorded by that system is provided here to permit the Nuclear Regulatory Commission to assess the radiological impact of Fermi 2 releases independently. The data format required by Regulatory Guide 1.21 is used. Appendix A contains the meteorological data tables.

14. CHANGES TO THE PROCESS CONTROL PROGRAM (PCP)

As required by the Fermi 2 license, the operator (Detroit Edison) is required to establish a program that will reasonably assure the complete processing of radioactive wastes. This program assures that processed wastes are completely solidified and are free of standing water. Changes to the PCP Manual are provided to document changes to established conditions and to ensure that controls are in place to assure that radioactive waste is solidified.

During this reporting period, July through December of 1991, a complete rewrite of the PCP Manual was approved. Subsequently, a minor change to the PCP Manual was approved which changed the name of Chem Nuclear Systems Incorported procedure SD-OP-090-48306 to reflect the fact that a Fermi-specific version of this procedure had been approved. The new name of this procedure is Process Control Program for Cement Solidification of Oil, Oily Sludges and Oil Residues at Fermi 2. The latest revision of the PCP Manual is contained in Appendix B.

15. CHANGES TO DOSE CALCULATION AND ENVIRONMENTAL MONITORING LOCATIONS

During this reporting period, the TLD at location T-11 was moved to the corner of Milliman and Jefferson Roads due to a high vandalism rate at the former location.

16. CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL (ODCM)

During this reporting period, July through December of 1991, the ODCM was not revised.

17. MAJOR CHANGES TO RADIOACTIVE WASTE SYSTEMS

During this reporting period, July through December of 1991, there were no major changes to the liquid, gaseous, or solid radioactive waste treatment systems.

18. LIQUID HOLDUP TANKS EXCEEDING LIMITS

Fermi 2 Technical Specification 3.11.1.4 requires that the quantity of radioactive material contained in any outside temporary tank shall be limited to 10 curies, excluding tritium and dissolved or entrained noble gases. During this reporting period, July through December of 1991, this activity limit for such tanks was not exceeded.

William S. Orser
Senior Vice President

Detroit Edison

Fermi 2
6400 North Dixie Highway
Newport, Michigan 48166
(313) 586-5201

August 28, 1992
NRC-92-0085

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

References: 1) Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

2) Appendix A, Facility Operating License No. NPF-43, Technical Specification 6.9.1.8

Subject: Semi-Annual Radioactive Effluent Release Report

The Semi-Annual Radioactive Effluent Release Report for Fermi 2 is attached. This report is being transmitted in compliance with Reference 2 and Regulatory Guide 1.21, Revision 1. The attached report covers the period from January 1 through June 30, 1992.

During this reporting period there were no instances of unmonitored or unplanned radioactive releases from the site.

Please direct any questions or requests for additional information to Joseph Pendergast, Compliance Engineer, at (313) 586-1682.

Sincerely,

WSOrser

cc: T. G. Colburn
A. B. Davis
M. P. Phillips
S. Stasek
Region III

POSTING REQ'D	☐ YES ☒ NO
ACTION REQ'D DATE	3-1-~~92~~ 93
RESPONSIBLE PERSON(S)	VANDERMAY SVETKOVICH
RESPONSE REQ'D DATE	2-10-~~92~~ 93
DATE DUE TO LICENSING	2-10-~~92~~ 93
RACTS NO(S)	92107 AND 3726
DER NO	N/A
FILE	NL CONTACT JML

M 9-28-92

DETROIT EDISON COMPANY

FERMI 2 NUCLEAR POWER PLANT

OPERATING LICENSE NO. NPF - 43

SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

for the period of

January 1, 1992 through June 30, 1992

PREFACE

The Fermi 2 Nuclear Power Plant maintains a comprehensive program of monitoring and controlling the release of radioactive material from the site. The releases covered in this report are of three types: liquid releases, gaseous releases, and radioactive waste shipments.

In a liquid release, a tank containing radioactive water is sampled prior to discharge. Based on the analysis of this sample, both the amount of radioactivity in the tank and the potential radiation dose to a member of the public are determined, and these figures are compared to federal limits. In calculating the radiation dose, very conservative assumptions are used. For example, it is assumed that an individual eats 46 pounds of fish per year from Lake Erie directly offshore of the Fermi 2 plant. The tank may be released only after it is determined that no federal limits are exceeded. As the tank is released, the contents of the tank are diluted by clean water in a ratio of approximately 400 gallons of clean water to one gallon of tank water. The release is continuously monitored by radiation detectors. In the first half of 1992, there were no liquid releases. This is due to the fact that the plant has operated in a steady state condition since the second refueling outage ending in June 1991, and to Detroit Edison's continuing efforts to minimize liquid releases at Fermi 2.

Radioactive gaseous releases occur as part of the normal operation of Fermi 2. There are six ventilation system release points, or "stacks", each of which is monitored by a sophisticated radiation monitor which continuously extracts a sample from the stack effluent. Since any gaseous radioactive material is diluted by the building ventilation air flow, the stack concentrations are small. In fact, radioactive material is not detected in most stack samples. All sample results are compared with federal limits to ensure they are not exceeded. If the amount of radioactivity in the effluent of any stack approaches a federal limit, an alarm will be activated in the Fermi 2 control room to alert operations personnel. After evaluating the situation, the operators may choose to order increased sampling, shut down building ventilation, or divert the effluent stream to a special gaseous treatment system so that federal limits are not exceeded. In the first half of 1992, gaseous releases were comparable to levels seen in previous non-outage periods, reflecting stable operating conditions.

Radioactive shipments of solid waste from the Fermi 2 site consist of waste generated during water treatment, radioactive trash, and irradiated components. Federal regulations governing these shipments are extensive, and Fermi 2 also complies with internal procedures. Shipment destinations are either licensed burial sites or intermediate processing facilities. In the first half of 1992, Fermi 2 did not ship any radioactive waste due to the exclusion of Michigan licensees from the burial sites.

TABLE OF CONTENTS

1. INTRODUCTION

The Detroit Edison Fermi 2 Nuclear Power Plant is designed and operated in a manner which strictly controls and monitors the release of radioactive material to the environment in accordance with Nuclear Regulatory Commission (NRC) and Detroit Edison Company requirements. This Semiannual Radioactive Effluent Release Report, for the January through June 1992 period, is submitted in accordance with Fermi 2 Technical Specification 6.9.1.8 and NRC Regulatory Guide 1.21. This report provides the following information required by those references:

1. Summation of the quantities of radioactive material (in the form of gases and liquids) released from the plant (Sections 8 and 9)
2. Summation of quantities of radioactive material contained in solid waste packaged and shipped for off-site disposal (Section 10)
3. Changes to the Process Control Program (PCP) (Section 12)
4. Changes to the Offsite Dose Calculation Manual (ODCM) (Section 14)
5. A list and description of any unplanned releases of radioactive materials to unrestricted areas (Section 6)
6. A list of any new locations for dose calculation or environmental monitoring identified by the land use census (Section 13)
7. A list of effluent monitors which were inoperable for a period longer than that specified in Technical Specifications 3.3.7.11 and 3.3.7.12, and an explanation of why the time limit was exceeded (Section 11)
8. A description of events leading up to any liquid holdup tanks exceeding the limit of Technical Specification 3.11.1.4 (Section 16)
9. A description of any major changes to radioactive waste treatment systems (Section 15)

2. REGULATORY LIMITS

The Nuclear Regulatory Commission limits on liquid and gaseous effluents are incorporated in the Fermi 2 Technical Specifications. These limits prescribe the maximum quantities and rates of release for radioactive effluents resulting from normal operation of Fermi 2. The limits are defined in several ways to limit the overall impact on persons living near the plant. The limits are described in the following sections.

A. Gaseous Effluents

1. Dose rate due to radioactive materials released in gaseous effluents from the site to areas at and beyond the site boundary shall be limited to the following:

   a. Noble gases

      Less than or equal to 500 mrem/year to the total body
      Less than or equal to 3000 mrem/year to the skin

   b. Iodine 131, 133, tritium, and for all radionuclides in particulate form with half lives greater than 8 days

      Less than or equal to 1500 mrem/year to any organ.

2. Air dose due to noble gases released in gaseous effluents to areas at and beyond the site boundary shall be limited to the following:

   a. Less than or equal to 5 mrads for gamma radiation
      Less than or equal to 10 mrads for beta radiation
      -During any calendar quarter

   b. Less than or equal to 10 mrads for gamma radiation
      Less than or equal to 20 mrads for beta radiation
      -During any calendar year

3. Dose to a member of the public from Iodine-131, 133, tritium, and all radionuclides in particulate form with half lives greater than 8 days in gaseous effluents released to areas at and beyond the site boundary shall be limited to the following:

   a. Less than or equal to 7.5 mrems to any organ
      -During any calendar quarter

   b. Less than or equal to 15 mrems to any organ
      -During any calendar year

B. Liquid Effluents

1. The concentration of radioactive material released in liquid effluents to unrestricted areas shall be limited to the concentrations specified in Title 10 of the Code of Federal Regulations Part 20 (Standards for Protection Against Radiation), Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 2E-4 (.0002) microcuries/ml total activity.

2. The dose or dose commitment to a member of the public from radioactive materials in liquid effluents released to unrestricted areas shall be limited to the values in the following sections.

a. Less than or equal to 1.5 mrem to the total body
Less than or equal to 5 mrem to any organ
–During any calender quarter

b. Less than or equal to 3 mrem to the total body
Less than or equal to 10 mrem to any organ
–During any calender year

3. MAXIMUM PERMISSIBLE CONCENTRATION (MPC)

Fermi 2 Technical Specifications implement the MPC requirements of 10 CFR 20 and NRC Regulatory Guide 1.21 by means of the following limits:

A. Gases

The dose rate due to gaseous effluents is calculated in accordance with the Fermi 2 Offsite Dose Calculation Manual (ODCM). The maximum permissible dose rates for gaseous releases are defined in Fermi 2 Technical Specifications.

Technical Specification 3.11.2.1.a (Dose rate at the site boundary from noble gases):

–Less than or equal to 500 mrem/year to the total body
–Less than or equal to 3000 mrem/year to the skin

Technical Specification 3.11.2.1.b (Dose rate at the site boundary from I–131, I–133, and particulates with half lives greater than 8 days):

–Less than or equal to 1500 mrem/year to any organ

B. Liquids

Allowable liquid release rates are calculated in accordance with the Fermi 2 Offsite Dose Calculation Manual (ODCM). As required by Technical Specification 3.11.1.1, the maximum permissible concentrations (MPC) for liquids used for these calculations are taken from 10 CFR 20, Appendix B, Table II, Column 2. The most restrictive MPC is used in all cases. For dissolved and entrained gases the MPC of 2E–4 microcuries/ml is applied. This MPC is based on the Xe–135 MPC in air (submersion dose) converted to an equivalent concentration in water as discussed in the International Commission on Radiological Protection (ICRP) Publication 2.

4. AVERAGE ENERGY

The calculated site boundary dose rates for Fermi 2 are based on identification of individual isotopes and on use of dose factors specific to each identified isotope or a highly conservative dose factor. Average energy values are not used in these calculations, and therefore need not be reported.

5. MEASUREMENTS AND APPROXIMATIONS OF TOTAL ACTIVITY

As required by NRC Regulatory Guide 1.21, this section describes the methods used to measure the total radioactivity in effluent releases and to estimate the overall errors associated with these measurements. The effluent monitoring systems are described in Chapter 11.4 of the Fermi 2 Updated Final Safety Analysis Report (UFSAR).

A. Gaseous Effluents

1. Fission and Activation Gases

Samples are obtained from each of the seven plant radiation monitors which continuously monitor the six ventilation exhaust points and from the Offgas Vent Pipe which carries the gland seal condenser exhaust, mechanical vacuum pump exhaust, and treated offgas streams. The Offgas Vent Pipe effluent is released through one of the six ventilation exhaust points (the reactor building exhaust plenum). The fission and activation gases are quantified by gamma spectroscopy analysis of periodic samples.

The values reported in Section 9 are the sums of all fission and activation gases quantified at all monitored release points.

Considering the inherent variability in radiation measurement, the variability in effluent stream composition, and the uncertainties in effluent flow rate and instrument calibration, Detroit Edison estimates that the uncertainty of the fission and activation gas total release figures is less than plus or minus 8 percent.

2. Radioiodines

Samples are obtained from each of the seven plant radiation monitors, which continuously monitor the six ventilation exhaust points. The radioiodines are entrained on charcoal and then quantified by gamma spectroscopy analysis. For each sample the duration of sampling and continuous flow rate through the charcoal are used in determining the concentration of radioiodines. From the flow rate of the ventilation system a rate of release can be determined.

The values reported in Section 9 are the sums of all radioiodines quantified at all continuously monitored release points.

Considering the inherent variability in radiation measurements, the variability in effluent stream composition, and the uncertainty in sample and effluent flow rates, Detroit Edison estimates that the uncertainty of the total radioiodine release figures is less than plus or minus 5 percent.

3. Particulates

Samples are obtained from each of the seven plant effluent radiation monitors, which continuously monitor the six ventilation exhaust points. The particulates are collected on a filter and then quantified by gamma spectroscopy analysis. For each sample the duration of sampling and continuous flow rate through the filter are used in determining the concentration of particulates. From the flow rate of the ventilation system a rate of release can be determined.

Quarterly the filters from each ventilation release point are composited and then radiochemically separated and analyzed for Strontium (Sr)-89/90 using various analytical methods. If found these radionuclides are reported as total particulate activity.

The values reported in Section 9 are the sums of all particulates quantified at all monitored release points.

Considering the inherent variability in radiation measurements, the variability in effluent stream composition, and the uncertainties in instrument calibration and in sample and effluent flow rates, Detroit Edison estimates that the the uncertainty of the total particulate release figures is less than plus or minus 3 percent.

4. Tritium

Samples are obtained for each of the seven plant effluent radiation monitors which continuously monitor the six ventilation exhaust points. The sample is passed through a bottle containing water and the tritium is "washed" out to the collecting water. Portions of the collecting water are analyzed for tritium using liquid scintillation counting techniques. For each sample, the duration of sample and sample flow rate is used to determine the concentration. From the flow rate of the ventilation system a release rate can be determined.

The values reported in Section 9 are the sums of all tritium quantified at all monitored release points.

Considering the inherent variability in radiation measurement, the variability in effluent stream composition, and the uncertainties in instrument calibration, sample and effluent flow rates, and collection efficiency, Detroit Edison estimates that the uncertainty of total gaseous tritium release figures is less than plus or minus 34 percent.

5. Gross Alpha

The gaseous particulate filters from the seven plant effluent radiation monitors are stored for one week to allow for decay of naturally occurring alpha emitters. These filters are then analyzed for gross alpha radioactivity by gas proportional counting, and any such radioactivity found is assumed to be plant related. The quantity of alpha emitters released can then be determined from sample flow rate, sample duration, and stack flow rate.

The values reported in Section 9 are the sums of all alpha emitters quantified at all monitored release points.

Considering the inherent variability in radiation measurements, the variability in effluent stream composition, and the uncertainties in instrument calibration and in sample and effluent flow rates, Detroit Edison estimates that the uncertainty of the total gaseous gross alpha release figures is less than plus or minus 10 percent.

B. Liquid Effluents

The liquid radwaste processing system and the liquid effluent monitoring system are described in the Fermi 2 UFSAR.

1. Fission and activation products

Before the contents of each holding tank is discharged to the environment, a representative sample of the tank's contents is taken and retained. The sample allows for the determination of radioactive material concentrations and establishes the rate at which the radioactive material can be discharged to the environment.

At the end of the calendar quarter a composite sample is made of all discharge samples taken during the quarter. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for Iron (Fe)-55 and Strontium (Sr)-89/90. Radiochemical separations and various analytical methods are used to quantify the amounts of Sr-89/90 and Fe-55.

As seen in Section 8, there were no liquid releases of radioactive material during the first and second quarters of 1992.

2 Tritium

Before the contents of each holding tank is discharged to the environment, a representative sample of the tank contents is taken and retained. At the end of the calendar month a composite sample is made of all discharge samples taken during the month. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for tritium by liquid scintillation counting.

As seen in Section 8, there were no liquid releases of radioactive material during the first and second quarters of 1992.

3. Dissolved and Entrained Gases

Prior to releasing liquid radioactive waste to the environment a sample is taken from the radwaste holding tank. This sample is representative of the tank's contents. The sample is examined using gamma spectroscopy to determine the dissolved and entrained noble gases.

As seen in Section 8, there were no liquid releases of radioactive material during the first and second quarters of 1992.

4. Gross Alpha

Before the contents of each holding tank is discharged to the environment, a representative sample of the tank's contents is taken and retained. At the end of the calendar month a composite sample is made of all discharge samples taken during the month. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for gross alpha radioactivity by gas proportional counting.

As seen in Section 8, there were no liquid releases of radioactive material during the first and second quarters of 1992.

6. ABNORMAL RELEASES

For the purpose of this report, an abnormal release is any release of radioactive material not performed in accordance with the Technical Specifications. No abnormal releases occurred during the reporting period.

7. BATCH RELEASES

As required by Regulatory Guide 1.21, a summary of data for batch releases must be provided in this report. During the January 1, 1992 through June 30, 1992 period, no batch liquid releases from radwaste holding tanks occurred.

The only batch gaseous releases from Fermi 2 are the venting or purging of the primary containment (drywell or torus) atmosphere. These venting or purging releases pass through the reactor building ventilation or standby gas treatment system and are monitored by the final effluent monitors for these pathways. Separate data on these venting or purging releases are not reported because the associated data are already included in the gaseous effluent release data (Section 5.A and Section 9).

8. LIQUID EFFLUENT SUMMARY

REPORT CATEGORY	: SEMIANNUAL SUMMATION OF ALL RELEASES BY QUARTER
TYPE OF ACTIVITY	: ALL LIQUID EFFLUENTS
REPORTING PERIOD	: QUARTER 1 AND QUARTER 2

During the first and second quarters of 1992, there were no liquid releases of radioactive material.

9. GASEOUS EFFLUENT SUMMARY

REPORT CATEGORY : SEMIANNUAL SUMMATION OF ALL RELEASES BY QUARTER
TYPE OF ACTIVITY : ALL AIRBORNE EFFLUENTS
REPORTING PERIOD : QUARTER 1 AND QUARTER 2

TYPE OF EFFLUENT	: UNIT	: QUARTER 1	: QUARTER 2
A. FISSION AND ACTIVATION GASES			
1. TOTAL RELEASE	: CURIES	: 1.17E+01	: 1.51E+01
2. AVERAGE RELEASE RATE FOR PERIOD	: uCi/sec	: 1.49E+00	: 1.92E+00
B. RADIOIODINES			
1. TOTAL IODINE - 131	: CURIES	: 1.00E-03	: 1.13E-03
2. AVERAGE RELEASE RATE FOR PERIOD	: uCi/sec	: 1.27E-04	: 1.44E-04
C. PARTICULATES			
1. PARTICULATES (HALF-LIVES>8 DAYS)	: CURIES	: 5.37E-04	: 8.67E-04
2. AVERAGE RELEASE RATE FOR PERIOD	: uCi/sec	: 6.83E-05	: 1.10E-04
3. GROSS ALPHA RADIOACTIVITY	: CURIES	: 1.22E-06	: 1.17E-06
D. TRITIUM (Note: N.D. = No activity detected)			
1. TOTAL RELEASE	: CURIES	: N.D.	: N.D.
2. AVERAGE RELEASE RATE FOR PERIOD	: uCi/sec	: N.A.	: N.A.

9. GASEOUS EFFLUENT SUMMARY (continued)

REPORT CATEGORY :SEMIANNUAL AIRBORNE CONTINUOUS RELEASES
TYPE OF ACTIVITY :FISSION GASES, IODINES, AND PARTICULATES
REPORTING PERIOD :QUARTER 1 AND QUARTER 2

	: MIXED MODE RELEASES		
NUCLIDE	:UNIT	:QUARTER 1	:QUARTER 2
PARTICULATES			
Cr-51	: CURIES	: 3.04E-04	: 5.58E-04
Co-58	: CURIES	: 5.21E-06	: 3.84E-06
Co-60	: CURIES	: 8.74E-06	: 1.15E-05
Na-24	: CURIES	: 4.77E-05	: 3.36E-04
Zn-65	: CURIES	: 5.76E-06	: 2.85E-06
Tc-99m	: CURIES	: 8.35E-04	: 2.69E-03
Ba-139	: CURIES	: 1.62E-01	: 2.50E-01
Ba-140	: CURIES	: 1.43E-04	: 2.07E-04
La-140	: CURIES	: 2.16E-04	: 2.33E-04
Y-91m	: CURIES	: 1.06E-03	: 1.42E-03
Sr-91	: CURIES	: 2.27E-03	: 4.47E-03
Rb-89	: CURIES	: 1.49E-01	: 2.09E-01
Cs-138	: CURIES	: 7.98E-02	: 9.89E-02
Br-82	: CURIES	: 1.89E-05	: 9.84E-05
Ba-131	: CURIES	:*<9.9E-12	: 1.21E-05
Te-131m	: CURIES	: 6.66E-05	:*<8.0E-12
Sr-89	: CURIES	: 7.00E-05	: 7.11E-05
Sr-90	: CURIES	: 6.88E-07	: 1.02E-06
Cs-134	: CURIES	:*<3.6E-14	:*<3.6E-14
Cs-137	: CURIES	:*<4.7E-14	:*<4.7E-14
Ce-141	: CURIES	:*<3.1E-14	:*<3.1E-14
Ce-144	: CURIES	:*<1.2E-13	:*<1.2E-13
Total for Period	: CURIES	: 3.96E-01	: 5.68E-01

* Less than the Lower Limit of Detection (LLD), i.e. the maximum sensitivity of measurement in units of microcuries per milliliter (uCi/ml)

9. GASEOUS EFFLUENT SUMMARY (continued)

REPORT CATEGORY : SEMIANNUAL AIRBORNE CONTINUOUS RELEASES
TYPE OF ACTIVITY : FISSION GASES, IODINES, AND PARTICULATES
REPORTING PERIOD : QUARTER 1 AND QUARTER 2

	MIXED MODE RELEASES		
NUCLIDE	UNIT	QUARTER 1	QUARTER 2
FISSION AND ACTIVATION GASES			
Ar-41	CURIES	9.67E-01	1.24E+00
Xe-135m	CURIES	1.09E+00	1.18E+00
Xe-138	CURIES	3.09E+00	2.99E+00
Xe-135	CURIES	3.85E+00	2.54E-01
Kr-85m	CURIES	*<2.0E-08	8.36E-02
Xe-137	CURIES	2.56E+00	9.36E+00
Kr-87	CURIES	1.59E-01	*<5.8E-08
Total for Period	CURIES	1.17E+01	1.51E+01
IODINES			
I-131	CURIES	1.00E-03	1.13E-03
I-132	CURIES	4.49E-03	4.95E-03
I-133	CURIES	6.52E-03	7.30E-03
I-135	CURIES	6.25E-03	4.76E-03
Total for Period	CURIES	1.83E-02	1.81E-02

* Less than the Lower Limit of Detection (LLD), i.e. the maximum sensitivity of measurement in units of microcuries per milliliter (uCi/ml)

10. SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. Solid Waste Shipped Offsite for burial or disposal (not irradiated fuel): No shipments in this reporting period.

B. Irradiated Fuel Shipments: No shipments in this reporting period.

11. RADIATION INSTRUMENTATION

Fermi 2 Technical Specifications 3.3.7.11, Radioactive Liquid Effluent Monitoring Instrumentation, and 3.3.7.12, Radioactive Gaseous Effluent Monitoring Instrumentation, require that those monitors which exceed the time specified for out of service status be reported in the next Semiannual Effluent Release Report. During this reporting period, January through June of 1992, the time specified in the action statements for these monitors was not exceeded.

12. CHANGES TO THE PROCESS CONTROL PROGRAM (PCP)

As required by the Fermi 2 license, the operator (Detroit Edison) is required to establish a program that will reasonably assure the complete processing of radioactive wastes. This program assures that processed wastes are completely solidified and are free of standing water. Changes to the PCP Manual are provided to document changes to established conditions and to ensure that controls are in place to assure that radioactive waste is solidified. During this reporting period, January through June of 1992, no changes were made to the PCP manual.

During the previous reporting period, July through December of 1991, a complete rewrite of the PCP Manual was approved (Revision 13). Subsequently, a minor change to the PCP Manual was approved (Revision 14) which changed the name of Chem Nuclear Systems Incorporated procedure SD-OP-090-48306 (formerly SD-OP-090) to reflect the fact that a Fermi-specific version of this procedure had been approved. Revision 14 of the PCP Manual was included in the Semiannual Effluent Release Report for second half of 1991, but the supporting documentation for changes to Revisions 13 and 14 was not included. In addition, a review of the 1988 Semiannual Radiological Effluent Report determined that supporting documentation for changes to Revisions 11 and 12 to the PCP Manual was not included. Accordingly, Appendix A provides change documentation for Revisions 11, 12, 13, and 14.

Revisions 11, 12, 13, and 14 were reviewed prior to their effective dates and the determination was made that the changes did not reduce the overall conformance of the solidified waste product to existing criteria. The Onsite Review Organization reviewed these changes to the PCP Manual and found the changes acceptable prior to each revision's effective date.

13. CHANGES TO DOSE CALCULATION AND ENVIRONMENTAL MONITORING LOCATIONS

During this reporting period, January through June of 1992, there were no changes to dose calculation or environmental monitoring locations.

14. CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL (ODCM)

During this reporting period, January through June of 1992, the ODCM was not revised.

15. MAJOR CHANGES TO RADIOACTIVE WASTE SYSTEMS

During this reporting period, January through June of 1992, there were no major changes to the liquid, gaseous, or solid radioactive waste treatment systems.

16. LIQUID HOLDUP TANKS EXCEEDING LIMITS

Fermi 2 Technical Specification 3.11.1.4 requires that the quantity of radioactive material contained in any outside temporary tank shall be limited to 10 curies, excluding tritium and dissolved or entrained noble gases. During this reporting period, January through June of 1992, this activity limit for such tanks was not exceeded.

0801.15
August 27, 1993
NRC-93-0104

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

References: 1) Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

2) Appendix A, Facility Operating License No. NPF-43, Technical Specification 6.9.1.8

Subject: **Semi-Annual Radioactive Effluent Release Report**

The Semi-Annual Radioactive Effluent Release Report for Fermi 2 is attached. This report is being transmitted in compliance with Reference 2 and Regulatory Guide 1.21, Revision 1. The attached report covers the period from January 1 through June 30, 1993.

During this reporting period there were no instances of unmonitored or unplanned radioactive releases from the site.

Please direct any questions or requests for additional information to Joseph Pendergast, Compliance Engineer, at (313) 586-1682.

Sincerely,

D. R. Gipson /s/

Attachment
cc: T. G. Colburn
W. J. Kropp
J. B. Martin
M. P. Phillips
Region III

w/o encl.

bcc: R. M. Baum (w/encl.)
R. A. DeLong (w/encl.)
R. R. Eberhardt, Jr. (w/encl.)
P. Fessler
D. R. Gipson
L. S. Goodman
R. McKeon
W. E. Miller, Jr.
R. A. Newkirk
D. P. Ockerman
R. B. Stafford
W. M. Tucker
J. G. Walker

Information Management (140 NOC)
Secretary's Office (2412 WCB)
D. R. Hahn (Michigan Dept./Public Health
NSRG Secretary/ISEG Coordinator 230 AIB)
UFSAR Coordinator
NRR Chron File
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APPENDIX A: REVISED OFFSITE DOSE CALCULATION MANUAL

DETROIT EDISON COMPANY

FERMI 2 NUCLEAR POWER PLANT

OPERATING LICENSE NO. NPF - 43

SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

for the period of

January 1, 1993 through June 30, 1993

PREFACE

The Fermi 2 Nuclear Power Plant maintains a comprehensive program of monitoring and controlling the release of radioactive material from the site. The releases covered in this report are of three types: liquid releases, gaseous releases, and radioactive waste shipments.

In a liquid release, a tank containing radioactive water is sampled prior to discharge. Based on the analysis of this sample, both the amount of radioactivity in the tank and the potential radiation dose to a member of the public are determined, and these figures are compared to federal limits. In calculating the radiation dose, very conservative assumptions are used. For example, it is assumed that an individual eats 46 pounds of fish per year from Lake Erie directly offshore of the Fermi 2 plant. The tank may be released only after it is determined that no federal limits are exceeded. As the tank is released, the contents of the tank are diluted by clean water in a ratio of approximately 400 gallons of clean water to one gallon of tank water. The release is continuously monitored by radiation detectors. Fermi 2 is continuing to work toward minimizing or eliminating liquid releases.

In the first half of 1993, there were six liquid releases. These releases contained 0.373 curies of tritium and 0.00149 curies of other radioactive material. Except for tritium, whose concentration remains fairly constant in liquid releases, the amount of radioactivity in these releases was small compared to most other reporting periods in which there were liquid releases.

Radioactive gaseous releases occur as part of the normal operation of Fermi 2. There are six ventilation system release points, or "stacks", each of which is monitored by a sophisticated radiation monitor which continuously extracts a sample from the stack effluent. Since any gaseous radioactive material is diluted by the building ventilation air flow, the stack concentrations are small. In fact, radioactive material is not detected in most stack samples. All sample results are compared with federal limits to ensure they are not exceeded. If the amount of radioactivity in the effluent of any stack approaches a federal limit, an alarm will be activated in the Fermi 2 control room to alert operations personnel. After evaluating the situation, the operators may choose to order increased sampling, shut down building ventilation, or divert the effluent stream to a special gaseous treatment system so that federal limits are not exceeded.

In the first half of 1993, the amount of radioiodines and particulate radionuclides with half lives greater than 8 days in gaseous releases was 0.0157 curies. This amount is comparable to levels seen in previous periods. The amount of noble gases released in the first half of 1993 was 52.6 curies. This amount is comparable to amounts reported in previous periods during which leaking fuel was not a problem.

Radioactive shipments of solid waste from the Fermi 2 site consist of waste generated during water treatment, radioactive trash, and irradiated components. Federal regulations governing these shipments are extensive, and Fermi 2 also complies with internal procedures. Shipment destinations are either licensed burial sites or intermediate processing facilities. In the first half of 1993, Fermi 2 did not ship any radioactive waste for disposal due to the exclusion of Michigan licensees from the burial sites.

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1. INTRODUCTION

The Detroit Edison Fermi 2 Nuclear Power Plant is designed and operated in a manner which strictly controls and monitors the release of radioactive material to the environment in accordance with Nuclear Regulatory Commission (NRC) and Detroit Edison Company requirements. This Semiannual Radioactive Effluent Release Report, for the January through June 1993 period, is submitted in accordance with Fermi 2 Technical Specification 6.9.1.8 and NRC Regulatory Guide 1.21. This report provides the following information required by those references:

1. Summation of the quantities of radioactive material (in the form of gases and liquids) released from the plant (Sections 8 and 9)

2. Summation of quantities of radioactive material contained in solid waste packaged and shipped for off-site disposal (Section 10)

3. Changes to the Process Control Program (PCP) (Section 12)

4. Changes to the Offsite Dose Calculation Manual (ODCM) (Section 14)

5. A list and description of any unplanned releases of radioactive materials to unrestricted areas (Section 6)

6. A list of any new locations for dose calculation or environmental monitoring (Section 13)

7. A list of effluent monitors which were inoperable for a period longer than that specified in ODCM Controls 3.3.7.11 and 3.3.7.12, and an explanation of why the time limit was exceeded (Section 11)

8. A description of events leading up to any liquid holdup tanks exceeding the limit of Technical Specification 3.11.1.4 (Section 16)

9. A description of any major changes to radioactive waste treatment systems (Section 15)

2. REGULATORY LIMITS

The Nuclear Regulatory Commission limits on liquid and gaseous effluents are incorporated in the Fermi 2 ODCM. These limits prescribe the maximum quantities and rates of release for radioactive effluents resulting from normal operation of Fermi 2. The limits are defined in several ways to limit the overall impact on persons living near the plant. The limits are described in the following sections.

A. Gaseous Effluents

1. Dose rate due to radioactive materials released in gaseous effluents from the site to areas at and beyond the site boundary shall be limited to the following:

a. Noble gases

Less than or equal to 500 mrem/year to the total body
Less than or equal to 3000 mrem/year to the skin

b. Iodine 131, 133, tritium, and for all radionuclides in particulate form with half lives greater than 8 days

Less than or equal to 1500 mrem/year to any organ.

2. Air dose due to noble gases released in gaseous effluents to areas at and beyond the site boundary shall be limited to the following:

a. Less than or equal to 5 mrads for gamma radiation
Less than or equal to 10 mrads for beta radiation
-During any calendar quarter

b. Less than or equal to 10 mrads for gamma radiation
Less than or equal to 20 mrads for beta radiation
-During any calendar year

3. Dose to a member of the public from Iodine-131, 133, tritium, and all radionuclides in particulate form with half lives greater than 8 days in gaseous effluents released to areas at and beyond the site boundary shall be limited to the following:

a. Less than or equal to 7.5 mrems to any organ
-During any calendar quarter

b. Less than or equal to 15 mrems to any organ
-During any calendar year

B. Liquid Effluents

1. The concentration of radioactive material released in liquid effluents to unrestricted areas shall be limited to the concentrations specified in Title 10 of the Code of Federal Regulations (10 CFR) Part 20 (Standards for Protection Against Radiation), Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 2E-4 (.0002) microcuries/ml total activity.

2. The dose or dose commitment to a member of the public from radioactive materials in liquid effluents released to unrestricted areas shall be limited to the values in the following sections.

a. Less than or equal to 1.5 mrem to the total body
Less than or equal to 5 mrem to any organ
-During any calender quarter

b. Less than or equal to 3 mrem to the total body
Less than or equal to 10 mrem to any organ
-During any calender year

3. MAXIMUM PERMISSIBLE CONCENTRATION (MPC)

The Fermi 2 ODCM implements the MPC requirements of 10 CFR 20 and NRC Regulatory Guide 1.21 by means of the following limits:

A. Gases

The dose rate due to gaseous effluents is calculated in accordance with the Fermi 2 ODCM. The maximum permissible dose rates for gaseous releases are defined in the Fermi 2 ODCM.

ODCM Control 3.11.2.1.a (Dose rate at the site boundary from noble gases):

-Less than or equal to 500 mrem/year to the total body
-Less than or equal to 3000 mrem/year to the skin

ODCM Control 3.11.2.1.b (Dose rate at the site boundary from I-131, I-133, and particulates with half lives greater than 8 days):

-Less than or equal to 1500 mrem/year to any organ

B. Liquids

Allowable liquid release rates are calculated in accordance with the Fermi 2 ODCM. As required by ODCM Control 3.11.1.1, the MPC's for liquids used for these calculations are taken from 10 CFR 20, Appendix B, Table II, Column 2. The most restrictive MPC is used in all cases. For dissolved and entrained gases the MPC of 2E-4 microcuries/ml is applied. This MPC is based on the Xe-135 MPC in air (submersion dose) converted to an equivalent concentration in water as discussed in the International Commission on Radiological Protection (ICRP) Publication 2.

4. AVERAGE ENERGY

The calculated site boundary dose rates for Fermi 2 are based on identification of individual isotopes and on use of dose factors specific to each identified isotope or a highly conservative dose factor. Average energy values are not used in these calculations, and therefore need not be reported.

5. MEASUREMENTS AND APPROXIMATIONS OF TOTAL ACTIVITY

As required by NRC Regulatory Guide 1.21, this section describes the methods used to measure the total radioactivity in effluent releases and to estimate the overall errors associated with these measurements. The effluent monitoring systems are described in Chapter 11.4 of the Fermi 2 Updated Final Safety Analysis Report (UFSAR).

A. Gaseous Effluents

1. Fission and Activation Gases

Samples are obtained from each of the seven plant radiation monitors which continuously monitor the six ventilation exhaust points and from the Offgas Vent Pipe which carries the gland seal condenser exhaust, mechanical vacuum pump exhaust, and treated offgas streams. The Offgas Vent Pipe effluent is released through one of the six ventilation exhaust points (the reactor building exhaust plenum). The fission and activation gases are quantified by gamma spectroscopy analysis of periodic samples.

The values reported in Section 9 are the sums of all fission and activation gases quantified at all monitored release points.

Considering the inherent variability in radiation measurement, the variability in effluent stream composition, and the uncertainties in effluent flow rate and instrument calibration, Detroit Edison estimates that the uncertainty of the fission and activation gas total release figures is less than plus or minus 8 percent.

2. Radioiodines

Samples are obtained from each of the seven plant radiation monitors, which continuously monitor the six ventilation exhaust points. The radioiodines are entrained on charcoal and then quantified by gamma spectroscopy analysis. For each sample the duration of sampling and continuous flow rate through the charcoal are used in determining the concentration of radioiodines. From the flow rate of the ventilation system a rate of release can be determined.

The values reported in Section 9 are the sums of all radioiodines quantified at all continuously monitored release points.

Considering the inherent variability in radiation measurements, the variability in effluent stream composition, and the uncertainty in sample and effluent flow rates, Detroit Edison estimates that the uncertainty of the total radioiodine release figures is less than plus or minus 5 percent.

3. Particulates

Samples are obtained from each of the seven plant effluent radiation monitors, which continuously monitor the six ventilation exhaust points. The particulates are collected on a filter and then quantified by gamma spectroscopy analysis. For each sample, the duration of sampling and continuous flow rate through the filter are used in determining the concentration of particulates. From the flow rate of the ventilation system a rate of release can be determined.

Quarterly, the filters from each ventilation release point are composited and then radiochemically separated and analyzed for Strontium (Sr)-89/90 using various analytical methods. If found these radionuclides are reported as total particulate activity.

The values reported in Section 9 are the sums of all particulates quantified at all monitored release points.

Considering the inherent variability in radiation measurements, the variability in effluent stream composition, and the uncertainties in instrument calibration and in sample and effluent flow rates, Detroit Edison estimates that the the uncertainty of the total particulate release figures is less than plus or minus 3 percent.

4. Tritium

Samples are obtained for each of the seven plant effluent radiation monitors which continuously monitor the six ventilation exhaust points. The sample is passed through a bottle containing water and the tritium is "washed" out to the collecting water. Portions of the collecting water are analyzed for tritium using liquid scintillation counting techniques. For each sample, the duration of sample and sample flow rate is used to determine the concentration. From the flow rate of the ventilation system a release rate can be determined.

The values reported in Section 9 are the sums of all tritium quantified at all monitored release points.

Considering the inherent variability in radiation measurement, the variability in effluent stream composition, and the uncertainties in instrument calibration, sample and effluent flow rates, and collection efficiency, Detroit Edison estimates that the uncertainty of total gaseous tritium release figures is less than plus or minus 34 percent.

5. Gross Alpha

The gaseous particulate filters from the seven plant effluent radiation monitors are stored for one week to allow for decay of naturally occurring alpha emitters. These filters are then analyzed for gross alpha radioactivity by gas proportional counting, and any such radioactivity found is assumed to be plant related. The quantity of alpha emitters released can then be determined from sample flow rate, sample duration, and stack flow rate.

The values reported in Section 9 are the sums of all alpha emitters quantified at all monitored release points.

Considering the inherent variability in radiation measurements, the variability in effluent stream composition, and the uncertainties in instrument calibration and in sample and effluent flow rates, Detroit Edison estimates that the uncertainty of the total gaseous gross alpha release figures is less than plus or minus 10 percent.

B. Liquid Effluents

The liquid radwaste processing system and the liquid effluent monitoring system are described in the Fermi 2 UFSAR.

1. Fission and activation products

Before the contents of each holding tank is discharged to the environment, a representative sample of the tank's contents is taken and retained. The sample allows for the determination of radioactive material concentrations and establishes the rate at which the radioactive material can be discharged to the environment.

At the end of the calendar quarter a composite sample is made of all discharge samples taken during the quarter. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for Iron (Fe)-55 and Strontium (Sr)-89/90. Radiochemical separations and various analytical methods are used to quantify the amounts of Sr-89/90 and Fe-55.

The values reported in Section 8 are the sums of all fission and activation products found in all batch releases. Also reported in Section 8 are the pre-dilution waste volume (the total volume of waste sample tanks released), the post-dilution waste volume (the total tank volume released plus the volume of circulating water released while the tanks were being released), and the total dilution volume discharged (the total volume of circulating water released during the reporting period).

Considering the inherent variability in radiation measurement and the uncertainties in volume measurements and instrument calibration, Detroit Edison estimates that the uncertainty in total liquid fission and activation product release figures is less than plus or minus 5 percent.

2. Tritium

Before the contents of each holding tank is discharged to the environment, a representative sample of the tank contents is taken and retained. At the end of the calendar month a composite sample is made of all discharge samples taken during the month. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for tritium by liquid scintillation counting.

The values reported in Section 8 sums all tritium quantified from all batch releases.

Considering the inherent variability in radiation measurement and the uncertainties in volume measurement and instrument calibration, Detroit Edison estimates the uncertainty in total tritium release figures is less than plus or minus 15 percent.

3. Dissolved and Entrained Gases

Prior to releasing liquid radioactive waste to the environment a sample is taken from the radwaste holding tank. This sample is representative of the tank's contents. The sample is examined using gamma spectroscopy to determine the dissolved and entrained noble gases.

The values reported in Section 8 are the sums of all radioactive gases found for all batch releases.

Considering the inherent variability in radiation measurement and the uncertainties in instrument calibration and volume measurements, Detroit Edison estimates that the uncertainty in total dissolved and entrained gas release figures is less than plus or minus 15 percent.

4. Gross Alpha

Before the contents of each holding tank is discharged to the environment, a representative sample of the tank's contents is taken and retained. At the end of the calendar month a composite sample is made of all discharge samples taken during the month. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for gross alpha radioactivity by gas proportional counting.

The values reported in Section 8 are the sums of the gross alpha radioactivity from all batch releases.

Considering the inherent variability in radiation measurement and the uncertainty in volume measurements and instrument calibration, Detroit Edison estimates that the uncertainty in total liquid gross alpha release figures is less than plus or minus 43 percent.

6. ABNORMAL RELEASES

For the purpose of this report, an abnormal release is any release of radioactive material not performed in accordance with the Fermi 2 license and implementing procedures. No abnormal releases occurred during the reporting period.

7. BATCH RELEASES

As required by Regulatory Guide 1.21, a summary of data for batch releases must be provided in this report. The following batch liquid releases from radwaste holding tanks to the circulating water decant line occurred between January 1, 1993 and June 30, 1993 (all these releases occurred during the first quarter of 1993):

Number of releases:	6
Total time for all releases: minutes	2742
Maximum time for a release: minutes	464
Average time for a release: minutes	457
Minimum time for a release: minutes	448

The only batch gaseous releases from Fermi 2 are the venting or purging of the primary containment (drywell or torus) atmosphere. These venting or purging releases pass through the reactor building ventilation or standby gas treatment system and are monitored by the final effluent monitors for these pathways. Separate data on these venting or purging releases are not reported because the associated data are already included in the gaseous effluent release data (Section 5.A and Section 9).

10. SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. Solid Waste Shipped Offsite for burial or disposal (not irradiated fuel): No shipments in this reporting period.

B. Irradiated Fuel Shipments: No shipments in this reporting period.

11. RADIATION INSTRUMENTATION

Fermi 2 ODCM Controls 3.3.7.11, Radioactive Liquid Effluent Monitoring Instrumentation, and 3.3.7.12, Radioactive Gaseous Effluent Monitoring Instrumentation, require that those monitors which exceed the time specified for out of service status be reported in the next Semiannual Effluent Release Report. During this reporting period, January through June of 1993, the time specified in the action statements for these monitors was not exceeded.

12. CHANGES TO THE PROCESS CONTROL PROGRAM (PCP)

During this reporting period, January through June of 1993, there were no changes to the Process Control Program Manual.

13. CHANGES TO DOSE CALCULATION AND ENVIRONMENTAL MONITORING LOCATIONS

During this reporting period, January through June 1993, there was one change to an environmental monitoring location: Offsite TLD number 34 (T34) was relocated from the east to the west side of Port Creek Road. This is a negligible change in the distance of this TLD from the plant.

14. CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL (ODCM)

In June 1993, revisions of sections 0.0, 3.0, 4.0, and 7.0 of the ODCM were approved. Appendix A contains these revisions, together with supporting documents.

15. MAJOR CHANGES TO RADIOACTIVE WASTE SYSTEMS

During this reporting period, January through June of 1993, there were no major changes to the liquid, gaseous, or solid radioactive waste treatment systems.

16. LIQUID HOLDUP TANKS EXCEEDING LIMITS

Fermi 2 Technical Specification 3.11.1.4 requires that the quantity of radioactive material contained in any outside temporary tank shall be limited to 10 curies, excluding tritium and dissolved or entrained noble gases. During this reporting period, January through June of 1993, this activity limit for such tanks was not exceeded.

8. LIQUID EFFLUENT SUMMARY

REPORT CATEGORY : SEMIANNUAL SUMMATION OF ALL RELEASES BY QUARTER
TYPE OF ACTIVITY : ALL LIQUID EFFLUENTS
REPORTING PERIOD : QUARTER 1 AND QUARTER 2

TYPE OF EFFLUENT	UNIT	QUARTER 1	QUARTER 2
A. FISSION AND ACTIVATION PRODUCTS			
1. TOTAL RELEASE (NOT INCLUDING TRITIUM, GASES, ALPHA)	CURIES	1.48E-03	0.00E+00

2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	: uCi/ml	: 1.76E-10	: 0.00E+00
3. MAXIMUM PERCENT OF ODCM CONTROL LIMIT FOR A SINGLE RELEASE	%	: 1.96E-01	: 0.00E+00

B. TRITIUM

1. TOTAL RELEASE	: CURIES	: 3.73E-01	: 0.00E+00
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	: uCi/ml	: 4.42E-08	: 0.00E+00
3. PERCENT OF ODCM CONTROL LIMIT	%	: 7.27E-02	: 0.00E+00

C. DISSOLVED AND ENTRAINED GASES

1. TOTAL RELEASE	: CURIES	: 9.17E-06	: 0.00E+00
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	: uCi/ml	: 1.09E-12	: 0.00E+00
3. MAXIMUM PERCENT OF ODCM CONTROL LIMIT FOR A SINGLE RELEASE	%	: 1.87E-04	: 0.00E+00

D. GROSS ALPHA RADIOACTIVITY (Note: N.D. = No activity detected)

1. TOTAL RELEASE	: CURIES	: N.D.	: N.D.
E. WASTE VOL RELEASED (PRE-DILUTION)	: LITERS	: 3.94E+05	: 0.00E+00
F. WASTE VOL RELEASED (POST-DILUTION)	: LITERS	: 1.71E+08	: 0.00E+00
G. TOTAL VOLUME DILUTION DISCHARGED	: LITERS	: 8.43E+09	: 9.33E+09

8. LIQUID EFFLUENT SUMMARY (continued)

REPORT CATEGORY : SEMIANNUAL LIQUID BATCH RELEASES
TYPE OF ACTIVITY : TOTALS FOR EACH NUCLIDE RELEASED
: ALL RADIONUCLIDES
REPORTING PERIOD : QUARTER 1 AND QUARTER 2
: BATCH RELEASES

NUCLIDE	: UNIT	: QUARTER 1	: QUARTER 2
ALL NUCLIDES			

H-3	: CURIES	: 3.73E-01	: 0.00E+00
Cr-51	: CURIES	: 1.56E-04	: 0.00E+00
Mn-54	: CURIES	: 3.51E-04	: 0.00E+00
Co-58	: CURIES	: 6.13E-05	: 0.00E+00
Co-60	: CURIES	: 5.52E-04	: 0.00E+00
Zn-65	: CURIES	: 1.40E-04	: 0.00E+00
Sr-89	: CURIES	: 1.89E-04	: 0.00E+00
Sb-125	: CURIES	: 1.87E-05	: 0.00E+00
Xe-133	: CURIES	: 9.17E-06	: 0.00E+00
Cs-134	: CURIES	:*<4.2E-08	: 0.00E+00
Cs-137	: CURIES	: 8.29E-06	: 0.00E+00
Ce-141	: CURIES	:*<3.7E-08	: 0.00E+00
Ce-144	: CURIES	:*<1.5E-07	: 0.00E+00
Total for Period	: CURIES	: 3.74E-01	: 0.00E+00

* Less than Lower Limit of Detection (LLD), i.e. the maximum sensitivity of measurement, in units of microcuries per milliliter (uCi/ml).

9. GASEOUS EFFLUENT SUMMARY

REPORT CATEGORY BY QUARTER : SEMIANNUAL SUMMATION OF ALL RELEASES
TYPE OF ACTIVITY : ALL AIRBORNE EFFLUENTS
REPORTING PERIOD : QUARTER 1 AND QUARTER 2

TYPE OF EFFLUENT	: UNIT	: QUARTER 1	: QUARTER 2
A. FISSION AND ACTIVATION GASES			
1. TOTAL RELEASE	: CURIES	: 2.76E+01	: 2.50E+01
2. AVERAGE RELEASE RATE FOR PERIOD	: uCi/sec	: 3.55E+00	: 3.18E+00
B. RADIOIODINES			
1. TOTAL IODINE - 131	: CURIES	: 5.36E-04	: 6.21E-04
2. AVERAGE RELEASE RATE FOR PERIOD	: uCi/sec	: 6.89E-05	: 7.90E-05
C. PARTICULATES			
1. PARTICULATES (HALF-LIVES>8 DAYS)	: CURIES	: 9.03E-05	: 1.16E-04
2. AVERAGE RELEASE RATE FOR PERIOD	: uCi/sec	: 1.16E-05	: 1.48E-05
3. GROSS ALPHA RADIOACTIVITY	: CURIES	: 1.03E-06	: 1.23E-06
D. TRITIUM			
1. TOTAL RELEASE	: CURIES	: 2.36E+00	:*<5.0E-08

Douglas R. Gipson
Senior Vice President
Nuclear Generation

Detroit Edison

Fermi 2
6400 North Dixie Highway
Newport, Michigan 48166
(313) 586-5249

March 31, 1995
NRC-95-0032

U. S Nuclear Regulatory Commission
Attn: Document Control Desk
Washington D.C. 20555

References: 1) Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

2) Appendix A, Facility Operating License No.
NPF-43, Technical Specification 6.9.1.8

Subject: Annual Radioactive Effluent Release Report

The Annual Radioactive Effluent Release Report for Fermi 2 is attached. This report is being transmitted in compliance with Reference 2 and Regulatory Guide 1.21, Revision 1. The attached report covers the period from January 1 through December 31, 1994.

Please direct any questions or requests for additional information to Lynda Craine Supervisor, Radiological Health, at (313) 586-1388.

Sincerely,

Enclosure

cc: T. G. Colburn
J. B. Martin
M. P. Phillips
A. Vegel
Region III

FERMI 2 NUCLEAR POWER PLANT

DETROIT EDISON COMPANY

OPERATING LICENSE NO. NPF - 43

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

for the period of
January 1, 1994 through December 31, 1994

TABLE OF CONTENTS

SUMMARY

The Fermi 2 Nuclear Power Plant maintains a comprehensive program of monitoring and controlling the release of radioactive material from the site. The releases covered in this report are of three types: liquid releases, gaseous releases, and radioactive waste shipments.

In a liquid release, a tank containing radioactive water is sampled for analysis prior to release. Based on the analysis, the amounts of radioactivity in the tank, and the potential radiation dose to a member of the public are determined, and these figures are compared to federal limits. Conservative assumptions are used in calculating the radiation dose. For example, it is assumed that an individual eats 46 pounds of fish per year from Lake Erie caught directly offshore of the Fermi 2 plant discharge point.

The tank will be released only after it is determined that federal limits are not exceeded. The contents of the tank are diluted by clean water (from the circulating water decant line) as the tank is released in a ratio of approximately 400 gallons of clean water to one gallon of tank water for tanks located in the Radwaste Building basement (the normal release pathway). In the case of a Condensate Storage Tank release (an alternate release pathway approved in January 1994 by the plant Onsite Review Organization), this ratio is approximately 50 gallons of clean water to one gallon of tank water. The release is continuously monitored by radiation detectors.

As a result of the December 25, 1993 turbine incident, the radwaste system and the normal liquid release pathway were not available. In 1994, there were 3 liquid releases from the Condensate Storage Tank, and no releases from the tanks in the Radwaste Building basement. In accordance with ALARA (As Low As Reasonably Achievable) principles, the three Condensate Storage Tank batches were thoroughly demineralized and filtered using portable equipment in order to ensure that the most restrictive Fermi 2 liquid effluent limit (monthly projected dose to the total body) would not be exceeded. The Condensate Storage Tank release pathway and associated monitoring equipment were designed to be as similar as possible to the normal release configuration. A new radiation monitor was purchased and installed in the discharge path; the entire discharge path was hard-piped; and the release was routed to the circulating water decant line and monitored by the circulating water decant line radiation monitor, as with a normal release.

The three 1994 liquid releases contained 2.4 curies of tritium and 0.011 curies of other radioactive material. This amount of tritium is high compared with previous years, simply because a larger volume of water was released. The tritium concentration in plant water is essentially constant, and it cannot be removed. However, the dose impact of tritium is relatively low. Due to the thorough water cleanup, the amount of other radioactive material is fairly low compared with previous years, despite the large volume released. This is due to Detroit Edison's commitment to maintain all radioactive releases As Low As Reasonably Achievable (ALARA).

The calculated 1994 liquid effluent radiation dose to the maximally exposed individual due to I-131, I-133, tritium, and particulates with half lives greater than 8 days, was 0.064 mrem to the total body and 0.085 mrem to the maximally exposed organ. (These values are 2.2% and 0.85% of federal limits, respectively.)

Fermi 2 is continuing to work toward minimizing or eliminating liquid releases. Between the last Condensate Storage Tank release in April 1994 and the date of this report (March 1995), there were no liquid radioactive releases from Fermi 2.

Radioactive gaseous releases occur as part of the normal operation of Fermi 2. There are six ventilation system release points, or "stacks", each of which is monitored by a sophisticated and sensitive radiation monitor which continuously extracts a sample from the stack effluent. Since any gaseous radioactive material is diluted by the building ventilation air flow, the stack concentrations are small. In fact, radioactive material is not detected in most stack samples. All sample results are compared with federal limits to ensure they are not exceeded. If the amount of radioactivity in the effluent of any stack approaches a federal limit, an alarm will be activated in the Fermi 2 control room to alert operations personnel. After evaluating the situation, the operators may choose to order increased sampling, shut down building ventilation, or divert the effluent stream to a special gaseous treatment system so that federal limits are not exceeded.

In 1994 , the amount of radioiodines and particulate radionuclides with half lives greater than 8 days in gaseous releases was 0.00027 curies. The amount of noble gases released in 1994 was 0.49 curies. These quantities are considerably less than those seen in previous years due to the fact that the plant did not operate above low power levels in 1994.

Estimated annual radiation doses due to gaseous effluents from Fermi 2 are included in this report. Noble gas doses to air at the site boundary in 1994 were 0.00015 mrad gamma and 0.000075 mrad beta. These doses are 0.0015% and 0.00038%, respectively, of federal limits. Dose to the maximally exposed organ of the maximally exposed individual due to I-131, I-133, tritium, and particulates with half lives greater than 8 days, was 0.0028 mrem. This dose is 0.019% of the federal limit.

Radioactive shipments of solid waste from the Fermi 2 site consist of waste generated during water treatment, radioactive trash, and irradiated components. Federal regulations governing these shipments are extensive, and Fermi 2 complies with these regulations and with internal procedures. Shipment destinations are either licensed burial sites or intermediate processing facilities. In 1994, Fermi 2 did not ship any radioactive waste for final disposal due to the exclusion of Michigan licensees from the burial sites.

1. INTRODUCTION

The Detroit Edison Fermi 2 Nuclear Power Plant is designed and operated in a manner which strictly controls and monitors the release of radioactive material to the environment in accordance with Nuclear Regulatory Commission (NRC) and Detroit Edison Company requirements. This Annual Radioactive Effluent Release Report, for the January through December 1994 period, is submitted in accordance with Fermi 2 Technical Specification 6.9.1.8 and NRC Regulatory Guide 1.21. This report provides the following information required by those references:

A. Summation of the quantities of radioactive material (in the form of gases and liquids) released from the plant (Sections 7 and 8).

B. Summation of quantities of radioactive material contained in solid waste packaged and shipped for off-site disposal (Section 9).

C. Changes to the Offsite Dose Calculation Manual (ODCM) (Section 14).

D. A list and description of any unplanned releases of radioactive materials to unrestricted areas (Section 5).

E. A list of any new locations for dose calculation or environmental monitoring identified by the land use census (Section 13).

F. A list of effluent monitors which were inoperable for a period longer than that specified in ODCM Controls 3.3.7.11 and 3.3.7.12, and an explanation of why the time limit was exceeded (Section 11).

G. A description of events leading up to any liquid holdup tanks exceeding the limit of Technical Specification 3.11.1.4 (Section 16).

H. A description of any major changes to radioactive waste treatment systems (Section 15).

I. An assessment of the radiological impact on the public in terms of dose due to liquid and gaseous effluents, both to the maximally exposed individual and to the population within a 50 mile radius of the plant (Section 10).

J. A summary of 1994 meteorological data (wind speed and wind direction for different stability classes) which was used in calculating gaseous dispersion factors (Section 12).

2. REGULATORY LIMITS

The Nuclear Regulatory Commission limits on liquid and gaseous effluents are incorporated into the Fermi 2 Offsite Dose Calculation Manual. These limits prescribe the maximum doses and dose rates due to radioactive effluents resulting from normal operation of Fermi 2. The limits are defined in several ways to limit the overall impact on persons living near the plant. The limits are described in the following sections.

A. Gaseous Effluents

I. Dose rate due to radioactive materials released in gaseous effluents from the site to areas at and beyond the site boundary shall be limited to the following:

a) Noble gases

Less than or equal to 500 mrem/year to the total body
Less than or equal to 3000 mrem/year to the skin

b) Iodine-131, Iodine-133, tritium, and for all radionuclides in particulate form with half lives greater than 8 days

Less than or equal to 1500 mrem/year to any organ.

II. Air dose due to noble gases to areas at and beyond the site boundary shall be limited to the following:

a) Less than or equal to 5 mrad for gamma radiation
Less than or equal to 10 mrad for beta radiation
- During any calendar quarter

b) Less than or equal to 10 mrad for gamma radiation
Less than or equal to 20 mrad for beta radiation
- During any calendar year

III. Dose to a member of the public from Iodine-131, Iodine-133, tritium, and all radionuclides in particulate form with half lives greater than 8 days in gaseous effluents released to areas at and beyond the site boundary shall be limited to the following:

a) Less than or equal to 7.5 mrem to any organ
   - During any calendar quarter

b) Less than or equal to 15 mrem to any organ
   - During any calendar year

B. Liquid Effluents

I. The concentration of radioactive material released in liquid effluents to unrestricted areas shall be limited to ten times the concentrations specified in Title 10 of the Code of Federal Regulations (10 CFR) Part 20 (Standards for Protection Against Radiation), Appendix B, Table 2, Column 2 for radionuclides other than dissolved or entrained noble gases, as required by the Fermi 2 Offsite Dose Calculation Manual. For dissolved or entrained noble gases, the concentration shall be limited to 2E-4 (.0002) microcuries/ml total activity. This limit is based on the Xe-135 air submersion dose limit converted to an equivalent concentration in water as discussed in the International Commission on Radiological Protection (ICRP) Publication 2.

II. The dose or dose commitment to a member of the public from radioactive materials in liquid effluents released to unrestricted areas shall be limited to the following:

a) Less than or equal to 1.5 mrem to the total body
   Less than or equal to 5 mrem to any organ
   - During any calendar quarter

b) Less than or equal to 3 mrem to the total body
   Less than or equal to 10 mrem to any organ
   - During any calendar year

3. AVERAGE ENERGY

The calculated site boundary dose rates for Fermi 2 are based on identification of individual isotopes and on use of dose factors specific to each identified isotope or a highly conservative dose factor. Average energy values are not used in these calculations, and therefore need not be reported.

4. MEASUREMENTS AND APPROXIMATIONS OF TOTAL ACTIVITY

As required by NRC Regulatory Guide 1.21, this section describes the methods used to measure the total radioactivity in effluent releases and to estimate the overall errors associated with these measurements. The effluent monitoring systems are described in Chapter 11.4 of the Fermi 2 Updated Final Safety Analysis Report (UFSAR).

A. Gaseous Effluents

I. Fission and Activation Gases

Samples are obtained from each of the seven plant radiation monitors which continuously monitor the six ventilation exhaust points and from the Offgas Vent Pipe which carries the gland seal condenser exhaust, mechanical vacuum pump exhaust, and treated offgas streams. The Offgas Vent Pipe effluent is released through one of the six ventilation exhaust points (the reactor building exhaust plenum). The fission and activation gases are quantified by gamma spectroscopy analysis of periodic samples.

The values reported in Section 8 are the sums of all fission and activation gases quantified at all monitored release points.

Considering the inherent variability in radiation measurement, the variability in effluent stream composition, and the uncertainties in effluent flow rate and instrument calibration, Detroit Edison estimates that the one sigma uncertainty of the fission and activation gas total release figures is plus or minus 30 percent.

II. Radioiodines

Samples are obtained from each of the seven plant radiation monitors which continuously monitor the six ventilation exhaust points. The radioiodines are entrained on charcoal and then quantified by gamma spectroscopy analysis. For each sample the duration of sampling and continuous flow rate through the charcoal are used in determining the concentration of radioiodines. From the flow rate of the ventilation system a rate of release can be determined.

The values reported in Section 8 are the sums of all radioiodines quantified at all continuously monitored release points.

Considering the inherent variability in radiation measurements, the variability in effluent stream composition, and the uncertainty in sample and effluent flow rates, Detroit Edison estimates that the one sigma uncertainty of the total radioiodine release figures is plus or minus 17 percent.

III. Particulates

Samples are obtained from each of the seven plant effluent radiation monitors which continuously monitor the six ventilation exhaust points. The particulates are collected on a filter and then quantified by gamma spectroscopy analysis. For each sample, the duration of sampling and continuous flow rate through the filter are used in determining the concentration of particulates. From the flow rate of the ventilation system a rate of release can be determined.

Quarterly, the filters from each ventilation release point are composited and then radiochemically separated and analyzed for Strontium (Sr)-89/90 using various analytical methods. If found, these radionuclides are reported as total particulate activity.

The values reported in Section 8 are the sums of all particulates quantified at all monitored release points.

Considering the inherent variability in radiation measurements, the variability in effluent stream composition, and the uncertainties in instrument calibration and in sample and effluent flow rates, Detroit Edison estimates that the one sigma uncertainty of the total particulate release figures is plus or minus 16 percent.

IV. Tritium

Samples are obtained for each of the seven plant effluent radiation monitors which continuously monitor the six ventilation exhaust points. The sample is passed through a bottle containing water and the tritium is "washed" out to the collecting water. Portions of the collecting water are analyzed for tritium using liquid scintillation counting techniques. For each sample, the duration of sample and sample flow rate is used to determine the concentration. From the flow rate of the ventilation system a release rate can be determined.

The values reported in Section 8 are the sums of all tritium quantified at all monitored release points.

Considering the inherent variability in radiation measurement, the variability in effluent stream composition, and the uncertainties in instrument calibration, sample and effluent flow rates, and collection efficiency, Detroit Edison estimates that the one sigma uncertainty of the total gaseous tritium release figures is plus or minus 30 percent.

V. Gross Alpha

The gaseous particulate filters from the seven plant effluent radiation monitors are stored for one week to allow for decay of naturally occurring alpha emitters. These filters are then analyzed for gross alpha radioactivity by gas proportional counting, and any such radioactivity found is assumed to be plant related. The quantity of alpha emitters released can then be determined from sample flow rate, sample duration, and stack flow rate.

The values reported in Section 8 are the sums of all alpha emitters quantified at all monitored release points.

Considering the inherent variability in radiation measurements, the variability in effluent stream composition, and the uncertainties in instrument calibration and in sample and effluent flow rates, Detroit Edison estimates that the one sigma uncertainty of the total gaseous gross alpha release figures is plus or minus 16 percent.

B. Liquid Effluents

The liquid radwaste processing system and the liquid effluent monitoring system are described in the Fermi 2 UFSAR.

I. Fission and Activation Products

Before the contents of each holding tank are discharged to the environment, a representative sample of the tank's contents is taken and retained. The sample allows for the determination of radioactive material concentrations and establishes the rate at which the radioactive material can be discharged to the environment.

At the end of the calendar quarter a composite sample is made of all discharge samples taken during the quarter. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for Iron (Fe)-55 and Strontium (Sr)-89/90. Radiochemical separations and various analytical methods are used to quantify the amounts of Sr-89/90 and Fe-55.

The values reported in Section 7 are the sums of all fission and activation products found in all batch releases. Also reported in Section 7 are the pre-dilution waste volume (the total volume of liquid waste tanks released), the post-dilution waste volume (the total tank volume released plus the volume of circulating water released while the tanks were being released), and the total dilution volume discharged (the total volume of circulating water released during the reporting period).

Considering the inherent variability in radiation measurement and the uncertainties in volume measurements and instrument calibration, Detroit Edison estimates that the one sigma uncertainty in total liquid fission and activation product release figures is plus or minus 15 percent.

II. Tritium

Before the contents of each holding tank are discharged to the environment, a representative sample of the tank contents is taken and retained. At the end of the calendar month a composite sample is made of all discharge samples taken during the month. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for tritium by liquid scintillation counting.

The values reported in Section 7 are the sums of all tritium quantified from all batch releases.

Considering the inherent variability in radiation measurement and the certainties in volume measurement and instrument calibration, Detroit Edison estimates that the one sigma uncertainty in total tritium release figures is plus or minus 7 percent.

III. Dissolved and Entrained Gases

Prior to releasing liquid radioactive waste to the environment, a sample is taken from the radwaste holding tank. This sample is representative of the tank's contents. The sample is examined using gamma spectroscopy to determine the concentration of dissolved and entrained noble gases.

The values reported in Section 7 are the sums of all radioactive gases found for all batch releases.

Considering the inherent variability in radiation measurement and the uncertainties in instrument calibration and volume measurements, Detroit Edison estimates that the one sigma uncertainty in total dissolved and entrained gas release figures is plus or minus 33 percent.

IV. Gross Alpha

Before the contents of each holding tank are discharged to the environment, a representative sample of the tank's contents is taken and retained. At the end of the calendar month a composite sample is made of all discharge samples taken during the month. This composite sample consists of portions of each discharge sample which are proportional to the volumes discharged. The composite sample is analyzed for gross alpha radioactivity by gas proportional counting. The values reported in Section 7 are the sums of the gross alpha radioactivity from all batch releases.

Considering the inherent variability in radiation measurement and the uncertainty in volume measurements and instrument calibration, Detroit Edison estimates that the one sigma uncertainty in total liquid gross alpha release figures is plus or minus 54 percent.

5. ABNORMAL RELEASES

For the purpose of this report, an abnormal release is any release of radioactive material not performed in accordance with the Fermi 2 license and implementing procedures. No abnormal releases occurred during the reporting period. However, as discussed in the preface to this report, three liquid releases were made from the Condensate Storage Tank. Releases from this tank had not been made previously and are not expected to be made in the future. To allow these releases, safety evaluations were performed, temporary modifications were approved and implemented, and changes to the Offsite Dose Calculation Manual and plant procedures were made.

6. BATCH RELEASES

As required by Regulatory Guide 1.21, a summary of data for batch releases must be provided in this report. The following batch liquid releases from the Condensate Storage Tank to the circulating water decant line occurred between January 1, 1994 and December 31, 1994 (these releases occurred during February, March, and April 1994).

Number of releases:	3
Total time for all releases:	4609 minutes
Maximum time for a release:	1668 minutes
Average time for a release:	1536 minutes
Minimum time for a release:	1423 minutes

The only batch gaseous releases from Fermi 2 are the venting or purging of the primary containment (drywell or torus) atmosphere. These venting or purging releases pass through the reactor building ventilation or standby gas treatment system and are monitored by the final effluent monitors for these pathways. Separate data on these venting or purging releases are not reported because the associated data are already included in the gaseous effluent release data (Section 8). The amount of radioactive material released during venting and purging has been a small fraction of the amount released as continuous gaseous effluents.

7. LIQUID EFFLUENT SUMMARY

A. Fission and Activation Products

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Total Release except Tritium, Gases, and Alpha (curies)	6.58E-03	4.21E-03	0.00E+00	0.00E+00
Average Diluted Concentration During Period (µCi/ml)*	6.82E-10	1.67E-09	0.00E+00	0.00E+00

Maximum Percent of ODCM Control Limit for a Single Release (%)	1.64E-01	1.56E-01	0.00E+00	0.00E+00

B. Tritium

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Total Release (curies)	1.70E+00	7.32E-01	0.00E+00	0.00E+00
Average Diluted Concentration During Period (μCi/ml)*	1.76E-07	2.90E-07	0.00E+00	0.00E+00
Percent of ODCM Control Limit (%)	1.06E-01	7.35E-02	0.00E+00	0.00E+00

* Dilution water volumes from part G were used in calculating these values.

C. Dissolved and Entrained Gases

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Total Release	*<8.0E-08	*<8.0E-08	0.00E+00	0.00E+00

D. Gross Alpha Radioactivity

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Total Release	2.38E-05 (curies)	*<1.1E-08	0.00E+00	0.00E+00

E. Waste Volume Released Pre-Dilution

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Pre-Dilution Volume (liters)	3.80E+06	2.11E+06	0.00E+00	0.00E+00

F. Waste Volume Released Post-Dilution

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Post-Dilution Volume (liters)	1.91E+08	9.98E+07	0.00E+00	0.00E+00

G. Total Volume Dilution Water Released

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Total Volume (liters)	9.65E+09	2.52E+09	4.10E+09	3.19E+09

* Less than the Lower Limit of Detection (LLD), i.e. the maximum sensitivity of measurement, in units of microcuries per milliliter (µCi/ml).

H. Total For Each Nuclide Released (curies)

(All are batch releases.)

Nuclide	Quarter 1	Quarter 2	Quarter 3	Quarter 4
H-3	1.70E+00	7.32E-01	0.00E+00	0.00E+00
Cr-51	5.26E-04	*<3.8E-07	0.00E+00	0.00E+00
Mn-54	4.[illegible]3E-04	1.47E-03	0.00E+00	0.00E+00
Co-58	2.49E-04	1.16E-04	0.00E+00	0.00E+00
Co-60	2.52E-03	1.12E-03	0.00E+00	0.00E+00
Sr-89	4.94E-04	5.06E-04	0.00E+00	0.00E+00
Sb-125	7.68E-04	*<1.7E-07	0.00E+00	0.00E+00
I-131	1.33E-04	*<4.8E-08	0.00E+00	0.00E+00
Cs-134	8.38E-04	5.54E-04	0.00E+00	0.00E+00
Cs-137	6.51E-04	4.48E-04	0.00E+00	0.00E+00
Ce-141	*<3.7E-08	*<3.7E-08	0.00E+00	0.00E+00
Ce-144	*<1.5E-07	*<1.5E-07	0.00E+00	0.00E+00
Total	**1.71E+00**	**7.36E-01**	**0.00E+00**	**0.00E+00**

8. GASEOUS EFFLUENT SUMMARY

(Mixed mode releases as defined in NRC Regulatory Guide 1.111)

A. Fission and Activation Gases

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Total Release (curies)	0.00E+00	0.00E+00	0.00E+00	4.90E-01
Average Release Rate for Period (μCi/sec)	0.00E+00	0.00E+00	0.00E+00	6.16E-02

B. Radioiodines

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Total I-131	1.26E-04 curies	*<3.4E-14	*<3.4E-14	*<3.4E-14
Average Release Rate for Period (μCi/sec)	1.62E-05	0.00E+00	0.00E+00	0.00E+00

* Less than the Lower Limit of Detection (LLD), i.e. the maximum sensitivity of measurement, in units of microcuries per milliliter (μCi/ml).

C. Particulates

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Particulates with half lives > 8 days (curies)	1.05 E-05	2.18E-05	8.88E-06	9.93E-05
Average Release Rate for Period (μCi/sec)	1.35E-06	2.77E-06	1.12E-06	1.25E-05
Gross Alpha Radioactivity (curies)	1.39E-06	1.61E-06	2.74E-06	1.49E-06

D. Tritium

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Total Release	*<5.0E-08	*<5.0E-08	*<5.0E-08	*<5.0E-08

E. Particulates: Totals for Each Nuclide Released (curies)

Nuclide	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Cr-51	3.95E-06	*<2.5E-13	*<2.5E-13	*<2.5E-13
Mn-54	*<4.8E-14	2.89E-06	*<4.8E-14	1.13E-05
Co-57	*<1.4E-14	1.20E-06	*<1.4E-14	*<1.4E-14
Co-60	5.47E-06	1.77E-05	8.49E-06	8.29E-05
Ba-139	*<2.0E-09	*<2.0E-09	*<2.0E-09	1.41E-03
Cs-138	*<3.5E-11	*<3.5E-11	*<3.5E-11	6.71E-03
Sr-89	1.05E-06	*<2.0E-15	*<2.0E-15	3.76E-06
Sr-90	*<3.0E-16	*<3.0E-16	3.93E-07	*<3.0E-16
Cs-134	*<4.2E-14	*<4.2E-14	*<4.2E-14	*<4.2E-14
Cs-137	*<5.0E-14	*<5.0E-14	*<5.0E-14	*<5.0E-14
Ce-141	*<3.9E-14	*<3.9E-14	*<3.9E-14	1.38E-06
Ce-144	*<1.3E-13	*<1.3E-13	*<1.3E-13	*<.1.3E-13
Total	**1.05E-05**	**2.18E-05**	**8.88E-06**	**8.22E-03**

* Less than the Lower Limit of Detection (LLD), i.e. the maximum sensitivity of measurement, in units of microcuries per milliliter (μCi/ml).

F. Fission and Activation Gases: Summary for Each Nuclide Released

Nuclide	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Xe-138	*<2.0E-07	*<2.0E-07	*<2.0E-07	**4.90E-01 curies**

G. Iodines: Summary for Each Nuclide Released

Nuclide	Quarter 1	Quarter 2	Quarter 3	Quarter 4
I-131	1.26E-04 curies	*<3.4E-14	*<3.4E-14	*<3.4E-14

* Less than the Lower Limit of Detection (LLD), i.e. the maximum sensitivity of measurement, in units of microcuries per milliliter (μCi/ml).

9. SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. Solid Waste Shipped Offsite for Burial or Disposal (not irradiated fuel):

No shipments in this reporting period.

B. Irradiated Fuel Shipments

No shipments in this reporting period.

10. RADIOLOGICAL IMPACT ON THE PUBLIC

A. Dose Due to Liquid Effluents

As discussed in Section 6.5.1 of the Fermi 2 ODCM, compliance with ODCM Control 3.11.1.2, which limits dose to a member of the public to any organ and to the total body due to liquid effluents, is evaluated by calculating the dose to a hypothetical individual who both eats fish from Lake Erie and drinks water extracted from Lake Erie at the water intake for the city of Monroe. Conservative assumptions from Regulatory Guide 1.109 are made about the quantity of fish and water consumed. The individual organ and total body doses for 1994 to this hypothetical individual were calculated according to Section 6.5.1 of the ODCM and are listed below.

Organ	1994 Liquid Effluent Dose
Bone	4.66E-2 mrem
Liver	8.51E-2 mrem
Thyroid	6.88E-4 mrem
Kidney	2.81E-2 mrem
Lung	9.36E-3 mrem
GI-LLI	4.30E-3 mrem
Total body	6.44E-2 mrem

The highest organ dose, 8.51E-2 mrem to the liver, is 0.85% of the ODCM Control 3.11.1.2 annual organ dose limit (10 mrem); the total body dose, 6.44E-2 mrem, is 2.15% of the ODCM Control 3.11.1.2 annual total body dose limit (3 mrem).

B. Dose Due to Gaseous Effluents

As discussed in Section 7.8.1 of the Fermi 2 ODCM, compliance with ODCM Control 3.11.2.3, which limits dose due to I-131, I-133, H-3, and particulates with half lives greater than 8 days in gaseous effluents to any organ of a member of the public, is evaluated by calculating the dose to an individual in an age group which would receive the highest single organ dose of any member of the public. This individual is a child who is assumed to live at an offsite location which is known to have a garden based on the Land Use Census,. This child is assumed to eat food from this garden, and to also be exposed by the inhalation and ground plane pathways. The individual organ and total body doses to this individual due to I-131, I-133, H-3, and particulates with half lives greater than 8 days were calculated according to Section 7.8.1 of the ODCM and are listed below.

Organ	1994 Gaseous Effluent Dose to Receptor with Highest Single Organ Dose
Bone	1.14E-3 mrem
Liver	1.01E-3 mrem
Thyroid	2.81E-3 mrem
Kidney	1.01E-3 mrem
Lung	1.02E-3 mrem
GI-LLI	1.05E-3 mrem
Total body	1.05E-3 mrem

The highest single organ dose to the maximally exposed receptor, 2.81E-3 mrem to the thyroid, is 0.019% of the ODCM Control 3.11.2.3 annual dose limit (15 mrem).

C. Dose Due to Direct Radiation and Compliance with 40CFR190

Title 40, Part 190 of the Code of Federal Regulations requires that dose to an individual in the unrestricted area from the uranium fuel cycle be limited to 25 mrem/yr to the total body and 75 mrem/yr to the thyroid. The sources of fuel cycle dose not analyzed above are due to other fuel cycle facilities and dose due to direct radiation. As discussed in Section 8.2 of the Fermi 2 ODCM, no other fuel cycle facilities contribute significantly to dose in the vicinity of Fermi 2. With respect to direct radiation, none of the offsite TLD locations listed in Table 10.0-1 of the ODCM showed 1994 TLD readings which were consistently greater than the TLD readings at the control locations. Since other facilities and direct radiation did not contribute significantly to offsite dose, and since the preceding sections of this report show compliance with the more restrictive requirements of 10CFR50 Appendix I, Fermi 2 was in compliance with 40CFR190 in 1994.

D. Dose to Members of the Public on Site due to Effluents

Members of the public may receive dose on site as visitors or as employees (non-radiation workers). As discussed in Section 8.0 of the Fermi 2 ODCM, "visitors" to the Fermi 2 site may receive dose due to their activities within the site boundary. For purposes of this analysis, visitors are members of the public who spend time within the site boundary and who do not do work associated with the operation of Fermi 2. The ODCM considers two categories of visitors: persons ice fishing on Lake Erie and persons spending time in the Fermi 2 Visitors Center. Employees (non-radiation workers) may receive dose from various activities and at various locations (other than radiation areas) on site.

Table 8.0-1 of the ODCM lists the maximum amount of time a member of the public is likely to spend on site, the likely locations of exposure, and the effluent exposure pathways which apply. A visitor is assumed to spend 240 hours per year ice fishing near the site or 4 hours per year at the Visitors Center; an employee is assumed to spend 2500 hours per year on site at various locations. Exposure by immersion in noble gases and by inhalation of radioactive particulates, iodines, and tritium are considered. In the case of employees, ingestion of potable water from the onsite water plant is also considered. The doses given below do not include dose due to the pathways already considered in parts A and C of this section, namely dose due to water ingestion from the Monroe water intake, fish ingestion, and direct radiation.

Based on these assumptions, the maximum dose in 1994 to a visitor at the Visitors Center is 1.02E-7 mrem to total body and 2.51E-7 mrem to the maximally exposed organ (thyroid). The maximum dose in 1994 to an ice fisherman is 9.37E-6 mrem to the total body and 2.78E-5 mrem to the maximally exposed organ (thyroid). The maximum dose in 1994 to an employee (non-radiation worker) on site is 1.49 E-3 mrem to the total body and 1.77 E-3 mrem to the maximally exposed organ (thyroid).

E. Population Dose

Dose to the population within a fifty mile radius of Ferm. ? due to 1994 gaseous and liquid effluents was calculated.

For liquid effluents, the fish ingestion and drinking water pathways were considered. Since there is no significant commercial fishery in the Michigan waters of Lake Erie, the dose due to fish ingestion was assumed to be 'ue to ingestion by the local population of the entire sport fish catch in these waters. In calculating dose due to fish ingestion, parameters from Regulatory Guide 1.109 were used, as was the UFSAR dilution factor of 100. The dose due to water ingestion was determined by assuming that all residents served by the Monroe water intake drink at the average rate given by Regulatory Guide 1.109, and by using the UFSAR dilution factor to the intake of 77. The population total body dose due to drinking water was estimated to be 3 mrem, and the total body dose due to fish ingestion was estimated to be 49 mrem, for a total estimated population total body dose due to liquid effluents of 52 mrem.

For gaseous effluents, the code MICROAIRDOS was used to estimate the population dose. Inputs to the code were 1994 gaseous release data, wind direction and wind speed frequencies for each stability class, population in each of 10 segments of each of 16 sectors, stack release specifications, etc. The estimated 1994 collective effective dose due to gaseous effluents i.. 21 mrem.

F. Site Boundary Air Dose

Gamma and beta dose to air at the site boundary due to noble gases must be calculated to evaluate compliance with ODCM Control 3.11.2.2. In 1994, gamma air dose was 1.46E-4 mrad and beta air dose was 7.53E-5 mrad. These doses represent 0.0015% and 0.00038% of the ODCM Control 3.11.2.2 gamma and beta annual air dose limits, respectively. (The gamma dose limit is 10 mrad and the beta dose limit is 20 mrad.)

11. RADIATION INSTRUMENTATION

Fermi 2 ODCM Controls 3.3.7.11, Radioactive Liquid Effluent Monitoring Instrumentation, and 3.3.7.12, Radioactive Gaseous Effluent Monitoring Instrumentation, require that those monitors which exceed the time specified for out of service status be reported in the next Annual Effluent Release Report.

On December 25, 1993, the Liquid Radwaste Effluent monitor became inoperable when it was submerged as a result of a turbine incident which flooded the Radwaste Building basement. This monitor remained submerged until February 1994 due to the difficulty of removing water from the Radwaste Building basement, thereby exceeding the 30 day out of service time specified in ODCM section 3.3.7.11. It was subsequently restored to full operability. No liquid releases via the pathway associated with this monitor have taken place since the turbine incident.

12. METEOROLOGICAL DATA SUMMARY

The meteorological monitoring system is described in the Fermi 2 UFSAR. In accordance with Regulatory Guide 1.21, data recorded by that system is provided here to permit the NRC to assess the radiological impact of Fermi 2 releases independently. The data format required by Regulatory Guide 1.21 is used. Appendix A contains the meteorological data tables. Specifically, these are joint frequency tables of wind speed versus wind direction for each atmospheric stability class for the 10 meter monitoring level. These data were used to derive annual average dispersion and deposition factors.

13. CHANGES TO DOSE CALCULATION AND ENVIRONMENTAL MONITORING LOCATIONS

During 1994, due to a request from local residents, one TLD and one air sampler at the same location were moved to a nearby location 0.66 miles west of Doty Road in the west sector at 270 degrees. These are control locations. Also, a new milk sampling location was added. It is in the north sector at 6 degrees, and is 4.2 miles from the plant.

14. CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL (ODCM)

In January 1994, sections 0.0, 3.0, and 6.0 of the ODCM were revised to allow discharge of the Condensate Storage Tank to the Circulating Water Decant Line and to institute proper controls on such releases, including use of a Condensate Storage Tank discharge monitor. In April 1994, after Condensate Storage Tank releases were completed, sections 0.0 and 3.0 of the ODCM were revised to delete operability and surveillance requirements for the Condensate Storage Tank discharge monitor. Appendix B contains a copy of the entire ODCM as approved in April 1994 with revision bars showing the April 1994 revisions in sections 0.0 and 3.0, and the January 1994 revisions in section 6.0. Also included in Appendix B are sections 0.0 and 3.0 as approved in January 1994 with revision bars showing the January 1994 changes. Plant documentation supporting these revisions is also included.

15. MAJOR CHANGES TO RADIOACTIVE WASTE SYSTEMS

During 1994, there were no major changes to the liquid, gaseous, or solid radioactive waste treatment systems.

16. LIQUID HOLDUP TANKS EXCEEDING LIMITS

Fermi 2 Technical Specification 3.11.1.4 requires that the quantity of radioactive material contained in any outside temporary tank shall be limited to 10 curies, excluding tritium and dissolved or entrained noble gases. During this reporting period, January through December of 1994, this activity limit for such tanks was not exceeded.

End of Text

Douglas R. Gipson
Senior Vice President
Nuclear Generation

Detroit Edison

Fermi 2
6400 North Dixie Highway
Newport, Michigan 48166
(313) 586-5249

March 31, 1997
NRC-97-0028

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington D. C. 20555

References: 1) Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

2) Appendix A, Facility Operating License No. NPF-43, Technical Specification 6.9.1.8 and 6.14.2

Subject: Annual Radioactive Effluent Release Report

The Annual Radioactive Effluent Release Report for Fermi 2 is attached. This report is being transmitted in accordance with Reference 2 and Regulatory Guide 1.21, Revision 1. The attached report covers the period from January 1 through December 31, 1996.

Please direct any questions or requests for additional information to Ronald Gillmore, Supervisor, Radiological Health, at (313) 586-1388.

Sincerely,

cc: A. B. Beach
G. A. Harris
M. J. Jordan
A. J. Kugler
M. V. Yudasz, Jr.
Region III
Wayne County Emergency Management Division

FERMI 2 NUCLEAR POWER PLANT

DETROIT EDISON COMPANY

OPERATING LICENSE NO. NPF - 43

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

for the period of
January 1, 1996 through December 31, 1996

TABLE OF CONTENTS

SUMMARY

This report summarizes the amount of radioactive material released from the Fermi 2 site during 1996. The Fermi 2 Nuclear Power Plant maintains a comprehensive program of monitoring and controlling the release of radioactive material from the site to ensure that all releases are below federal limits. These releases are in the form of gaseous effluents and radioactive waste shipments. There have been no radioactive liquid releases since April 1994.

The dose consequence due to the radioactivity released in gaseous effluents during 1996 was less than one-tenth of one millirem (mrem) to any individual member of the public. This dose is well below the federal dose limit of 15 millirem per year for these releases and was in the same range as that seen in previous years of power operation.

Fermi 2 complies with the extensive federal regulations which govern radioactive waste shipments. Radioactive waste shipments from the Fermi 2 site consist of waste generated during water treatment, radioactive trash, irradiated components, and waste oil. Shipment destinations are either licensed burial sites or intermediate processing facilities.

During 1996, Fermi 2 transported 63 shipments of radioactive waste for disposal. Of these, 49 were shipped to intermediate processors for volume reduction to minimize burial costs. The remaining shipments were sent directly to the Barnwell, S.C., Disposal Facility.

1. INTRODUCTION

The Detroit Edison Fermi 2 Nuclear Power Plant is designed and operated in a manner which strictly controls and monitors the release of radioactive material to the environment in accordance with Nuclear Regulatory Commission (NRC) and Detroit Edison Company requirements. This Annual Radioactive Effluent Release Report, for the January through December 1996 period, is submitted in accordance with Fermi 2 Technical Specification 6.9.1.8 and NRC Regulatory Guide 1.21. This report provides the following information required by those references:

A. Summation of the quantities of radioactive material in the form of gases and liquids released from the plant (Sections 7 and 8).

B. Summation of quantities of radioactive material contained in solid waste packaged and shipped for off-site disposal (Section 9).

C. Changes to the Offsite Dose Calculation Manual (ODCM) (Section 14).

D. A list and description of any unplanned releases of radioactive materials to unrestricted areas (Section 5).

E. A list of any new locations for dose calculation or environmental monitoring identified by the land use census (Section 13).

F. A list of effluent monitors which were inoperable for a period longer than that specified in ODCM Controls 3.3.7.11 and 3.3.7.12, and an explanation of why the time limit was exceeded (Section 11).

G. A description of events leading up to any liquid holdup tanks exceeding the limit of Technical Specification 3.11.1.4 (Section 16).

H. A description of any major changes to radioactive waste treatment systems (Section 15).

I. An assessment of the radiological impact on the public in terms of dose due to liquid and gaseous effluents, both to the maximally exposed individual and to the population within a 50 mile radius of the plant (Section 10).

J. A summary of 1996 meteorological data (wind speed and wind direction for different stability classes) which was used in calculating gaseous dispersion factors (Section 12).

2. REGULATORY LIMITS

The Nuclear Regulatory Commission limits on liquid and gaseous effluents are incorporated into the Fermi 2 Offsite Dose Calculation Manual. These limits prescribe the maximum doses and dose rates due to radioactive effluents resulting from normal operation of Fermi 2. These limits are described in the following sections.

A. Gaseous Effluents

I. Dose rate due to radioactivity released in gaseous effluents to areas at and beyond the site boundary shall be limited to the following:

a) Noble gases

Less than or equal to 500 mrem/year to the total body
Less than or equal to 3000 mrem/year to the skin

b) Iodine-131, Iodine-133, tritium, and for all radionuclides in particulate form with half lives greater than 8 days

Less than or equal to 1500 mrem/year to any organ.

II. Air dose due to noble gases to areas at and beyond the site boundary shall be limited to the following:

a) Less than or equal to 5 mrad for gamma radiation
Less than or equal to 10 mrad for beta radiation
- During any calendar quarter

b) Less than or equal to 10 mrad for gamma radiation
Less than or equal to 20 mrad for beta radiation
- During any calendar year

III. Dose to a member of the public from Iodine-131, Iodine-133, tritium, and all radionuclides in particulate form with half lives greater than 8 days in gaseous effluents released to areas at and beyond the site boundary shall be limited to the following:

a) Less than or equal to 7.5 mrem to any organ
- During any calendar quarter

b) Less than or equal to 15 mrem to any organ
- During any calendar year

B. Liquid Effluents

I. The concentration of radioactive material released in liquid effluents to unrestricted areas shall be limited to ten times the concentrations specified in Title 10 of the Code of Federal Regulations (10 CFR) Part 20 (Standards for Protection Against Radiation), Appendix B, Table 2, Column 2 for radionuclides other than dissolved or entrained noble gases, as required by the Fermi 2 Offsite Dose Calculation Manual. For dissolved or entrained noble gases, the concentration shall be limited to 2E-4 (.0002) microcuries/ml total activity. This limit is based on the Xe-135 air submersion dose limit converted to an equivalent concentration in water as discussed in the International Commission on Radiological Protection (ICRP) Publication 2.

II. The dose or dose commitment to a member of the public from radioactive materials in liquid effluents released to unrestricted areas shall be limited to the following:

a) Less than or equal to 1.5 mrem to the total body
Less than or equal to 5 mrem to any organ
- During any calendar quarter

b) Less than or equal to 3 mrem to the total body
Less than or equal to 10 mrem to any organ
- During any calendar year

3. AVERAGE ENERGY

The calculated site boundary dose rates for Fermi 2 are based on identification of individual isotopes and on use of dose factors specific to each identified isotope or a highly conservative dose factor. Average energy values are not used in these calculations, and therefore need not be reported.

4. MEASUREMENTS AND APPROXIMATIONS OF TOTAL ACTIVITY

As required by NRC Regulatory Guide 1.21, this section describes the methods used to measure the total radioactivity in effluent releases and to estimate the overall errors associated with these measurements. The effluent monitoring systems are described in Chapter 11.4 of the Fermi 2 Updated Final Safety Analysis Report (UFSAR).

A. Gaseous Effluents

I. Fission and Activation Gases

Samples are obtained from each of the plant radiation monitors which continuously monitor the six ventilation exhaust points. The fission and activation gases are quantified by gamma spectroscopy analysis of periodic samples.

The values reported in Section 8 are the sums of all fission and activation gases quantified at all monitored release points.

II. Radioiodines

Samples are obtained from each of the seven plant radiation monitors which continuously monitor the six ventilation exhaust points. The radioiodines are entrained on charcoal and then quantified by gamma spectroscopy analysis. For each sample the duration of sampling and continuous flow rate through the charcoal are used in determining the concentration of radioiodines. From the flow rate of the ventilation system a rate of release can be determined.

The values reported in Section 8 are the sums of all radioiodines quantified at all continuously monitored release points.

III. Particulates

Samples are obtained from each of the seven plant effluent radiation monitors which continuously monitor the six ventilation exhaust points. The particulates are collected on a filter and then quantified by gamma spectroscopy analysis. For each sample, the duration of sampling and continuous flow rate through the filter are used in determining the concentration of particulates. From the flow rate of the ventilation system a rate of release can be determined.

Quarterly, the filters from each ventilation release point are composited and then radiochemically separated and analyzed for Strontium (Sr)-89/90 using various analytical methods.
The values reported in Section 8 are the sums of all particulates quantified at all monitored release points.

IV. Tritium

Samples are obtained for each of the seven plant effluent radiation monitors which continuously monitor the six ventilation exhaust points. The sample is passed through a bottle containing water and the tritium is "washed" out to the collecting water. Portions of the collecting water are analyzed for tritium using liquid scintillation counting techniques. For each sample, the duration of sample and sample flow rate is used to determine the concentration. From the flow rate of the ventilation system a release rate can be determined.

The values reported in Section 8 are the sums of all tritium quantified at all monitored release points.

V. Gross Alpha

The gaseous particulate filters from the seven plant effluent radiation monitors are stored for one week to allow for decay of naturally occurring alpha emitters. These filters are then analyzed for gross alpha radioactivity by gas proportional counting, and any such radioactivity found is assumed to be plant related. The quantity of alpha emitters released can then be determined from sample flow rate, sample duration, and stack flow rate.

The values reported in Section 8 are the sums of all alpha emitters quantified at all monitored release points.

B. Liquid Effluents

The liquid radwaste processing system and the liquid effluent monitoring system are described in the Fermi 2 UFSAR. Fermi 2 released no radioactive liquid effluents in 1996.

C. Statistical Measurement Uncertainties

The statistical uncertainty of the measurements in this section has been calculated and summarized in the following table:

Measurement Type	Sample Type	One Sigma Uncertainty
Fission and Activation Gases	Gaseous	30%
Radioiodines	Gaseous	17%
Particulates	Gaseous	16%
Tritium	Gaseous	30%
Gross Alpha	Gaseous	16%

5. ABNORMAL RELEASES

For the purpose of this report, an abnormal release is any release of radioactive material not performed in accordance with the Fermi 2 license and implementing procedures. No abnormal releases occurred during 1996.

6. BATCH RELEASES

During 1996, there were no liquid batch releases from Fermi 2.

The only batch gaseous releases from Fermi 2 are the venting or purging of the primary containment (drywell or torus) atmosphere. These venting or purging releases pass through the reactor building ventilation or standby gas treatment system and are monitored by the final effluent monitors for these pathways. Separate data on these venting or purging releases are not reported because the associated data are already included in the gaseous effluent release data (Section 8). The amount of radioactivity released during venting and purging has been a small fraction of the amount released as continuous gaseous effluents.

7. LIQUID EFFLUENT SUMMARY

There were no liquid effluents from Fermi 2 in 1996.

8. GASEOUS EFFLUENT SUMMARY

These are considered mixed mode releases as defined in NRC Regulatory Guide 1.111. Values expressed in the following tables with the symbol "<" represent the Lower Limit of Detection (LLD) in units of microcuries per cubic centimeter (uCi/cc) for individual samples. These LLD values indicate that the isotope in question was not detected during the release period. These LLD values are not included in column totals.

A. Fission and Activation Gases Summary

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Total Release (curies)	3.66E+01	9.06E+00	2.05E+01	0.00E+00
Average Release Rate for Period (μCi/sec)	4.66E+00	1.15E+00	2.61E+00	0.00E+00

B. Radioiodines Summary

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Total I-131 (curies)	1.24E-03	2.29E-03	5.25E-04	6.81E-04
Average Release Rate for Period (μCi/sec)	1.58E-04	2.91E-04	6.68E-05	8.66E-05

C. Particulates Summary

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Particulates with half lives > 8 days (curies)	7.11E-04	6.12E-04	6.79E-5	1.23E-04
Average Release Rate for Period (μCi/sec)	9.04E-05	7.78E-05	8.64E-06	1.56E-05
Gross Alpha Radioactivity (curies)	1.89E-06	1.82E-06	9.31E-07	1.71E-06

D. Tritium Summary

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Total Release	<4.4E-08	<4.4E-08	<4.4E-08	<4.4E-08

E. Particulates Summary: Totals for Each Nuclide Released (curies)

Nuclide	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Cr-51	6.70E-04	5.67E-04	2.00E-05	3.49E-05
Mn-54	2.07E-06	<2.4E-14	5.67E-07	3.30E-05
Co-58	1.19E-06	1.93E-06	<3.4E-14	1.68E-06
Co-60	<4.7E-14	3.44E-06	6.14E-06	3.25E-05
Fe-59	<1.7E-14	<1.7E-14	<1.7E-14	1.28E-05
Zn-65	<6.2E-14	<6.2E-14	<6.2E-14	6.90E-06
Na-24	1.97E-04	1.29E-04	<8.5E-14	<8.5E-14
Tc-99m	3.90E-03	2.24E-03	2.44E-04	<2.5E-13
Ba-139	4.51E-02	5.61E-02	4.43E-02	5.47E-04
La-140	1.42E-05	1.12E-05	3.47E-05	<6.4E-14
Ba-140	1.32E-05	6.20E-06	1.58E-05	<5.8E-14
Y-91m	6.09E-03	7.68E-03	5.57E-03	<1.2E-11
Sr-91	9.02E-05	3.10E-04	2.43E-04	<8.8E-13
Rb-88	7.63E-01	<3.1E-09	<3.1E-09	<3.1E-09
Rb-89	<3.9E-11	5.72E-02	2.45E-02	<3.9E-11
Cs-138	4.09E-02	9.41E-02	6.58E-02	2.38E-03
Br-82	2.11E-05	1.37E-05	4.67E-05	<2.6E-14

Nuclide	Quarter 1	Quarter 2	Quarter 3	Quarter 4
As-76	<2.2E-13	6.15E-05	<2.2E-13	<2.2E-13
Re-188	4.94E-05	<3.5E-13	<3.5E-13	<3.5E-13
Sr-89	2.43E-05	2.59E-05	2.54E-05	1.47E-06
Sr-90	1.40E-07	2.63E-07	<1.0E-16	<1.0E-16
Cs-134	<1.3E-14	2.22E-06	<1.3E-14	<1.3E-14
Cs-137	<3.8E-14	5.24E-06	<3.8E-14	<3.8E-14
Ce-141	<2.4E-14	<2.4E-14	<2.4E-14	<2.4E-14
Ce-143	<1.3E-13	<1.3E-13	<1.3E-13	<1.3E-13
Ce-144	<7.4E-14	<7.4E-14	<7.4E-14	<7.4E-14
Total	**8.60E-01**	**2.18E-01**	**1.41E-01**	**3.05E-03**

F. Fission and Activation Gases Summary: Totals for Each Nuclide Released (curies)

Nuclide	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Kr-85m	3.32E-01	1.09E-01	<1.6E-08	<1.6E-08
Kr-87	<6.8E-08	4.53E-04	<6.8E-08	<6.8E-08
Kr-88	4.54E-01	<6.1E-08	<6.1E-08	<6.1E-08
Xe-129m	<2.6E-07	3.22E-03	<2.6E-07	<2.6E-07
Xe-133	2.55E+01	4.12E-03	<5.9E-08	<5.9E-08
Xe-133m	7.73E-01	<1.4E-07	<1.4E-07	<1.4E-07
Xe-135	3.44E+00	1.12E+00	1.04E+00	<1.6E-08
Xe-135m	1.89E+00	2.93E+00	2.90E+00	<2.8E-07
Xe-137	2.05E+00	<2.4E-07	9.41E+00	<2.4E-07
Xe-138	2.20E+00	4.89E+00	7.14E+00	<5.4E-07
Total	**3.66+01**	**9.06E+00**	**2.05E+01**	**N/A**

G. Iodines Summary: Total for Each Nuclide Released (curies)

Nuclide	Quarter 1	Quarter 2	Quarter 3	Quarter 4
I-131	1.24E-03	2.29E-03	5.25E-04	6.81E-04
I-132	1.77E-03	5.51E-03	2.36E-03	<3.6E-12
I-133	1.84E-03	2.77E-03	2.21E-03	1.02E-04
I-134	7.51E-04	1.31E-02	2.33E-03	<1.6E-11
I-135	2.00E-03	6.31E-03	3.01E-03	1.48E-04
Total	**7.60E-03**	**3.00E-02**	**1.04E-02**	**9.31E-04**

9. SOLID WASTE, IRRADIATED FUEL SHIPMENTS, AND WASTE OIL

Radioactive waste shipments from the Fermi 2 site consist of waste generated during water treatment, radioactive trash, irradiated components, and waste oil. Fermi 2 complies with the extensive federal regulations which govern these shipments. Shipment destinations are either licensed burial sites or intermediate processor facilities. Waste shipped to intermediate processing facilities is shipped directly from these facilities to licensed burial sites after processing.

A. Solid Waste Shipped Offsite for Burial or Disposal (not irradiated fuel):

Note: Sections 1 and 2 show quantities received at the Barnwell, S.C., burial facility in 1996, both directly from Fermi 2 and from intermediate processing facilities. Section 3 shows waste shipments in 1996 from Fermi 2 to Barnwell, S.C., and to intermediate processing facilities.

1. Type of waste	Unit	12 month period	Est. total error, %
a. Spent resins, sludges, etc.	m^3 curies	6.64E+01 2.80E+02	±25
b. Dry compressible waste, contaminated equipment, etc.	m^3 curies	8.46E+01 6.70E+00	±25
c. Irradiated components, control rods, etc.	m^3 curies	3.71E+00 3.49E+04	±25
d. Other		0	

2. Estimate of major nuclide composition (by class of waste)

a. Spent resins, sludges, etc. (Total of Class A and Class B waste: All spent resin waste in this category was shipped in High Integrity Containers. Ash from resin incinerated at an intermediate processing facility and solid residue from waste water processed at an intermediate processing facility is also included in this category. No solidification agent or absorbent was used in processing waste in this category. All quantities were determined by measurement.)

Nuclide	Percent of total activity	Curies
Ag-110m	<0.1	2.29E-03
Ba-133	<0.1	2.45E-02
C-14	1.3	3.60E+00
Ce-144	0.1	2.30E-01
Co-57	<0.1	6.10E-04
Co-58	2.3	6.37E+00

Nuclide	Percent of total activity	Curies
Co-60	28.1	7.88E+01
Cr-51	13.9	3.89E+01
Cs-134	1.2	3.46E+00
Cs-137	2.4	6.85E+00
Fe-55	33.8	9.47E+01
Fe-59	<0.1	7.44E-02
H-3	0.3	7.52E-01
Hf-181	0.1	2.11E-01
I-129	<0.1	3.45E-03
Mn-54	5.8	1.63E+01
Na-22	<0.1	5.03E-03
Nb-95	<0.1	3.32E-02
Ni-59	<0.1	4.63E-02
Ni-63	7.2	2.03E+01
Sb-125	0.1	3.44E-01
Sr-90	<0.1	6.27E-03
Tc-99	<0.1	9.88E-02
Zn-65	3.2	9.06E+00

Note: The following is a breakdown of the above quantities into Class A and Class B waste as required by Fermi 2 Technical Specifications.

Class A quantities: Consists of dewatered resin, ash from resin incineration, solid residue from processing contaminated water, etc. (total volume: 61.6 m^3)

Nuclide	Percent of total activity	Curies
Ag-110m	<0.1	2.29E-03
Ba-133	<0.1	2.45E-02
C-14	0.8	1.72E+00
Ce-144	<0.1	1.79E-01
Co-57	<0.1	6.10E-04
Co-58	2.9	6.37E+00
Co-60	22.8	4.92E+01
Cr-51	18.0	3.89E+01
Cs-134	0.8	1.68E+00
Cs-137	1.5	3.23E+00
Fe-55	34.3	7.43E+01
Fe-59	<0.1	7.44E-02
H-3	0.3	7.12E-01
Hf-181	<0.1	2.11E-01
I-129	<0.1	3.45E-03
Mn-54	6.0	1.30E+01
Na-22	<0.1	5.03E-03
Nb-95	<0.1	3.32E-02

Nuclide	Percent of total activity	Curies
Ni-59	<0.1	4.63E-02
Ni-63	8.8	1.90E+01
Sb-125	0.2	3.44E-01
Sr-90	<0.1	3.20E-03
Tc-99	<0.1	3.38E-02
Zn-65	3.4	7.26E+00

Class B Quantities: Consists of dewatered resin (total volume: 4.8 m^3)

Nuclide	Percent of total activity	Curies
C-14	2.9	1.88E+00
Ce-144	<0.1	5.11E-02
Co-60	46.4	2.96E+01
Cs-134	2.8	1.78E+00
Cs-137	5.7	3.62E+00
Fe-55	32.0	2.04E+01
H-3	<0.1	4.04E-02
Mn-54	5.2	3.30E+00
Ni-63	2.0	1.30E+00
Sr-90	<0.1	3.07E-03
Tc-99	0.1	6.50E-02
Zn-65	2.8	1.80E+00

b. Dry compressible waste, contaminated equipment, etc. (All waste in this category was Class A waste, was shipped in strong tight containers, and was classified as dry active waste (DAW). After incineration by an intermediate processor, some of the residue from this waste is solidified in concrete. All quantities were determined by measurement.)

Nuclide	Percent of total activity	Curies
Ag-110m	<0.1	2.20E-04
C-14	0.3	1.75E-02
Ce-144	<0.1	7.86E-04
Cm-243	<0.1	1.00E-07
Co-58	0.4	2.37E-02
Co-60	9.5	6.37E-01
Cr-51	11.2	7.51E-01
Cs-134	1.8	1.20E-01
Cs-137	1.8	1.18E-01
Fe-55	69.7	4.67E+00
Fe-59	0.1	9.69E-03
H-3	0.2	1.01E-02
I-129	<0.1	3.80E-04
Mn-54	2.6	1.77E-01
Ni-59	<0.1	3.62E-04

Nuclide	Percent of total activity	Curies
Ni-63	0.8	5.59E-02
Pu-241	<0.1	1.70E-06
Sb-124	<0.1	9.82E-04
Sb-125	<0.1	1.76E-04
Sr-89	<0.1	5.10E-06
Sr-90	<0.1	7.00E-07
Tc-99	<0.1	4.71E-04
Zn-65	1.6	1.07E-01

c. **Irradiated components, control rods, etc.:** (All waste in this category was Class C waste, was shipped in Type B casks and consisted of control rod blades, LPRMs, jet pump beams, velocity limiters, etc. All quantities were determined by measurement.)

Nuclide	Percent of total activity	Curies
Am-241	<0.1	6.05E-08
C-14	<0.1	9.99E-01
Cm-242	<0.1	1.38E-06
Cm-243	<0.1	8.22E-11
Co-58	<0.1	2.12E-02
Co-60	65.3	2.28E+04
Cs-134	<0.1	8.64E-01
Cs-137	<0.1	1.28E+00
Fe-55	29.7	1.04E+04
H-3	1.2	4.21E+02
Mn-54	1.1	3.81E+02
Nb-94	<0.1	2.01E-02
Ni-59	<0.1	7.11E+00
Ni-63	2.6	9.23E+02
Pu-238	<0.1	1.29E-06
Pu-239	<0.1	1.84E-06
Pu-240	<0.1	6.02E-07
Pu-241	<0.1	4.82E-05
Sr-90	<0.1	5.80E-05
Tc-99	<0.1	2.30E-03
U-235	<0.1	7.84E-09

3. Solid Waste Disposition: (shipments from Fermi 2 to Barnwell burial site or to intermediate processors)

Type of shipment/ solidification process	Number of shipments	Mode of transportation	Destination
Spent resin, sludges etc.	9	tractor trailer with cask	Barnwell, SC
Dry compressible waste, etc.	49	tractor trailer	SEG, Hake, DSSI, ALARON, and Manufacturing Sciences
Irradiated components, etc.	5	tractor trailer with cask	Barnwell, SC

B. Irradiated Fuel Shipments

There were no shipments of irradiated fuel during 1996.

C. Disposal of Contaminated Oil

Fermi 2 is shipping waste oil containing small concentrations of radioactive material to an intermediate processor, Scientific Ecology Group (SEG). SEG incinerates this oil at its facility, and it includes quantities of radioactive material released during incineration in its effluent reporting. If there is a residue from this incineration which contains radioactivity, it is treated as solid radwaste and is reported in sections 9.A.1 and 9.A.2 of this report. In 1996, no such oil residue was present.

10. RADIOLOGICAL IMPACT ON THE PUBLIC

A. Dose Due to Liquid Effluents

There were no liquid releases to Lake Erie in 1996 and therefore no dose due to liquid effluents.

B. Dose Due to Gaseous Effluents

10CFR50, Appendix I provides limits on dose due to I-131, I-133, H-3, and particulates with half lives greater than 8 days in gaseous effluents to any organ of a member of the public. This is evaluated by calculating the dose to the critical receptor which is defined as the individual who receives the highest single organ dose, due to these isotopes.

During 1996, the critical receptor for Fermi 2 was a child assumed to live at an offsite location which is known to have a garden. This was identified during the Land Use Census, which is a required annual survey of land use and food pathways within a 5 mile radius of the plant. The individual organ and total body doses to this individual are listed below.

Organ	1996 Gaseous Effluent Dose to Receptor with Highest Single Organ Dose
Bone	0.0007 mrem
Liver	0.0003 mrem
Thyroid	0.03 mrem
Kidney	0.0004 mrem
Lung	0.0002 mrem
GI-LLI	0.0003 mrem
Total body	0.0003 mrem

The highest single organ dose to the critical receptor is 0.03 mrem to the thyroid. This is less than 0.2% of the federal limit of 15 mrem specified in 10CFR50, Appendix I.

C. Dose Due to Direct Radiation and Compliance with 40CFR190

Title 40, Part 190 of the Code of Federal Regulations requires that dose to an individual in the unrestricted area from the uranium fuel cycle including direct radiation be limited to 25 mrem/yr to the total body and 75 mrem/yr to the thyroid. During 1996, there was no measurable direct radiation as shown by offsite TLD readings. All offsite TLD locations indicated direct radiation readings which were at or below the TLD readings at the control locations.

D. Population Dose

Dose to the population within a fifty mile radius of Fermi 2 due to 1996 gaseous effluents was calculated. There was no dose due to liquid effluents.

For gaseous effluents, the code MICROAIRDOS was used to estimate the population dose. Inputs to the code were 1996 gaseous release data, wind direction and wind speed frequencies for each stability class, population in each of 10 segments of each of 16 sectors, stack release specifications, etc.

The estimated 1996 collective effective dose due to gaseous effluents to the approximately 6 million people living within 50 miles of Fermi 2 is 0.9 person-rem. This dose is insignificant compared to the estimated annual collective dose to this population of 1.8 million person-rem due to background radiation.

E. Site Boundary Air Dose

Gamma and beta dose to air at the site boundary due to noble gases must be calculated to evaluate compliance with the limits of 10CFR50, Appendix I. In 1996, gamma air dose was 0.008 mrad and beta air dose was 0.01 mrad. These doses represent 0.08% and 0.05% of the 10CFR50 gamma and beta annual air dose limits, respectively. (The gamma dose limit is 10 mrad and the beta dose limit is 20 mrad.)

11. RADIATION INSTRUMENTATION OUT OF SERVICE AND DEVIATIONS FROM RELEASE PROCEDURES

The Fermi 2 Offsite Dose Calculation Manual (ODCM) requires that those monitors which exceed the time specified for out of service status be reported in the next Annual Radioactive Effluent Release Report. In September 1996, it was determined that the circulating water decant line flow rate sensor was not acceptably monitoring the decant line flow rate because the decant line cannot be maintained full of water. Correcting this problem is expected to involve a major modification of the decant line, and planning for this modification is in progress.

In March 1996 a purge of the torus was initiated prior to obtaining a sample as required by the ODCM. No effluent releases were detected during this purge. Corrective actions to ensure that pre-release samples of future purges are initiated included procedure revision and special training.

12. METEOROLOGICAL DATA SUMMARY

The meteorological monitoring system is described in the Fermi 2 UFSAR. In accordance with Regulatory Guide 1.21, data recorded by that system is provided here to permit the NRC to assess the radiological impact of Fermi 2 releases independently. The data format required by Regulatory Guide 1.21 is used. Appendix A contains the meteorological data tables. Specifically, these are joint frequency tables of wind speed versus wind direction for each atmospheric stability class for the 10 meter monitoring level. These data were used to derive annual average dispersion and deposition factors.

13. CHANGES TO DOSE CALCULATION AND ENVIRONMENTAL MONITORING LOCATIONS

During the 1996 Land Use Census, it was determined that there was no longer a viable garden at the location where the critical receptor was previously assumed to reside. From Land Use Census data a new critical receptor location was determined. The new critical receptor is assumed to be a child residing 1.05 miles northwest of the plant who is exposed by the inhalation, vegetation ingestion, and ground plane direct radiation pathways.

Also during 1996, milk location M-9, located 4.2 miles north of the plant, was dropped from the radiological environmental monitoring program due to the fact that this location was an unreliable source of milk samples.

14. CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL (ODCM)

In 1996, the ODCM was not revised.

15. MAJOR CHANGES TO RADIOACTIVE WASTE SYSTEMS

During 1996, there were no major changes to the liquid, gaseous, or solid radioactive waste treatment systems.

16. LIQUID HOLDUP TANKS EXCEEDING LIMITS

Fermi 2 Technical Specification 3.11.1.4 requires that the quantity of radioactive material contained in any outside temporary tank shall be limited to 10 curies, excluding tritium and dissolved or entrained noble gases. During 1996, this activity limit for such tanks was not exceeded.

End of Text

Attachment 12
NRC3-09-0014

Response to RAI letter related to Fermi 3 ER

RAI Question HY4.2.1-7

NRC RAI HY4.2.1-7

Provide the methods to be used to dredge Lake Erie Sediments for the construction of water intake, barge slip, and water discharge structures for Fermi 3.

Provide information on maps to show the extent of dredging for the above proposed structures and for areas outside of the barge slip.

What is the plan of disposing the sediment from dredging in the future at the Fermi site as the existing dredge retention basin reaches its capacity?

Supplemental Information

There is no information in the ER regarding the methods used for dredging and the extent of the dredging. This information is needed for the impact analysis to be presented in the EIS.

The existing retention pond for dredging material disposal is reaching its maximum capacity, according to a study conducted by Detroit Edison. Dredging is anticipated for construction of the Fermi 3 water intake structure, barge slip, and discharge pipe, in addition to the normal operation of Fermi 2. The disposal of dredging material, treatment of the dredge material to accelerate sediment settlement from the water, and the handling of returned water from the dredge retention pond to Lake Erie will be considered in the EIS.

Response

Anticipated Dredging and Disposal Method

The proposed Fermi 3 intake and barge slip construction will benefit from ongoing operation and maintenance dredging activities for Fermi 2. No additional dredging outside the parameters of the following permits will be required for the construction and installation of the Fermi 3 intake and barge slip. Previous Fermi 2 operation and maintenance dredging has been conducted as authorized by:

- U.S. Army Corps of Engineer (USACE) permit number 88-001-040-8 issued for activities governed by Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act; and

- Michigan Department of Environmental Quality (MDEQ) permit number 04-58-0009-P issued for activities governed under the Natural Resources and Protection Act 451, Part 325 Great Lakes Submerged Lands.

It is expected that future permit conditions will be consistent with the conditions for maintenance dredging operations contained in the above permits. Per the USACE and MDEQ permit, Fermi 2 maintenance dredging is conducted via hydraulic dredge with an 8-inch slurry discharge line to the existing onsite dredge material storage basin.

Installation of the Fermi 3 discharge pipeline will require dredging beyond that which is currently permitted for Fermi 2 maintenance dredging.

The Fermi 3 discharge pipeline will be routed in the existing location of the Fermi 1 intake pipeline. This will require the removal of the Fermi 1 intake pipeline. The removal of the existing Fermi 1 intake pipeline and installation of the Fermi 3 discharge pipeline is anticipated to require the use of a mechanical dredge to remove 2000 to 2500 yd^3 of overburden to create a trench approximately 1300 ft. long, 10 ft. wide, and 5 ft. deep. It is expected that material removed through mechanical dredging will be utilized onsite as fill.

During hydraulic dredging, the dredge slurry is pumped into the basin. The basin allows for spoils to settle. Chemical additives (Polyfloc AP1120 and Klaraid PC2700) may be utilized to assist in the settling of suspended solids from the water column. The clarified water then returns to Lake Erie via a weir and valve system at the south end of the basin. Per the existing National Pollution Discharge Elimination System (NPDES) permit requirements, prior to returning the clarified water to Lake Erie, the water is tested and must meet permit limits for total suspended solids and pH. In addition, while discharging to Lake Erie, a daily visual observation is performed to insure the discharge does not contain unnatural turbidity, color, oil films, floating solids, foams, settleable solids, or deposits that are or may become injurious to any designated use. Future treatment of dredge slurry entering the basin is expected to be consistent with the permit conditions, and water effluents from the basin will meet or exceed permit conditions.

The exact method and means of dredging and physical removal of the Fermi 1 intake pipeline and installation of the new Fermi 3 discharge pipeline will be determined at the time a construction contractor is retained. The construction of the Fermi 3 discharge pipeline will require permits from the USACE and MDEQ authorizing dredging and dredged material disposal. The methods and means for construction of the Fermi 3 discharge pipeline will conform with permit conditions.

Map

The removal of the Fermi 1 intake pipeline and installation of the Fermi 3 discharge pipeline are the only anticipated construction activities extending beyond the groins. Refer to Environmental Report (ER) Figure 2.1-4 for the location of the Fermi 3 discharge pipeline.

Future Disposal of Dredged Material

It is expected that material removed through mechanical dredging will be dewatered in the basin and would ultimately be utilized onsite as fill when the basin is periodically cleared out to maintain its capacity. This is consistent with historical Fermi 2 basin management practices.

Proposed COLA Revision

None

Attachment 13
NRC3-09-0014

Response to RAI letter related to Fermi 3 ER

RAI Question HY4.2.1-8

NRC RAI HY4.2.1-8

Provide information regarding sediment plumes that would result from proposed dredging operations. Information should include:

- *Sampling associated with the Fermi dredging permit*
- *Sediment particle size of the dredged material*
- *Plan for any turbidity monitoring before, during, and after dredging*
- *Dredge basin history summary report, dated 7/9/2004*
- *If available, input and output files (in electronic form), calibration, and sensitivity analyses*

Supporting Information

Information on sediment plumes caused by proposed dredging operations was not presented in the ER. The information will be used to evaluate the impacts of dredging on the Western Basin of Lake Erie.

Response

Analytical and Geotechnical Data

Available analytical and geotechnical sample data associated with Fermi 2 dredge permitting is attached in Enclosures 1 through 7. The data found in Enclosures 2 and 3 were collected to obtain dredge permits. The data contained in Enclosures 4 and 5 were used to qualify the sediments to be used as clean fill on the Fermi site.

Turbidity Monitoring

Turbidity monitoring will be conducted if required by the U.S. Army Corps of Engineers (USACE) and Michigan Department of Environmental Quality (MDEQ) National Pollutant Discharge Elimination System (NPDES) permits. The current Fermi 2 dredge permits do not require turbidity monitoring.

Dredge Basin History Summary Report

The RAI requests a dredge basin history summary report dated 7/9/2004. This one page summary is included in this response as Enclosure 8. Attached sample results referenced in this summary report can be found in Enclosures 2 through 5. Any other pointers, to either a letter, permit, or drawing, are not included in this response.

Calibration and Sensitivity Analysis

No modeling of the potential sediment plumes has been conducted or is planned. The level of re-suspended sediments from dredging activities is dependent upon the physical and chemical characteristics of the sediment as well as the site conditions, type of equipment, and manner of dredging utilized. Regardless, during almost all dredging activities, the majority of re-suspended sediments re-settle within one hour of re-suspension and only a small fraction of the re-suspended sediments take longer than 1 hour to re-settle. (See the bottom of Page 8 of "Literature Review of Effects of Resuspended Sediments Due to Dredging Operations", prepared by Anchor Environmental CA, L.P. June 2003. A link to the document is provided as follows: www.coastal.ca.gov/sediment/Lit-ResuspendedSediments.pdf). Dredging associated with the proposed construction of Fermi 3 will require limited amounts of dredging for the excavation of the Fermi 1 pipeline and installation of the Fermi 3 discharge pipeline. As indicated within the Environmental Report (ER) Section 4.2.1, Detroit Edison will comply with hydrological mitigation standards, regulations, and industry practices during construction of Fermi 3. The USACE, MDEQ, and other appropriate agencies will be consulted, and permits and approvals will be obtained, as necessary.

Proposed COLA Revision

Proposed markup to Section 4.3.2.2 is included.

Markup of Detroit Edison COLA
(following 4 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in the next appropriate update of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAI's, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be different than presented here.

these effects quickly without significant decreases in overall health and sustainability. Wetlands are further discussed in Subsection 4.3.1.2.2.

Historically, onsite aquatic resources have been subjected to heavy sediment deposition associated with clearing of adjacent lands for agricultural purposes as well as with the construction of Fermi 2. Increased erosion and turbidity in and around the identified water bodies likely occurred as a result of these activities. The presence of established aquatic communities in these water bodies (described in Subsection 2.4.2) demonstrates the ability of these resources to recover from such perturbation. Because of the highly adaptive nature of the onsite aquatic system, impacts to aquatic resources at the Fermi site due to construction activities are expected to be SMALL.

Construction activities associated with building the NDCT and associated components as well as transferal of Fermi 2 structures will impact approximately 169 acres of wetland and open water habitats (see Figure 4.3-5). This acreage includes 49.49 acres of emergent marsh (PEM), 93.83 acres of forested wetland (PFO), 7.04 acres of scrub-scrub wetland (PSS), and 15.41 acres of open water. In addition, construction may lead to soil erosion and sedimentation into onsite drainage systems, canals, Swan Creek, and other waters within the DRIWR. Erosion and sedimentation may cause some temporary disruption and modification of the onsite drainage systems and may provide a surface conveyance of silt and sediment to aquatic habitats. This input of materials will be minimized and controlled through the use of BMPs established in the SESC Plan. BMPs include the utilization of silt fencing, hay bales, turbidity curtains, and sediment traps. BMPs are discussed in more detail in Section 4.3. These measures will be installed prior to the start of construction activities and will be maintained on a routine basis. Accordingly, impacts to these habitats will be SMALL,

Excess material excavated during construction will be placed in a designated spoils area. Stormwater runoff from the spoils area and other areas of disturbed soil will be controlled by BMPs established in the SESC Plan. These practices may include use of silt fences and hay bales to prevent silted runoff from indirectly impacting the onsite drainage systems and canals. Areas subjected to sediment deposition during local precipitation periods will likely return to pre-construction conditions upon completion of construction.

Permanent construction–related losses to aquatic biota are expected to be limited to portions of the DRIWR associated with construction of the NDCT and filling in of certain onsite water bodies. Construction impacts on the DRIWR are discussed in Subsection 4.3.1.2.2.

4.3.2.2 **Impacts to Lake Erie**

The western basin of Lake Erie is characterized by shallow water, wind driven seiche currents, and varied substrates. Relatively warm water temperatures and shallow depths make it a highly productive biological system.

These same characteristics also make the western Lake Erie system particularly susceptible to variations associated with wind and current patterns that change habitats, as well as dynamic conditions resulting from nutrient runoff and accelerated eutrophication. Such conditions require a diverse and resilient assemblage of aquatic organisms with the ability to adapt and survive such perturbations. Since the 1950s, Lake Erie has experienced numerous environmental events that have been detrimental to the overall health and stability of aquatic populations. The most infamous of these events was the increased eutrophication and anoxia prevalent in the lake from the 1950s through the 1970s. This period was characterized by fish kills, significant losses in mayfly populations, and increased algal blooms, particularly cladophora. In the 1980s and 1990s, the zebra and quagga mussels, as well as round and tubenose gobies, were introduced into the lake system via ship ballast water, causing significant habitat changes, alteration of the natural food chain, and competition with many native species. In the mid 1990s, increased levels of cyanobacteria were documented, and carbon and nitrogen were identified as limiting factors in ecosystem health in Lake Erie. Recently, there has been a transition toward improvement in the Lake Erie system. Important indicator species, such as the mayfly and walleye, have been recovering, and are currently documented to have fair to good status. Current environmental regulations that limit nutrient runoff into Lake Erie are believed to have been responsible for the system's recovery and will be a significant contributor to the increased health and future stability of Lake Erie. Insert 1

Construction activities associated with Fermi 3 will be restricted almost entirely to the existing plant property. However, the construction of the intake structure for Fermi 3 and discharge line to Lake Erie will require temporary dredging and maintenance dredging of the existing water intake bay and construction of the intake structure and associated components. Additional dredging will also be required at the existing barge terminal to allow access for equipment and materials that will be barged to the site. Construction of the intake structure and discharge line will result in a minimal permanent loss of benthic habitat associated with the intake structure. Impacts to other aquatic ~~species associated with the station water intake structure are considered to be SMALL.~~

Dredging activities for ~~impacts of~~ the ~~existing~~ barge slip and the intake embayment are expected to be performed as part of ~~similar to~~ ongoing operations and maintenance (O&M)[1] dredging activities utilized to maintain the existing intake embayment under an existing USACE permit and include increased turbidity, siltation, and temporary loss of benthic habitat and associated biota (see Subsection 2.4.2 for benthic biota speciation). ~~These dredging activities are expected to be similar to those utilized to maintain these areas.~~ Therefore, impacts to the biota are expected to be temporary, consistent with activities to which local populations of organisms have adapted.

Dewatering associated with the construction of Fermi 3 includes dewatering the excavation site for the reactor unit including portions of the onsite canals. The Groundwater Modeling System software (Reference 4.2-5) was used to simulate groundwater flow with two barrier alternatives. Option 1 is a reinforced diaphragm concrete wall, and Option 2 represents a grout curtain or freeze wall. Under the Option 1 simulation, the aquifer water levels beneath the Quarry Lakes will be lowered less than 1 ft. Under the Option 2 simulation, the water levels beneath the Quarry Lakes will be lowered approximately 2 ft (Subsection 4.2.1.5).

1. Maintenance dredging for the Fermi 2 intake embayment has been performed every 4 years. Approximately 22,000 yd^3 of material is removed from the intake embayment during these activities (permit allows for removal of up to 25,000 yd^3 of material each year for five years).

Construction activities conducted on Lake Erie are not expected to significantly impact surface water biota (see Subsection 4.3.2.4.2).

4.3.2.3 Impact to the Transmission Corridors and Offsite Areas

Transmission corridor construction activities are expected to include the installation of three transmission lines in an assumed 300-foot wide corridor, 29.4 miles long between the Fermi site and the Milan Substation, located near Milan, MI. The route is illustrated and described in Subsection 2.4.1.9. Vegetative communities and land use along the corridor are illustrated in Figure 2.2-3. ITC*Transmission*, which owns and operates the transmission system in southeastern Michigan, will be responsible for the construction and maintenance of the new transmission infrastructure. The three 345 kV lines for Fermi 3 will run in a common corridor, with transmission lines for Fermi 2, to a point just east of I-75. From the intersection of this Fermi site corridor and I-75, the three Fermi-Milan lines will run west and north for approximately 12 miles in the corridor shared with other non-Fermi lines within an assumed 300-foot wide right-of way (ROW). The western 10.8 miles of the ROW is undeveloped, with no lines or towers erected. Where vegetation is present, the maintenance has been minimal, except to keep tall woody vegetation removed. It is assumed that the Milan Substation may require an expansion from its current size of 350 by 500 feet to an area approximately 1,000 by 1,000 feet to accommodate the three new transmission lines from Fermi 3. There are no aquatic resources in this assumed expansion area.

Construction impacts to aquatic resources along the eastern 18.6 miles of the transmission corridor are expected to be SMALL, since the reconfiguration of existing conductors would largely allow for the use of existing infrastructure to create the new lines, and access for installing additional lines is good (as the plant life has been managed to exclude tall woody vegetation). Existing aquatic habitats in this portion of the corridor will be spanned and best management practices will be used to protect aquatic habitats crossed by the new lines. This includes, but is not limited to, the use of silt fencing, hay bails and similar practices to ensure the protection of aquatic habitats in close proximity to construction activity.

The western 10.8 miles of the transmission corridor is undeveloped. Potential impacts to aquatic resources in this portion of the corridor are discussed in the subsections that follow.

4.3.2.3.1 Aquatic Communities and Principal Aquatic Species

Aquatic communities and principal aquatic species are described in Subsection 2.4.2.9. Construction impacts to aquatic communities and principal aquatic species described in Subsection 2.4.2.9 are expected to be SMALL. The creeks and ditches occurring in the western corridor are mostly narrow and could be avoided by using tower spans of 700-900 feet. Numerous roads in the vicinity are expected to provide sufficient access to this region of the corridor without the need for construction of new access roads.

4.3.2.3.2 Important Aquatic Species

Important aquatic species potentially occurring in or along the transmission corridor are considered in Subsection 2.4.2.9.2. No Federal or State protected species or designated critical habitat listed

Insert 1

Construction activities associated with Fermi 3 will be restricted almost entirely to the existing plant property. However, the construction of the Fermi 3 intake structure, the barge slip, and discharge line to Lake Erie will require (1) temporary construction dredging and operational maintenance dredging of the existing water intake bay and (2) construction of the intake structure and associated components. Construction of the intake structure and barge facility will benefit from ongoing maintenance dredging of the area between the groins. No dredging in addition to that which is routinely completed is anticipated for installation of those structures. Construction of the discharge pipeline will extend approximately 200 feet beyond the area routinely dredged for Fermi 2 maintenance. Therefore, construction of the above structures will result in a minimal permanent loss of benthic habitat associated with the intake structure. Impacts to other aquatic species associated with the station water intake structure are considered to be SMALL.

NRC3-09-0014
RAI Question HY4.2.1-8

Enclosure 1

1994 Soil Sampling and Analysis of Dredge Spoils at Fermi 2
(following 42 pages)

Detroit
Edison

Date: December 15, 1994

To: Walter Meiers
Technical & Engineering Services
H-127 Warren Service Center

From: Julius Lawrence J.A.L
SPE-Inspection Services
B-243 Warren Service Center

Subject: **Soil Sampling and Analysis of Dredge Spoils at Fermi 2**

Project

As requested, I sampled the existing dredge spoils from the dredge basin at Fermi 2.

Sampling Location and Method

A total of four representative samples were obtained from the solids end of the basin. The area was divided into four sections. The sample locations and correlating test data are labeled; A, B1 & B2, C and D. Please see attached sketch and drawing.

A three inch diameter soil sampling tool was used to obtain a cross sectional sample, from the surface elevation down to the clay liner, (approximately 5 ft.). Each sample weighed approximately 25 to 40 lbs.

Testing

As agreed upon, the following test were performed, in accordance to American Society for Testing and Materials.

- Percent Dry Solids
- Specific Gravity and Absorption of fine Aggregate - A.S.T.M. C-128
- Sieve or Screen Analysis of Fine and Coarse Aggregate - A.S.T.M. C-136
- Classification of Soils for Engineering Purposes - A.S.T.M. D-2487
  (Unified Soil Classification System)

- Laboratory Determination of Moisture Content of Soil - A.S.T.M. D-2216
- Unit Weight of Aggregate - A.S.T.M. C-29

Related Test Procedures

- Reducing Field Samples of Aggregate To Testing Size - A.S.T.M. C-702
- Standard Practice for Sampling Aggregates - A.S.T.M. D-75

TEST RESULTS

	% Dry Solids	Specific Gravity	Soil Type	Moisture Content As Rec'd	Unit Weight lbs./ft.3
A	60.6	2.58	Clayey silty fine sand	39.4	78.3
B1	55.8	2.53	Clayey silty fine to med. sand	44.2	79.6
B2	54.6	2.61	Clayey silty fine sand	45.4	82.8
C	60.7	2.41	Silty clay with sand	39.3	70.53
D	59.2	2.54	Clayey silty fine sand	40.8	80.9

Please refer to attached lab reports for complete test data. For a point of reference, I included the Michigan Department of Transportation Specification Requirements for Class II sand.

Field Boring Log Information - Visual Observation

Sample A

0 - 10" - Light brown sand

10" - 4'-5" - Fine gray sand

4' -5" - 5' - Gray sand with shells

Ground water was encountered at 4'-10" depth

Sample B1

0 -14" - Variegated clay

14" - 3' - Gray clay

Sample B2

3' -5' - Gray sand

Ground water was encountered at 4'-8" depth

Sample C

0 -3' - Organics with some sand

3' - 4' - Sand with organics

4'- 5' - Variegated clay (may have hit clay liner)

Ground water was encountered at 4'-6" depth

Sample C

0 -12" - Fine light brown sand

12" -5' - Gray sand

Ground water was encountered at 3'-10" depth

The samples are being stored at our laboratory (H-120 Warren Service Center), for your review and/or disposal.

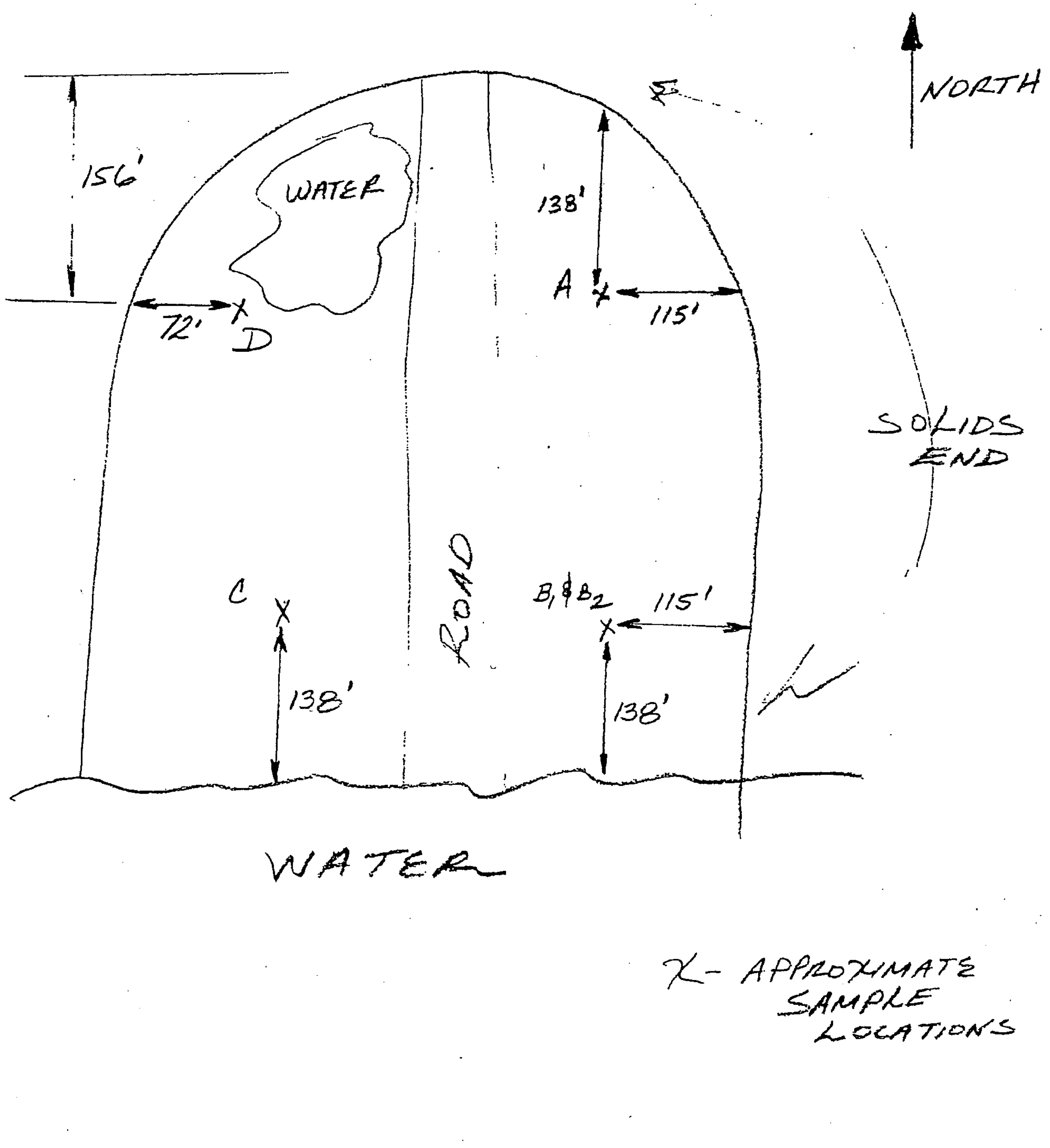
If you have any questions or need additional information, please call me on 897-0661.

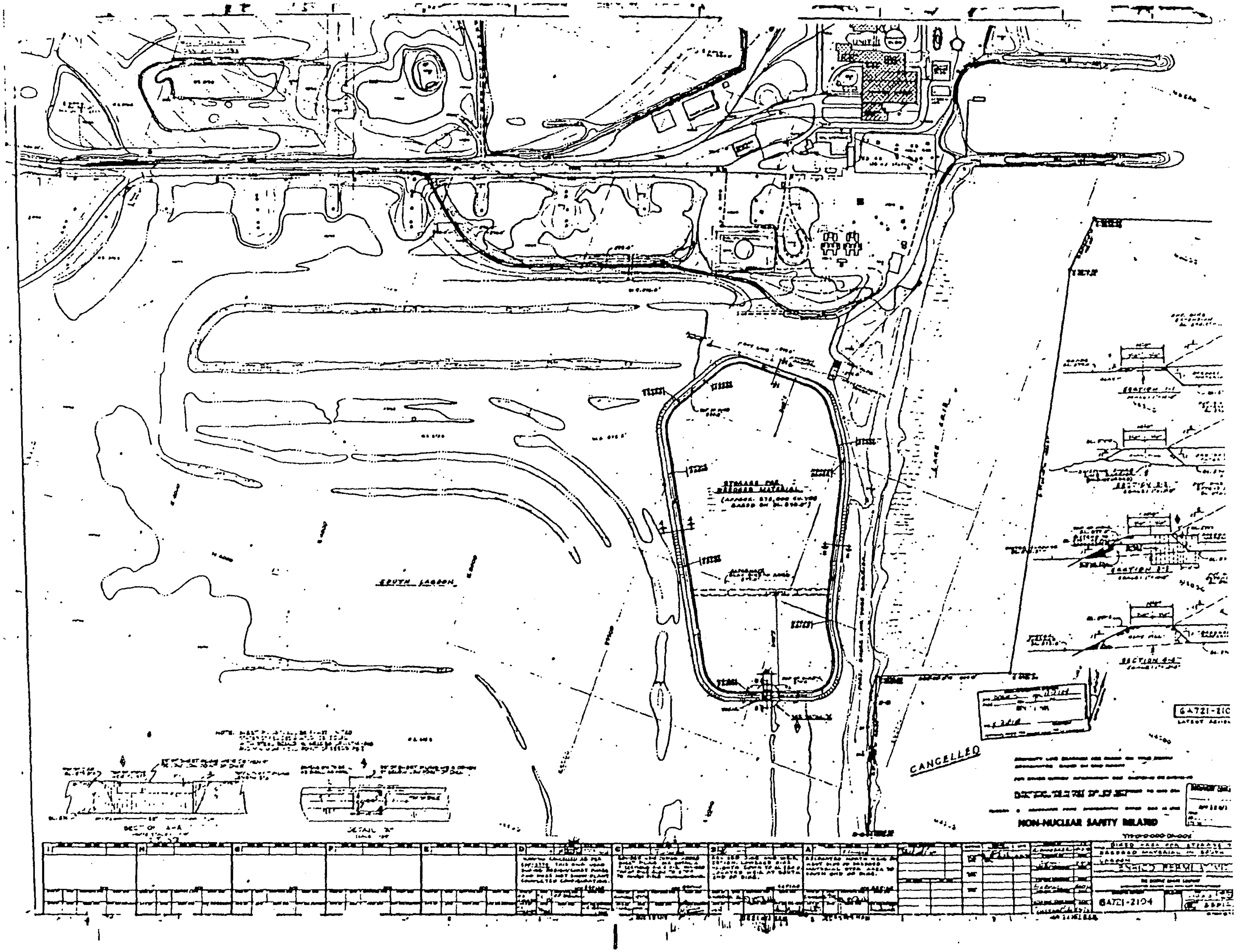
Approved by: Michael Kondogian

Michael Kondogian
Director
Central Contracting

JL/sam

FERMI II - DREDGE BASIN





SOUTH LAGOON
CANCELLED
NON-NUCLEAR SAFETY RELATED
6A721-2104
6A721-210

DETROIT EDISON
SPE - INSPECTION SERVICES
GRADATION REPORT

Location: FERMI 2 Date: 10-25-94

Work Order: 720 ks 297 J120 Lab #: 106.94

Source of Aggregate: DREDGE BASIN Sample "A"

Spec. Requirement: Spec. Requirement:

	Fine Aggregate				Coarse Aggregate			
Sieve	Weight	%Ret.	%Pass	Spec.	Weight	%Ret.	%Pass.	Spec.
3"				100				
1-1/2								
1"				60-100				
3/4"								
1/2"								
3/8"								
* #4	0	0	100					
* #8	0.50	0.2	99.8					
*#16	2.20	0.7	99.3					
*#30	6.10	1.9	98.1					
*#50	13.9	4.3	95.7					
*#100	54.9	17.1	82.9	0-30				
#200	236.3	73.7	26.3					
PAN	263.3	82.1						
WASH	57.3		17.9	0-7				
TOTAL	320.6							
F.M.		S.G. 2.58			F.M.			S.G.
U.W. 78.3		O.I.			U.W.			

Remarks:

Copies: Walt Meiers, H-127, WSC Tested By: R. Zinke

DETROIT EDISON
SPE - INSPECTION SERVICES
GRADATION REPORT

Location: FERMI 2 Date: 10-25-94

Work Order: 720 KS 297 J 120 Project #: Lab #: 107.94

Source of Aggregate: DREDGE BASIN SAMPLE B1

Spec. Requirement: Spec. Requirement:

	Fine Aggregate				Coarse Aggregate			
Sieve	Weight	%Ret.	%Pass	Spec.	Weight	%Ret.	%Pass.	Spec.
3"				100				
1-1/2								
1"				60-100				
3/4"								
1/2"								
3/8"								
* #4	0	0	0					
* #8	17.5	9.3	90.7					
*#16	46.5	24.6	75.4					
*#30	79.2	42.0	58.0					
*#50	111.1	58.9	41.1					
*#100	140.7	74.6	25.4	0-30				
#200	173.4	91.9	8.1					
PAN	179.2							
WASH	9.4		5.0	0-7				
TOTAL	188.6							
F.M.		S.G. 2.53			F.M.			S.G.
U.W. 79.6		O.I.			U.W.			

Remarks:

Copies: W. Meiers, H-127, WSC Tested By: RMT & JAL

Approved By:

DETROIT EDISON
SPE - INSPECTION SERVICES
GRADATION REPORT

Location: FERMI 2 Date: 11-29-94

Work Order: 720 KS 297 J120 Project #: Lab #: 108.94

Source of Aggregate: DREDGE BASIN SAMPLE B2

Spec. Requirement: Spec. Requirement:

	Fine Aggregate				Coarse Aggregate			
Sieve	Weight	%Ret.	%Pass	Spec.	Weight	%Ret.	%Pass.	Spec.
3"				100				
1-1/2								
1"				60-100				
3/4"								
1/2"								
3/8"	0	0	100					
* #4	3.4	1.0	99.0					
* #8	8.6	2.4	97.6					
*#16	14.0	3.9	96.1					
*#30	19.8	5.6	94.4					
*#50	26.2	7.4	92.6					
*#100	39.2	11.0	89.0	0-30				
#200	260.9	73.2	26.8					
PAN	291.4							
WASH	65.0		18.2	0-7				
TOTAL	356.4							

F.M.	S.G. 2.61	F.M.	S.G.
U.W. 82.8	O.I.	U.W.	

Remarks:

Copies: W.Meiers, H127, WSC Tested By: RMT & JAL

DETROIT EDISON
SPE - INSPECTION SERVICES
GRADATION REPORT

Location: FERMI 2 Date: 11-15-94

Work Order: 720 KS 297 J 120 Lab #: 109.94

Source of Aggregate: DREDGE BASIN SAMPLE C

Spec. Requirement: Spec. Requirement:

	Fine Aggregate				Coarse Aggregate			
Sieve	Weight	%Ret.	%Pass	Spec.	Weight	%Ret.	%Pass.	Spec.
3"				100				
1-1/2								
1"				60-100				
3/4"								
1/2"								
3/8"	0	0	100					
* #4	1.1	0.3	99.7					
* #8	3.4	0.9	99.1					
*#16	6.0	1.6	98.4					
*#30	10.4	2.9	97.1					
*#50	20.4	5.7	94.3					
*#100	52.4	14.6	85.4	0-30				
#200	123.1	34.3	65.7					
PAN	135.6							
WASH	223.0		62.2	0-7				
TOTAL	358.6							
F.M.		S.G. 2.41			F.M.			S.G.
U.W. 70.5		O.I.			U.W.			

Remarks:

Copies: W.Meiers, H-127, WSC Tested By: RMT & JAL

DETROIT EDISON
SPE - INSPECTION SERVICES
GRADATION REPORT

Location: FERMI 2 Date: 11-29-94

Work Order: 720 KS 297 J120 Lab #: 110.94

Source of Aggregate: DREDGE BASIN SAMPLE D

Spec. Requirement: Spec. Requirement:

Fine Aggregate					Coarse Aggregate			
Sieve	Weight	%Ret.	%Pass	Spec.	Weight	%Ret.	%Pass.	Spec.
3"				100				
1-1/2								
1"				60-100				
3/4"								
1/2"								
3/8"	0	0	100					
* #4	1.0	.3	99.7					
* #8	1.9	.5	99.5					
*#16	4.0	1.1	98.9					
*#30	8.3	2.3	97.3					
*#50	19.4	5.4	94.6					
*#100	63.1	17.5	82.5	0.30				
#200	275.7	76.5	23.5					
PAN	293.5							
WASH	66.8		18.5	0-7				
TOTAL	260.3							
F.M.		S.G. 2.54			F.M.			S.G.
U.W. 80.9		O.I.			U.W.			

Remarks:Wood on #4 sieve/wood & some stone on #8 sieve

Copies:W. Meiers, H-127,WSC Tested By: RMT & JAL

Detroit Edison

Particle Size Distribution Chart

SAMPLE A

DE 963-6156 9-83CS

Location	Date	Work Order
ENRICO FERMI COMPLEX-DREDGE BASIN	11-30-94	720 KS 297 J 120

Unified Soil Classification

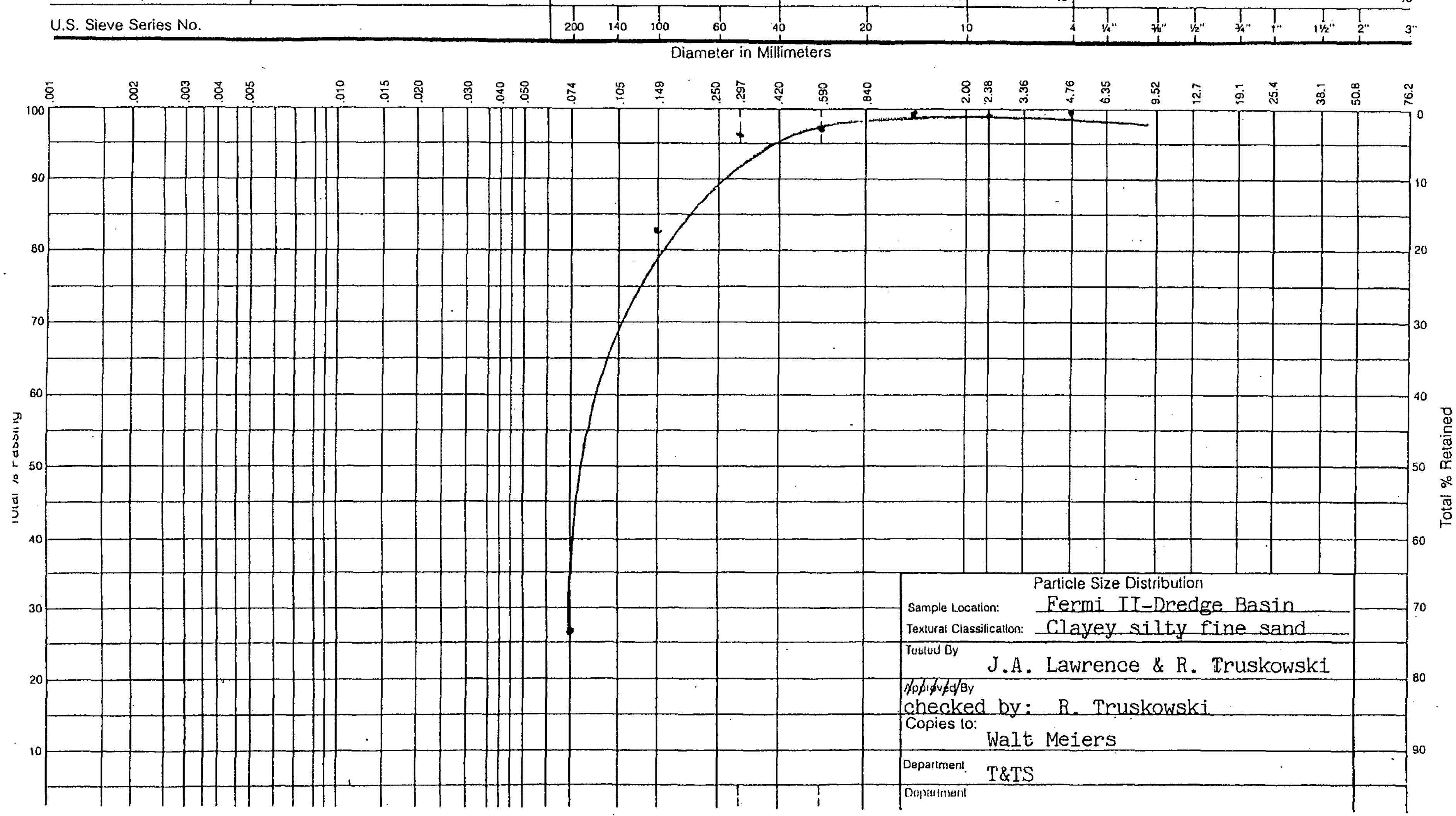
Clay & Silt	Fine Sand	Medium Sand	Coarse Sand	Fine Gravel	Coarse Gravel
26.3 %	70.7 %	2.8 %	0.2 %	0 %	0 %

American Association of State Highway Officials Classification

Clay	Silt	Fine Sand	Coarse Sand	Gravel
%	%	%	%	%

American Society for Testing and Materials Classification

Clay	Silt	Fine Sand	Medium Sand	Coarse Sand	Gravel
%	%	%	%	%	%



Particle Size Distribution

Sample Location: Fermi II-Dredge Basin

Textural Classification: Clayey silty fine sand

Tested By J.A. Lawrence & R. Truskowski

~~Approved~~ By checked by: R. Truskowski

Copies to: Walt Meiers

Department T&TS

Department

Detroit Edison

Particle Size Distribution Chart

SAMPLE B1

DE 963-6156 9-83CS

Location	Date	Work Order
ENRICO FERMI COMPLEX-DREDGE BASIN	11-30-94	720 KS 297 J120

Unified Soil Classification

Clay & Silt	Fine Sand	Medium Sand	Coarse Sand	Fine Gravel	Coarse Gravel
8.0 %	42.0 %	38.0 %	12.0 %	0 %	0 %

American Association of State Highway Officials Classification

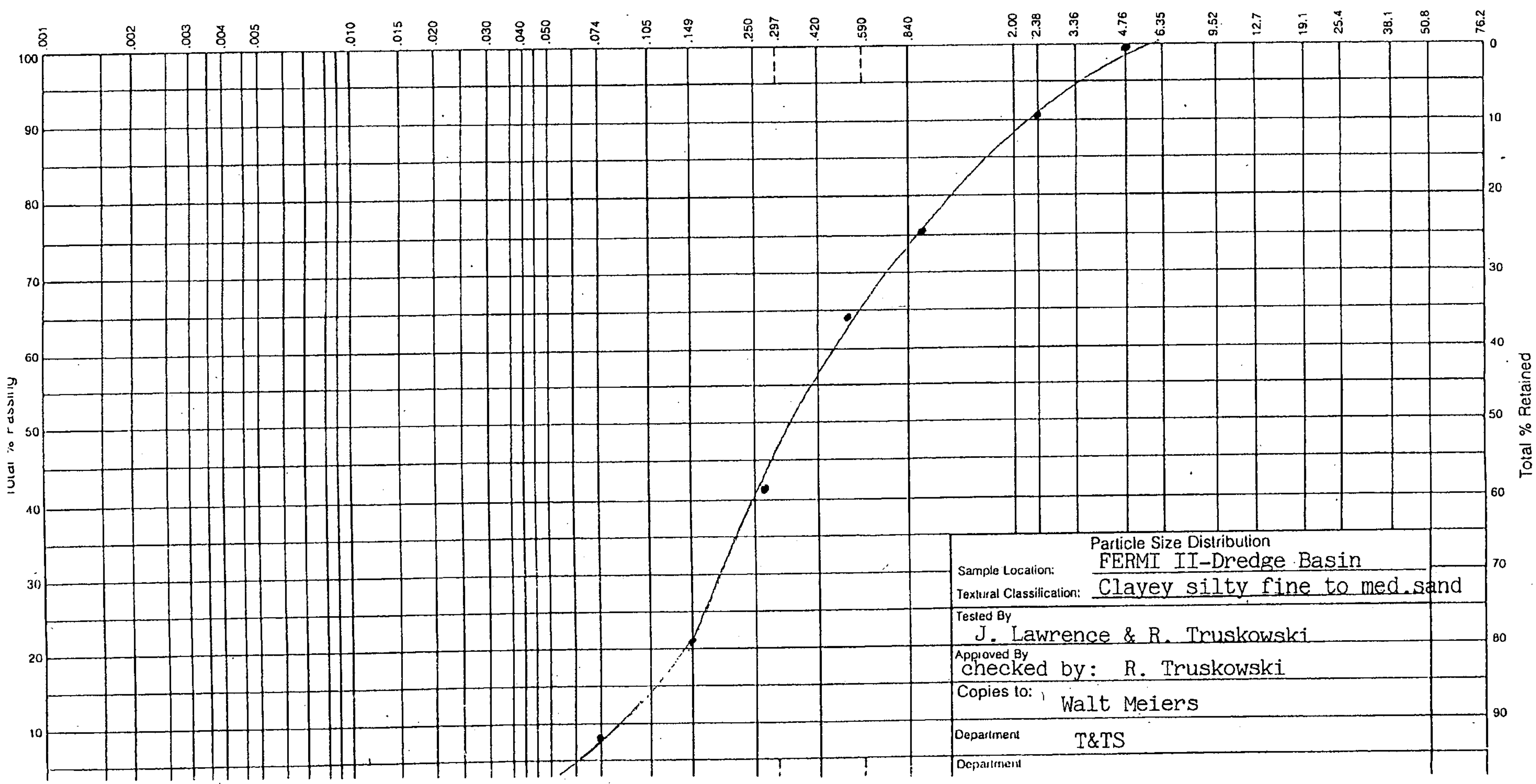
Clay	Silt	Fine Sand	Coarse Sand	Gravel
%	%	%	%	%

American Society for Testing and Materials Classification

Clay	Silt	Fine Sand	Medium Sand	Coarse Sand	Gravel
%	%	%	%	%	%

U.S. Sieve Series No. 200 140 100 60 40 20 10 4 ¼" ⅜" ½" ¾" 1" 1½" 2" 3"

Diameter in Millimeters



Particle Size Distribution

Sample Location: FERMI II-Dredge Basin

Textural Classification: Clayey silty fine to med.sand

Tested By: J. Lawrence & R. Truskowski

Approved By: checked by: R. Truskowski

Copies to: Walt Meiers

Department: T&TS

Department

Detroit Edison

Particle Size Distribution Chart SAMPLE B2

DE 963-6156 9-83CS

Location	Date	Work Order
ENRICO FERMI COMPLEX-DREDGE BASIN	11-30-94	720 KS 297 J120

Unified Soil Classification

Clay & Silt	Fine Sand	Medium Sand	Coarse Sand	Fine Gravel	Coarse Gravel
26.8 %	67.2 %	5.0 %	1.0 %	0 %	0 %

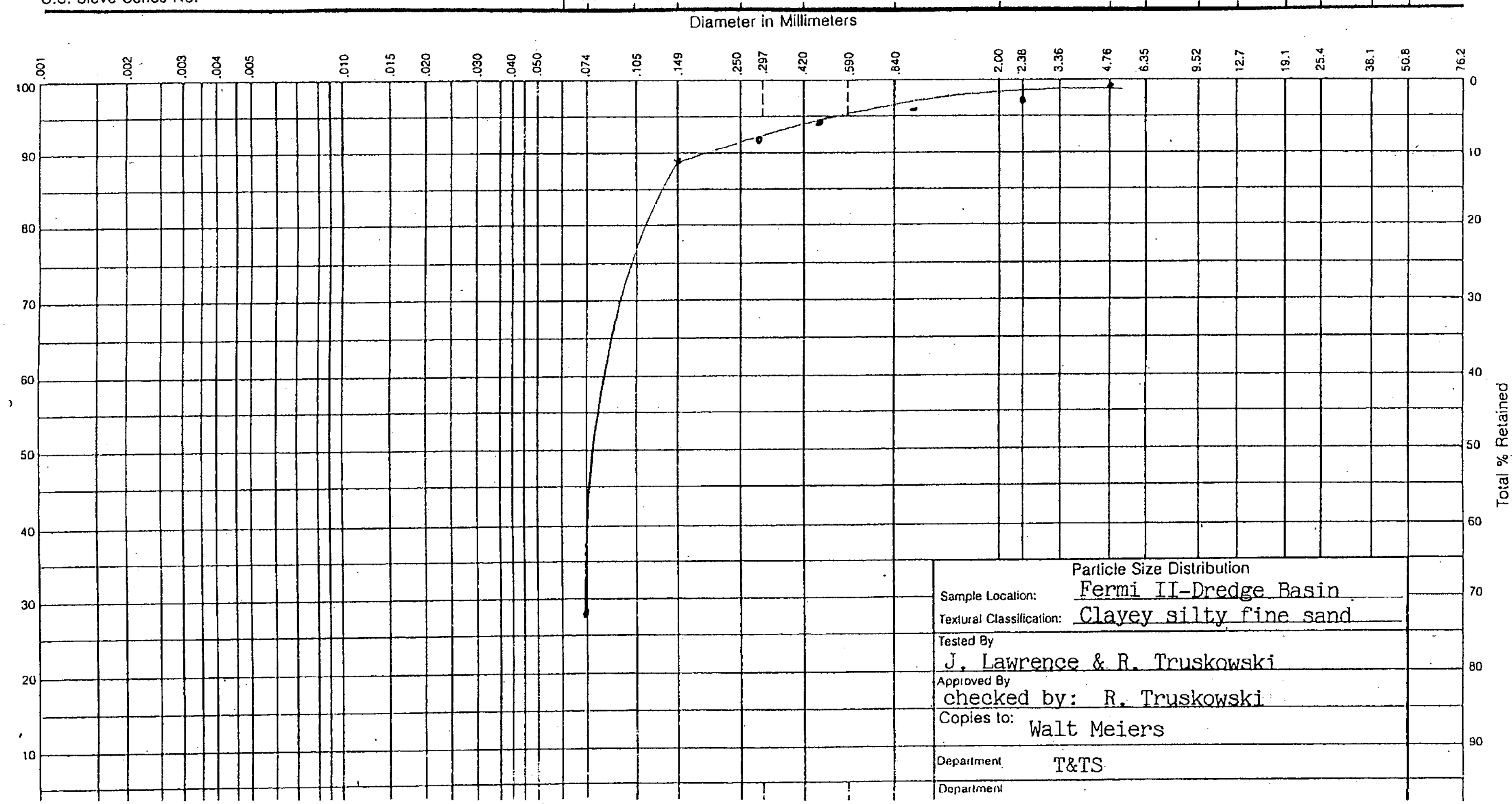
American Association of State Highway Officials Classification

Clay	Silt	Fine Sand	Coarse Sand	Gravel
%	%	%	%	%

American Society for Testing and Materials Classification

Clay	Silt	Fine Sand	Medium Sand	Coarse Sand	Gravel
%	%	%	%	%	%

U.S. Sieve Series No.



Particle Size Distribution

Sample Location: Fermi II-Dredge Basin

Textural Classification: Clayey silty fine sand

Tested By: J. Lawrence & R. Truskowski

Approved By: checked by: R. Truskowski

Copies to: Walt Meiers

Department: T&TS

Department

Detroit Edison

Particle Size Distribution Chart

SAMPLE C

DE 963-6156 9-83CS

Location	Date	Work Order
ENRICO FERMI II-DREDGE BASIN	11-30-94	720 KS 297 J 120

Unified Soil Classification

Clay & Silt	Fine Sand	Medium Sand	Coarse Sand	Fine Gravel	Coarse Gravel
60 %	35 %	4.7 %	0.3 %	0 %	0 %

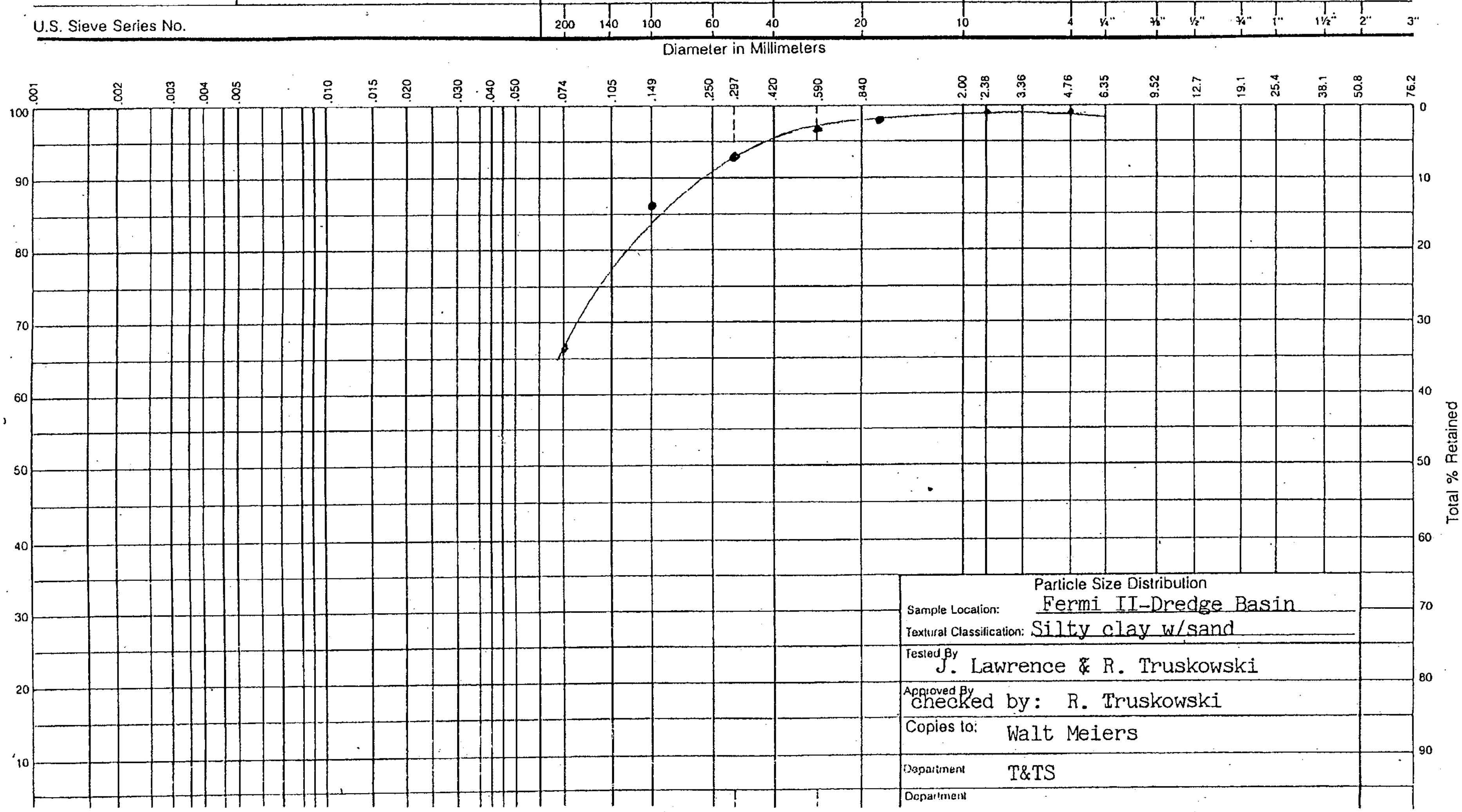
American Association of State Highway Officials Classification

Clay	Silt	Fine Sand	Coarse Sand	Gravel
%	%	%	%	%

American Society for Testing and Materials Classification

Clay	Silt	Fine Sand	Medium Sand	Coarse Sand	Gravel
%	%	%	%	%	%

U.S. Sieve Series No.



Particle Size Distribution

Sample Location: Fermi II-Dredge Basin

Textural Classification: Silty clay w/sand

Tested By: J. Lawrence & R. Truskowski

Approved By: checked by: R. Truskowski

Copies to: Walt Meiers

Department: T&TS

Department

Detroit Edison

Particle Size Distribution Chart

SAMPLE D

DE 963-6156 9-83CS

Location	Date	Work Order
ENRICO FERMI II - DREDGE BASIN	11-30-94	720 KS 297 J120

Unified Soil Classification

Clay & Silt	Fine Sand	Medium Sand	Coarse Sand	Fine Gravel	Coarse Gravel
18.5 %	76.5 %	4.5 %	0.5 %	0 %	0 %

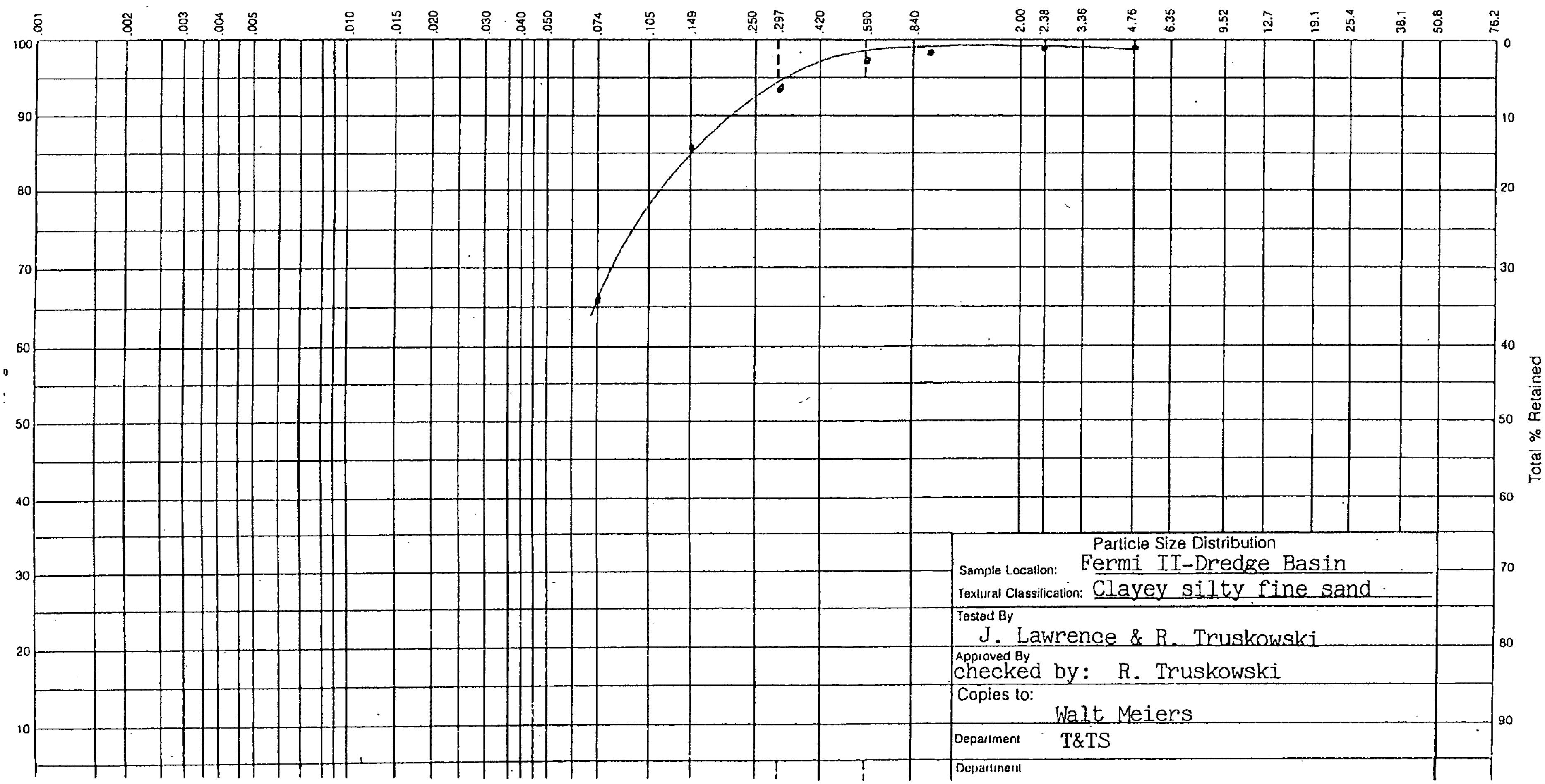
American Association of State Highway Officials Classification

Clay	Silt	Fine Sand	Coarse Sand	Gravel
%	%	%	%	%

American Society for Testing and Materials Classification

Clay	Silt	Fine Sand	Medium Sand	Coarse Sand	Gravel
%	%	%	%	%	%

U.S. Sieve Series No.



Particle Size Distribution

Sample Location: Fermi II-Dredge Basin

Textural Classification: Clayey silty fine sand

Tested By
J. Lawrence & R. Truskowski

Approved By
checked by: R. Truskowski

Copies to:
Walt Meiers

Department T&TS

Department

TRAVERSE
ANALYTICAL

2141 Logan Valley Road
Traverse City, Michigan 49686
(616) 947-2389
FAX: (616) 947-3629

Wet Chem
Soil Analysis Results

Client/Site:	Detroit Edison
Project Number:	8047
COC Number:	2948
Collection Date:	11/94
Collected By:	GT
Submittal Date:	3/8/95
Analysis Date(s):	3/11/95 & *3/15/95 & *3/17/95 *3/20/95 & *3/21/95 & *3/23/95
Analyzed By:	SH & *RM & *KW
Report Date:	3/27/95

Remarks: Results in mg/kg. ND = Nondetect.
Work Order #720RA297J235 *EB Results

Sample ID: TA17628
Sample Name: Sample A 95E00227

Compound	Result	MDL
*Total Kjeldahl Nitrogen	7.31	0.02
*Total Ammonia as Nitrogen	2.11	0.10
*Nitrate/Nitrite	18.9	0.05
*Total Phosphorus	166	0.020
*COD	4190	1
*BOD	87	1.0
pH	8.1	Units
*Lime Index	7.4	0.1 (S.U.)
*Cation Exchange Capacity	15.9	1.0 (me/100 gm)

Ken Fitzek for
Jim Tomalia
Laboratory Manager

TRAVERSE
ANALYTICAL

3141 Logan Valley Road
Traverse City, Michigan 49686
(616) 947-2389
FAX: (616) 947-3629

Pesticides
Soil Analysis Results
EPA Solid Waste Method 1311/8270

Client/Site:	Detroit Edison
Project Number:	8047
COC Number:	2948
Collection Date:	11/01/94
Collected By:	JL
Submittal Date:	3/09/95
Analysis Date:	3/27/95
Analyzed By:	KF
Report Date:	3/28/95

Remarks: Results and limits in mg/l. Level of detection 0.005 mg/l. ND = Nondetect.

Sample ID: TA17628
Sample Name: Sample A 95E00227 Fermi 2 Dredge

Compound	Result
Aldrin	ND
a-BHC	ND
b-BHC	ND
d-BHC	ND
y-BHC (Lindane)	ND
Chlordane (technical)	ND
4,4'-DDD	ND
4,4'-DDE	ND
4,4'-DDT	ND
Dieldrin	ND
Endosulfan I	ND
Endosulfan II	ND
Endosulfan sulfate	ND
Endrin	ND
Endrin Aldehyde	ND
Heptachlor	ND
Heptachlor epoxide	ND
Methoxyclor	ND
Toxaphene	ND

Jim Tomalia
Laboratory Manager

TRAVERSE ANALYTICAL
3141 Logan Valley Road
Traverse City, Michigan 49686
(616) 947-2389
FAX: (616) 947-3629

Semivolatile Organic Compounds
Soil Analysis Results
EPA Solid Waste Method 8270A::3050

Client/Site: Detroit Edison
Project Number: 8047
COC Number: 2948
Collection Date: 11/01/94
Collected By: JL
Submittal Date: 3/09/95
Analysis Date: 3/22/95
Analyzed By: JT
Report Date: 3/27/95

Remarks: Results in ug/kg and based on dry weight.
ND = Nondetect.

Sample ID: TA17628
Sample Name: Sample A 95E00227 Fermi 2 Dredge

Compound	Result	MDL
Acenaphthene	ND	330
Acenaphthylene	ND	330
Aniline	ND	330
Anthracene	ND	330
Benzoic Acid	ND	330
Benzo(a)anthracene	ND	330
Benzo(b)fluoranthene	ND	330
Benzo(k)fluoranthene	ND	330
Benzo(g,h,i)perylene	ND	330
Benzo(a)pyrene	ND	330
Benzyl Alcohol	ND	330
Bis(2-chloroethoxy)methane	ND	330
Bis(2-chloroethyl)ether	ND	330
Bis(2-chloroisopropyl)ether	ND	330
Bis(2-ethylhexy)phthalate	ND	330
4-Bromophenyl phyenyl ether	ND	330
Butyl benzyl phthalate	ND	330
4-Chloroaniline	ND	1300
4-Chloro-3-methylphenol	ND	1300
2-Chloronaphthalene	ND	330
2-Chlorophenol	ND	330
4-Chlorophenyl phenyl ether	ND	330

Ken Lilyk for
Jim Tomalia
Laboratory Manager

Complete Environmental Analysis
Soil, Water, Air, Mobile Lab

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3141 Logan Valley Road
Traverse City, Michigan 49686
(616) 947-2389
FAX: (616) 947-3629

Semivolatile Organic Compounds
Soil Analysis Results
EPA Solid Waste Method 8270A::3050

Client/Site: Detroit Edison
Project Number: 8047
COC-Number: 2948
Collection Date: 11/01/94
Collected By: JL
Submittal Date: 3/09/95
Analysis Date: 3/22/95
Analyzed By: JT
Report Date: 3/27/95

Remarks: Results in ug/kg and based on dry weight.
ND = Nondetect.

Sample ID: TA17628
Sample Name: Sample A 95E00227 Fermi 2 Dredge

Compound	Result	MDL
Chrysene	ND	330
Dibenzo(a,h)anthracene	ND	330
Dibenzofuran	ND	330
Di-n-butyl phthalate	ND	330
1,2-Dichlorobenzene	ND	330
1,3-Dichlorobenzene	ND	330
1,4-Dichlorobenzene	ND	330
3,3-Dichlorobenzidine	ND	2000
2,4-Dichlorophenol	ND	330
Diethyl phthalate	ND	330
2,4-Dimethylphenol	ND	330
Dimethyl phthalate	ND	330
4,6-Dinitro-2-methylphenol	ND	330
2,4-Dinitrophenol	ND	1700
2,4-Dinitrotoluene	ND	330
2,6-Dinitrotoluene	ND	330
Di-n-octyl phthalate	ND	330
Fluoranthene	ND	330
Fluorene	ND	330
Hexachlorobenzene	ND	330
Hexachlorbutadiene	ND	330
Hexachlorochyclopentadiene	ND	330

Ken [signature] for
Jim Tomalia
Laboratory Manager

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3141 Logan Valley Road
Traverse City, Michigan 49686
(616) 947-2389
FAX: (616) 947-3629

Semivolatile Organic Compounds
Soil Analysis Results
EPA Solid Waste Method 8270A::3050

Client/Site: Detroit Edison
Project Number: 8047
COC Number: 2948
Collection Date: 11/01/94
Collected By: JL
Submittal Date: 3/09/95
Analysis Date: 3/22/95
Analyzed By: JT
Report Date: 3/27/95

Remarks: Results in ug/kg and based on dry weight.
ND = Nondetect.

Sample ID: TA17628
Sample Name: Sample A 95E00227 Fermi 2 Dredge

Compound	Result	MDL
Hexachlorethane	ND	330
Indeno(1,2,3-cd)pyrene	ND	330
Isophorone	ND	330
2-Methylnaphthalene	ND	330
2-Methylphenol	ND	330
4-Methylphenol	ND	330
Napththalene	ND	330
2-Nitroaniline	ND	1700
3-Nitroaniline	ND	1700
4-Nitroaniline	ND	1700
Nitrobenzene	ND	330
2-Nitrophenol	ND	330
4-Nitrophenol	ND	1700
N-Nitrosodiphenylamine	ND	330
N-Nitrosodi-n-propylamine	ND	330
Pentachlorophenol	ND	330
Phenanthrene	380	330
Phenol	ND	330
Pyrene	530	330
1,2,4-Trichlorbenzene	ND	330
2,4,5-Trichlorphenol	ND	1700
2,4,6-Trichlorphenol	ND	330

Jim Tomalia
Laboratory Manager

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Soil, Water, Air, Mobile Lab

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ANALYTICAL
3141 Logan Valley Road
Traverse City, Michigan 49686
(616) 947-2389
FAX: (616) 947-3629

Wet Chem
Soil Analysis Results

Client/Site:	Detroit Edison
Project Number:	8047
COC Number:	2948
Collection Date:	11/94
Collected By:	GT
Submittal Date:	3/8/95
Analysis Date(s):	*3/15/95 & *3/17/95 & *3/20/95 & *3/21/95 & *3/23/95
Analyzed By:	*RM & *KW
Report Date:	3/27/95

Remarks: Results in mg/kg. ND = Nondetect.
Work Order #720RA297J235 *EB Results

Sample ID: TA17629
Sample Name: Sample B 95E00228

Compound	Result	MDL
*Total Kjeldahl Nitrogen	9.26	0.02
*Total Ammonia as Nitrogen	6.11	0.10
*Nitrate/Nitrite	11.1	0.05
*Total Phosphorus	401	0.020
*COD	11800	1
*BOD	225	1.0
pH	8.1	Units
*Lime Index	7.3	0.1 (S.U.)
*Cation Exchange Capacity	23.5	1.0 (me/100 gm)

Ken Sitzek for
Jim Tomalia
Laboratory Manager

TRAVERSE ANALYTICAL
3141 Logan Valley Road
Traverse City, Michigan 49686
(616) 947-2389
FAX: (616) 947-3629

Pesticides
Soil Analysis Results
EPA Solid Waste Method 1311/8270

Client/Site:	Detroit Edison
Project Number:	8047
COC Number:	2948
Collection Date:	11/01/94
Collected By:	JL
Submittal Date:	3/09/95
Analysis Date:	3/27/95
Analyzed By:	KF
Report Date:	3/28/95

Remarks: Results and limits in mg/l. Level of detection 0.005 mg/l. ND = Nondetect.

Sample ID: TA17629
Sample Name: Sample B 95E00228 Fermi 2 Dredge

Compound	Result
Aldrin	ND
a-BHC	ND
b-BHC	ND
d-BHC	ND
y-BHC (Lindane)	ND
Chlordane (technical)	ND
4,4'-DDD	ND
4,4'-DDE	ND
4,4'-DDT	ND
Dieldrin	ND
Endosulfan I	ND
Endosulfan II	ND
Endosulfan sulfate	ND
Endrin	ND
Endrin Aldehyde	ND
Heptachlor	ND
Heptachlor epoxide	ND
Methoxyclor	ND
Toxaphene	ND

Jim Tomalia
Laboratory Manager

TRAVERSE ANALYTICAL
3141 Logan Valley Road
Traverse City, Michigan 49686
(616) 947-2389
FAX: (616) 947-3629

Semivolatile Organic Compounds
Soil Analysis Results
EPA Solid Waste Method 8270A::3050

Client/Site: Detroit Edison
Project Number: 8047
COC Number: 2948
Collection Date: 11/01/94
Collected By: JL
Submittal Date: 3/09/95
Analysis Date: 3/22/95
Analyzed By: JT
Report Date: 3/27/95

Remarks: Results in ug/kg and based on dry weight.
ND = Nondetect.

Sample ID: TA17629
Sample Name: Sample B 95E00228 Fermi 2 Dredge

Compound	Result	MDL
Acenaphthene	ND	330
Acenaphthylene	ND	330
Aniline	ND	330
Anthracene	ND	330
Benzoic Acid	ND	330
Benzo(a)anthracene	ND	330
Benzo(b)fluoranthene	ND	330
Benzo(k)fluoranthene	ND	330
Benzo(g,h,i)perylene	ND	330
Benzo(a)pyrene	ND	330
Benzyl Alcohol	ND	330
Bis(2-chloroethoxy)methane	ND	330
Bis(2-chloroethyl)ether	ND	330
Bis(2-chloroisopropyl)ether	ND	330
Bis(2-ethylhexy)phthalate	ND	330
4-Bromophenyl phyenyl ether	ND	330
Butyl benzyl phthalate	ND	330
4-Chloroaniline	ND	1300
4-Chloro-3-methylphenol	ND	1300
2-Chloronaphthalene	ND	330
2-Chlorophenol	ND	330
4-Chlorophenyl phenyl ether	ND	330

Jim Tomalia
Laboratory Manager

TRAVERSE ANALYTICAL
3141 Logan Valley Road
Traverse City, Michigan 49686
(616) 947-2389
FAX: (616) 947-3629

Semivolatile Organic Compounds
Soil Analysis Results
EPA Solid Waste Method 8270A::3050

Client/Site: Detroit Edison
Project Number: 8047
COC Number: 2948
Collection Date: 11/01/94
Collected By: JL
Submittal Date: 3/09/95
Analysis Date: 3/22/95
Analyzed By: JT
Report Date: 3/27/95

Remarks: Results in ug/kg and based on dry weight.
ND = Nondetect.

Sample ID: TA17629
Sample Name: Sample B 95E00228 Fermi 2 Dredge

Compound	Result	MDL
Chrysene	ND	330
Dibenzo(a,h)anthracene	ND	330
Dibenzofuran	ND	330
Di-n-butyl phthalate	ND	330
1,2-Dichlorobenzene	ND	330
1,3-Dichlorobenzene	ND	330
1,4-Dichlorobenzene	ND	330
3,3-Dichlorobenzidine	ND	2000
2,4-Dichlorophenol	ND	330
Diethyl phthalate	ND	330
2,4-Dimethylphenol	ND	1700
Dimethyl phthalate	ND	330
4,6-Dinitro-2-methylphenol	ND	330
2,4-Dinitrophenol	ND	330
2,4-Dinitrotoluene	ND	330
2,6-Dinitrotoluene	ND	330
Di-n-octyl phthalate	ND	330
Fluoranthene	ND	330
Fluorene	ND	330
Hexachlorobenzene	ND	330
Hexachlorbutadiene	ND	330
Hexachlorochyclopentadiene	ND	330

Jim Tomalia
Laboratory Manager

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3141 Logan Valley Road
Traverse City, Michigan 49686
(616) 947-2389
FAX: (616) 947-3629

Semivolatile Organic Compounds
Soil Analysis Results
EPA Solid Waste Method 8270A::3050

Client/Site: Detroit Edison
Project Number: 8047
COC Number: 2948
Collection Date: 11/01/94
Collected By: JL
Submittal Date: 3/09/95
Analysis Date: 3/22/95
Analyzed By: JT
Report Date: 3/27/95

Remarks: Results in ug/kg and based on dry weight.
ND = Nondetect.

Sample ID: TA17629
Sample Name: Sample B 95E00228 Fermi 2 Dredge

Compound	Result	MDL
Hexachlorethane	ND	330
Indeno(1,2,3-cd)pyrene	ND	330
Isophorone	ND	330
2-Methylnaphthalene	ND	330
2-Methylphenol	ND	330
4-Methylphenol	ND	330
Napththalene	ND	330
2-Nitroaniline	ND	1700
3-Nitroaniline	ND	1700
4-Nitroaniline	ND	1700
Nitrobenzene	ND	330
2-Nitrophenol	ND	330
4-Nitrophenol	ND	1700
N-Nitrosodiphenylamine	ND	330
N-Nitrosodi-n-propylamine	ND	330
Pentachlorophenol	ND	330
Phenanthrene	ND	330
Phenol	ND	330
Pyrene	ND	330
1,2,4-Trichlorbenzene	ND	330
2,4,5-Trichlorphenol	ND	1700
2,4,6-Trichlorphenol	ND	330

for

Jim Tomalia
Laboratory Manager

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TRAVERSE
ANALYTICAL
3141 Logan Valley Road
Traverse City, Michigan 49686
(616) 947-2389
FAX: (616) 947-3629

Wet Chem
Soil Analysis Results

Client/Site:	Detroit Edison
Project Number:	8047
COC Number:	2948
Collection Date:	11/94
Collected By:	GT
Submittal Date:	3/8/95
Analysis Date(s):	*3/15/95 & *3/17/95 & *3/20/95 & *3/21/95 & *3/23/95
Analyzed By:	*RM & *KW
Report Date:	3/27/95

Remarks: Results in mg/kg. ND = Nondetect.
Work Order #720RA297J235 *EB Results

Sample ID: TA17630
Sample Name: Sample C 95E00229

Compound	Result	MDL
*Total Kjeldahl Nitrogen	12.0	0.02
*Total Ammonia as Nitrogen	5.05	0.10
*Nitrate/Nitrite	4.0	0.05
*Total Phosphorus	515	0.020
*COD	2340	1
*BOD	63	1.0
pH	7.3	Units
*Lime Index	7.6	0.1 (S.U.)
*Cation Exchange Capacity	32.5	1.0 (me/100 gm)

Ken Jeltek for
Jim Tomalia
Laboratory Manager

TRAVERSE
ANALYTICAL

3141 Logan Valley Road
Traverse City, Michigan 49686
(616) 947-2389
FAX: (616) 947-3629

Pesticides
Soil Analysis Results
EPA Solid Waste Method 1311/8270

Client/Site: Detroit Edison
Project Number: 8047
COC Number: 2948
Collection Date: 11/01/94
Collected By: JL
Submittal Date: 3/09/95
Analysis Date: 3/27/95
Analyzed By: KF
Report Date: 3/28/95

Remarks: Results and limits in mg/l. Level of detection 0.005 mg/l. ND = Nondetect.

Sample ID: TA17630
Sample Name: Sample C 95E00229 Fermi 2 Dredge

Compound	Result
Aldrin	ND
a-BHC	ND
b-BHC	ND
d-BHC	ND
y-BHC (Lindane)	ND
Chlordane (technical)	ND
4,4'-DDD	ND
4,4'-DDE	ND
4,4'-DDT	ND
Dieldrin	ND
Endosulfan I	ND
Endosulfan II	ND
Endosulfan sulfate	ND
Endrin	ND
Endrin Aldehyde	ND
Heptachlor	ND
Heptachlor epoxide	ND
Methoxyclor	ND
Toxaphene	ND

Jim Tomalia
Laboratory Manager

TRAVERSE ANALYTICAL
3141 Logan Valley Road
Traverse City, Michigan 49686
(616) 947-2389
FAX: (616) 947-3629

Semivolatile Organic Compounds
Soil Analysis Results
EPA Solid Waste Method 8270A::3050

Client/Site: Detroit Edison
Project Number: 8047
COC Number: 2948
Collection Date: 11/01/94
Collected By: JL
Submittal Date: 3/09/95
Analysis Date: 3/22/95
Analyzed By: JT
Report Date: 3/27/95

Remarks: Results in ug/kg and based on dry weight.
ND = Nondetect.

Sample ID: TA17630
Sample Name: Sample C 95E00229 Fermi 2 Dredge

Compound	Result	MDL
Acenaphthene	ND	330
Acenaphthylene	ND	330
Aniline	ND	330
Anthracene	ND	330
Benzoic Acid	ND	330
Benzo(a)anthracene	ND	330
Benzo(b)fluoranthene	ND	330
Benzo(k)fluoranthene	ND	330
Benzo(g,h,i)perylene	ND	330
Benzo(a)pyrene	ND	330
Benzyl Alcohol	ND	330
Bis(2-chloroethoxy)methane	ND	330
Bis(2-chloroethyl)ether	ND	330
Bis(2-chloroisopropyl)ether	ND	330
Bis(2-ethylhexy)phthalate	ND	330
4-Bromophenyl phyenyl ether	ND	330
Butyl benzyl phthalate	ND	330
4-Chloroaniline	ND	1300
4-Chloro-3-methylphenol	ND	1300
2-Chloronaphthalene	ND	330
2-Chlorophenol	ND	330
4-Chlorophenyl phenyl ether	ND	330

Jim Tomalia
Laboratory Manager

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Soil, Water, Air, Mobile Lab

TRAVERSE ANALYTICAL
3141 Logan Valley Road
Traverse City, Michigan 49686
(616) 947-2389
FAX: (616) 947-3629

Semivolatile Organic Compounds
Soil Analysis Results
EPA Solid Waste Method 8270A::3050

Client/Site: Detroit Edison
Project Number: 8047
COC Number: 2948
Collection Date: 11/01/94
Collected By: JL
Submittal Date: 3/09/95
Analysis Date: 3/22/95
Analyzed By: JT
Report Date: 3/27/95

Remarks: Results in ug/kg and based on dry weight.
ND = Nondetect.

Sample ID: TA17630
Sample Name: Sample C 95E00229 Fermi 2 Dredge

Compound	Result	MDL
Chrysene	ND	330
Dibenzo(a,h)anthracene	ND	330
Dibenzofuran	ND	330
Di-n-butyl phthalate	ND	330
1,2-Dichlorobenzene	ND	330
1,3-Dichlorobenzene	ND	330
1,4-Dichlorobenzene	ND	330
3,3-Dichlorobenzidine	ND	2000
2,4-Dichlorophenol	ND	330
Diethyl phthalate	ND	330
2,4-Dimethylphenol	ND	330
Dimethyl phthalate	ND	330
4,6-Dinitro-2-methylphenol	ND	330
2,4-Dinitrophenol	ND	1700
2,4-Dinitrotoluene	ND	330
2,6-Dinitrotoluene	ND	330
Di-n-octyl phthalate	ND	330
Fluoranthene	ND	330
Fluorene	ND	330
Hexachlorobenzene	ND	330
Hexachlorbutadiene	ND	330
Hexachlorochyclopentadiene	ND	330

Ken [signature] for

Jim Tomalia
Laboratory Manager

TRAVERSE ANALYTICAL
3141 Logan Valley Road
Traverse City, Michigan 49686
(616) 947-2389
FAX: (616) 947-3629

Semivolatile Organic Compounds
Soil Analysis Results
EPA Solid Waste Method 8270A::3050

Client/Site: Detroit Edison
Project Number: 8047
COC Number: 2948
Collection Date: 11/01/94
Collected By: JL
Submittal Date: 3/09/95
Analysis Date: 3/22/95
Analyzed By: JT
Report Date: 3/27/95

Remarks: Results in ug/kg and based on dry weight.
ND = Nondetect.

Sample ID: TA17630
Sample Name: Sample C 95E00229 Fermi 2 Dredge

Compound	Result	MDL
Hexachlorethane	ND	330
Indeno(1,2,3-cd)pyrene	ND	330
Isophorone	ND	330
2-Methylnaphthalene	ND	330
2-Methylphenol	ND	330
4-Methylphenol	ND	330
Napththalene	ND	330
2-Nitroaniline	ND	1700
3-Nitroaniline	ND	1700
4-Nitroaniline	ND	1700
Nitrobenzene	ND	330
2-Nitrophenol	ND	330
4-Nitrophenol	ND	1700
N-Nitrosodiphenylamine	ND	330
N-Nitrosodi-n-propylamine	ND	330
Pentachlorophenol	ND	330
Phenanthrene	ND	330
Phenol	ND	330
Pyrene	ND	330
1,2,4-Trichlorbenzene	ND	330
2,4,5-Trichlorphenol	ND	1700
2,4,6-Trichlorphenol	ND	330

for
Jim Tomalia
Laboratory Manager

TRAVERSE
ANALYTICAL
3141 Logan Valley Road
Traverse City, Michigan 49686
(616) 947-2389
FAX: (616) 947-3629

Wet Chem
Soil Analysis Results

Client/Site:	Detroit Edison
Project Number:	8047
COC Number:	2948
Collection Date:	11/94
Collected By:	GT
Submittal Date:	3/8/95
Analysis Date(s):	*3/15/95 & *3/17/95 & *3/20/95 & *3/21/95 & *3/23/95
Analyzed By:	*RM & *KW
Report Date:	3/27/95

Remarks: Results in mg/kg. ND = Nondetect.
Work Order #720RA297J235 *EB Results

Sample ID: TA17631
Sample Name: Sample D 95E00230

Compound	Result	MDL
*Total Kjeldahl Nitrogen	9.26	0.02
*Total Ammonia as Nitrogen	3.06	0.10
*Nitrate/Nitrite	4.6	0.05
*Total Phosphorus	401	0.020
*COD	4290	1
*BOD	150	1.0
pH	7.7	Units
*Lime Index	7.4	0.1 (S.U.)
*Cation Exchange Capacity	19.6	1.0 (me/100 gm)

Jim Tomalia
Laboratory Manager

TRAVERSE
ANALYTICAL

3141 Logan Valley Road
Traverse City, Michigan 49686
(616) 947-2389
FAX: (616) 947-3629

Pesticides
Soil Analysis Results
EPA Solid Waste Method 1311/8270

Client/Site:	Detroit Edison
Project Number:	8047
COC Number:	2948
Collection Date:	11/01/94
Collected By:	JL
Submittal Date:	3/09/95
Analysis Date:	3/27/95
Analyzed By:	KF
Report Date:	3/28/95

Remarks: Results and limits in mg/l. Level of detection 0.005 mg/l. ND = Nondetect.

Sample ID: TA17631
Sample Name: Sample D 95E00230 Fermi 2 Dredge

Compound	Result
Aldrin	ND
a-BHC	ND
b-BHC	ND
d-BHC	ND
y-BHC (Lindane)	ND
Chlordane (technical)	ND
4,4'-DDD	ND
4,4'-DDE	ND
4,4'-DDT	ND
Dieldrin	ND
Endosulfan I	ND
Endosulfan II	ND
Endosulfan sulfate	ND
Endrin	ND
Endrin Aldehyde	ND
Heptachlor	ND
Heptachlor epoxide	ND
Methoxyclor	ND
Toxaphene	ND

Jim Tomalia
Laboratory Manager

TRAVERSE ANALYTICAL
3141 Logan Valley Road
Traverse City, Michigan 49686
(616) 947-2389
FAX: (616) 947-3629

Semivolatile Organic Compounds
Soil Analysis Results
EPA Solid Waste Method 8270A::3050

Client/Site: Detroit Edison
Project Number: 8047
COC Number: 2948
Collection Date: 11/01/94
Collected By: JL
Submittal Date: 3/09/95
Analysis Date: 3/22/95
Analyzed By: JT
Report Date: 3/27/95

Remarks: Results in ug/kg and based on dry weight.
ND = Nondetect.

Sample ID: TA17631
Sample Name: Sample D 95E00230 Fermi 2 Dredge

Compound	Result	MDL
Acenaphthene	ND	330
Acenaphthylene	ND	330
Aniline	ND	330
Anthracene	ND	330
Benzoic Acid	ND	330
Benzo(a)anthracene	ND	330
Benzo(b)fluoranthene	ND	330
Benzo(k)fluoranthene	ND	330
Benzo(g,h,i)perylene	ND	330
Benzo(a)pyrene	ND	330
Benzyl Alcohol	ND	330
Bis(2-chloroethoxy)methane	ND	330
Bis(2-chloroethyl)ether	ND	330
Bis(2-chloroisopropyl)ether	ND	330
Bis(2-ethylhexy)phthalate	ND	330
4-Bromophenyl phyenyl ether	ND	330
Butyl benzyl phthalate	ND	330
4-Chloroaniline	ND	1300
4-Chloro-3-methylphenol	ND	1300
2-Chloronaphthalene	ND	330
2-Chlorophenol	ND	330
4-Chlorophenyl phenyl ether	ND	330

Jim Tomalia
Laboratory Manager

Complete Environmental Analysis
Soil, Water, Air, Mobile Lab

TRAVERSE ANALYTICAL
3141 Logan Valley Road
Traverse City, Michigan 49686
(616) 947-2389
FAX: (616) 947-3629

Semivolatile Organic Compounds
Soil Analysis Results
EPA Solid Waste Method 8270A::3050

Client/Site: Detroit Edison
Project Number: 8047
COC Number: 2948
Collection Date: 11/01/94
Collected By: JL
Submittal Date: 3/09/95
Analysis Date: 3/22/95
Analyzed By: JT
Report Date: 3/27/95

Remarks: Results in ug/kg and based on dry weight.
ND = Nondetect.

Sample ID: TA17631
Sample Name: Sample D 95E00230 Fermi 2 Dredge

Compound	Result	MDL
Chrysene	ND	330
Dibenzo(a,h)anthracene	ND	330
Dibenzofuran	ND	330
Di-n-butyl phthalate	ND	330
1,2-Dichlorobenzene	ND	330
1,3-Dichlorobenzene	ND	330
1,4-Dichlorobenzene	ND	330
3,3-Dichlorobenzidine	ND	2000
2,4-Dichlorophenol	ND	330
Diethyl phthalate	ND	330
2,4-Dimethylphenol	ND	330
Dimethyl phthalate	ND	330
4,6-Dinitro-2-methylphenol	ND	330
2,4-Dinitrophenol	ND	1700
2,4-Dinitrotoluene	ND	330
2,6-Dinitrotoluene	ND	330
Di-n-octyl phthalate	ND	330
Fluoranthene	ND	330
Fluorene	ND	330
Hexachlorobenzene	ND	330
Hexachlorbutadiene	ND	330
Hexachlorochyclopentadiene	ND	330

Jim Tomalia
Laboratory Manager

Complete Environmental Analysis
Soil, Water, Air, Mobile Lab

TRAVERSE ANALYTICAL
3141 Logan Valley Road
Traverse City, Michigan 49686
(616) 947-2389
FAX: (616) 947-3629

Semivolatile Organic Compounds
Soil Analysis Results
EPA Solid Waste Method 8270A::3050

Client/Site: Detroit Edison
Project Number: 8047
COC Number: 2948
Collection Date: 11/01/94
Collected By: JL
Submittal Date: 3/09/95
Analysis Date: 3/22/95
Analyzed By: JT
Report Date: 3/27/95

Remarks: Results in ug/kg and based on dry weight.
ND = Nondetect.

Sample ID: TA17631
Sample Name: Sample D 95E00230 Fermi 2 Dredge

Compound	Result	MDL
Hexachlorethane	ND	330
Indeno(1,2,3-cd)pyrene	ND	330
Isophorone	ND	330
2-Methylnaphthalene	ND	330
2-Methylphenol	ND	330
4-Methylphenol	ND	330
Napththalene	ND	330
2-Nitroaniline	ND	1700
3-Nitroaniline	ND	1700
4-Nitroaniline	ND	1700
Nitrobenzene	ND	330
2-Nitrophenol	ND	330
4-Nitrophenol	ND	1700
N-Nitrosodiphenylamine	ND	330
N-Nitrosodi-n-propylamine	ND	330
Pentachlorophenol	ND	330
Phenanthrene	ND	330
Phenol	ND	330
Pyrene	ND	330
1,2,4-Trichlorbenzene	ND	330
2,4,5-Trichlorphenol	ND	1700
2,4,6-Trichlorphenol	ND	330

Jim Tomalia
Laboratory Manager

Complete Environmental Analysis
Soil, Water, Air, Mobile Lab

Detroit Edison
Technical & Engineering Services
Chemistry and Fuels Group
PCB ANALYSIS

Project/LIMS Report No.: 95A84-002(M)

Report To:	Walter Meiers	Submitted by:	JULIUS LAWRENCE
Address:	H-139, WSC	Date Submitted:	03/07/1995
Phone:	71329		
Organization:	NUCLEAR QUALITY ASSURANCE		

Sample Identification			Sample Number	PCB Results*
FERMI 3 DREDGE SPOIL - TA1360				
SAMPLE A				
SERIAL #:	MFG'R:	KVA:	95E-00227	NOT DETECTED
SAMPLE TYPE: Soil	QC BATCH: 25	CALIBRATION: C0000363B		
FERMI 3 DREDGE SPOIL - TA1360				
SAMPLE B				
SERIAL #:	MFG'R:	KVA:	95E-00228	NOT DETECTED
SAMPLE TYPE: Soil	QC BATCH: 25	CALIBRATION: C0000363B		
FERMI 3 DREDGE SPOIL - TA1360				
SAMPLE C				
SERIAL #:	MFG'R:	KVA:	95E-00229	NOT DETECTED
SAMPLE TYPE: Soil	QC BATCH: 25	CALIBRATION: C0000363B		
FERMI 3 DREDGE SPOIL - TA1360				
SAMPLE D				
SERIAL #:	MFG'R:	KVA:	95E-00230	NOT DETECTED
SAMPLE TYPE: Soil	QC BATCH: 25	CALIBRATION: C0000363B		

ANALYST: SW / CH REVIEWER: [signature] Date: 03/21/1995

For ADDITIONAL INFORMATION, CALL the PCB LABORATORY COORDINATOR, H-3 WSC, Phone: x70265

*For SAMPLE TYPES: OIL & SOIL - Results are: PARTS PER MILLION (ppm)
WIPE - MICROGRAMS PER FILTER

NOTE: All measurements involve statistical error. Results indicated above have an approximate 15% error interval.

Fermi 2 Dredge Sample Results

Total Analysis Results

Constituent	Sample A	Sample B	Sample C	Sample D
Total Iron	1.00 percent	1.25 percent	1.52 percent	0.99 percent
Total Sodium	1.14 percent	0.93 percent	0.47 percent	0.97 percent
Total Manganese	240 ppm	240 ppm	300 ppm	230 ppm
Total Molybdenum	<5 ppm	<5 ppm	<5 ppm	<5 ppm
Total Chloride	58 ppm	23 ppm	33 ppm	21 ppm
Total Sulfate	940 ppm	640 ppm	980 ppm	1900 ppm

Bulk Sediment Analysis Results

Constituent	Sample A	Sample B	Sample C	Sample D
Arsenic	2.0 ppm	2.7 ppm	4.3 ppm	3.0 ppm
Barium	18 ppm	40 ppm	82 ppm	28 ppm
Cadmium	0.6 ppm	0.8 ppm	1.0 ppm	0.6 ppm
Chromium	8.5 ppm	16 ppm	22 ppm	11 ppm
Copper	11 ppm	13 ppm	16 ppm	8.9 ppm
Mercury	<0.05 ppm	<0.05 ppm	<0.05 ppm	<0.05 ppm
Nickel	10 ppm	19 ppm	26 ppm	12 ppm
Lead	6.6 ppm	13 ppm	16 ppm	8.7 ppm
Selenium	0.4 ppm	0.3 ppm	0.4 ppm	0.3 ppm
Zinc	55 ppm	68 ppm	82 ppm	54 ppm

Method 1312 Extract Results

Constituent	Sample A	Sample B	Sample C	Sample D
Arsenic	0.003 ppm	0.002 ppm	0.001 ppm	0.002 ppm
Barium	0.05 ppm	0.11 ppm	0.08 ppm	0.04 ppm
Cadmium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Chromium	0.002 ppm	0.004 ppm	0.002 ppm	0.001 ppm
Copper	0.004 ppm	0.005 ppm	0.003 ppm	0.001 ppm
Iron	0.46 ppm	1.1 ppm	0.69 ppm	0.13 ppm
Mercury	<0.0005 ppm	<0.0005 ppm	<0.0005 ppm	<0.0005 ppm
Nickel	0.002 ppm	0.002 ppm	0.006 ppm	<0.001 ppm
Lead	0.002 ppm	0.003 ppm	<0.001 ppm	<0.001 ppm
Selenium	0.002 ppm	<0.001 ppm	0.001 ppm	0.001 ppm
Zinc	0.025 ppm	0.039 ppm	0.034 ppm	0.024 ppm

Fermi 2 Dredge Sample Results

Method
EPA Method 200.7
EPA Method 200.7
EPA Method 200.7
EPA Method 200.7
ASTM Method D512-89(B)
EPA Method 375.4

Method
EPA Method 200.8
EPA Method 200.7
EPA Method 200.8
EPA Method 200.7
EPA Method 200.7
EPA Method 245.1
EPA Method 200.7
EPA Method 200.7
EPA Method 200.8
EPA Method 200.7

Method
EPA Method 200.8
EPA Method 200.7
EPA Method 200.8
EPA Method 200.8
EPA Method 200.8
EPA Method 200.7
EPA Method 245.1
EPA Method 200.8
EPA Method 200.8
EPA Method 200.8
EPA Method 200.7

APPENDIX B

SAMPLING PLAN

AND

CHAIN OF CUSTODY

1) The dredge spoils were sampled by Julius Lawrence of Detroit Edison- System Project & Engineering and were analyzed by Traverse Analytical, 3141 Logan Valley Road, Traverse City, Mi and by Paul Beckwith of Detroit Edison Technical and Engineering Services.

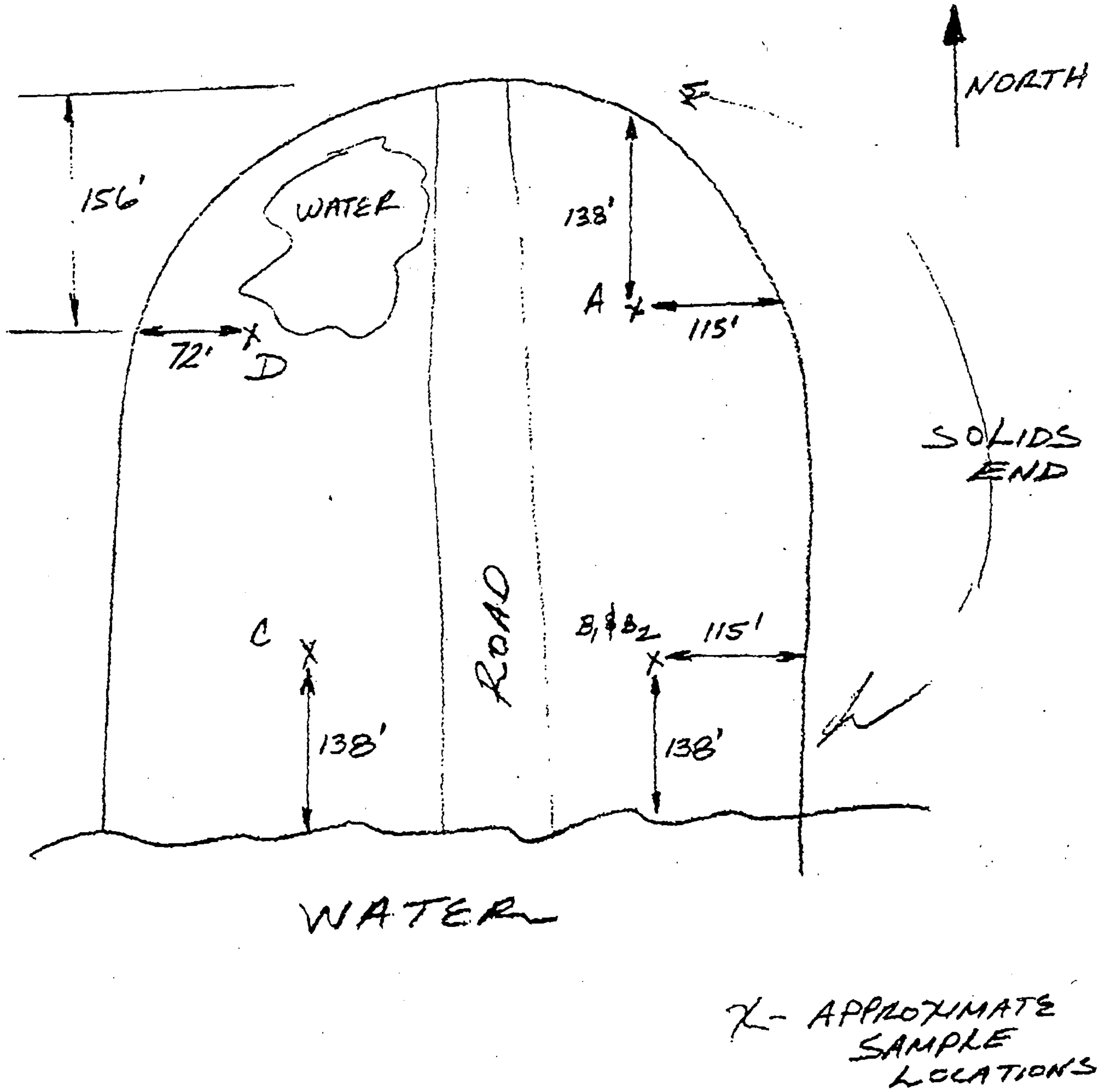
2) The samples were obtained as required by SW846 from the 4 corners of the basin to ensure representation.

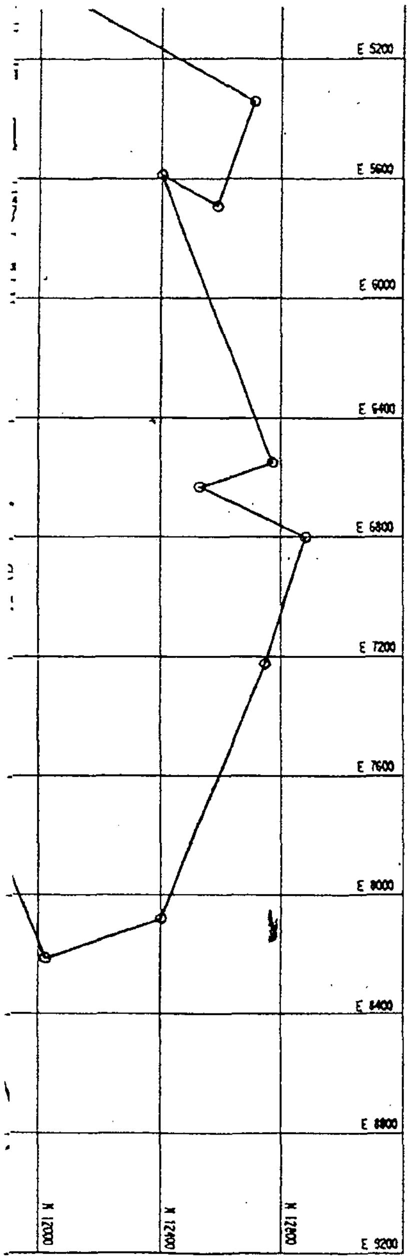
3) The samples were collected in 1pt glass jars with foil lined caps. Preservatives were not required by the analytical procedures.

4) See the other attachments for the list of analytical methods used.

5) Julius Lawrence took the samples and relinquished them to Walt Meiers of Technical and Engineering Services. The samples were then sent to Traverse and Paul Beckwith of Technical and Engineering Services.

FERMI II - DREDGE BASIN





NOTES:
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6A721-2102
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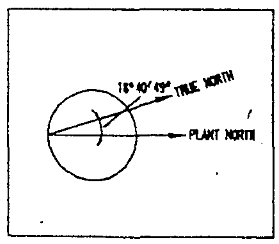

ARMS-INFORMATION SYSTEMS
DTC DDDACS DSN A-2102
PAGE ____ REV I PIS ____
NOV. 8, 1985
PIS M21000 ____ RECIPIENT
APPROVAL REQ'D: YES ____ NO ____

THIS IS AN IGS REPLACEMENT DRAWING FOR 6A721-2102.

SYS. ENG.	OTHER APPROVALS	DATE	DRAWN BY INTERACTIVE GRAPHICS	DATE
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OCP#X2110A1. OPERATIONS AND OFFICE AND MAINTENANCE			CHECKED BY	DATE
			R. WHEEKER	1-14-71
			PROJECT ENGINEER	DATE
			C.A. KUS	1-16-71
W 88P1A0	REF. DWGS.	REF. BMS.	PROJECT DIRECTOR	DATE
ELECT.			DIVISION DIRECTOR	DATE
IGS DIV. DIRECTOR L.E. JOHNSON /RCW			CHIEF DESIGN ENG.	DATE
			C.R. BACON	1-15-71

The Detroit Edison Co. Engineering

TITLE
SITE KEY PLAN
DOCUMENT CONTROL NO. M21-00

APERTURE CARD TITLE: SITE KEY PLAN
LOCATION NAME: ENRICO FERMI 2 POWER PLANT
UNIT NUMBER
ORIGINATING SOURCE
SCALE 1"=400'
USE DIMENSIONS ONLY DO NOT SCALE
DRAWING NUMBER 6A721-2102
ORDER FOR WORK 8BP1A0

DESIGN FILE NAME:OS2:C71.121SITEPLAN.DGN

NRC3-09-0014
RAI Question HY4.2.1-8

Enclosure 2

1997 TCLP Metals/Sieve Analysis of Fermi 2
General Service Water Intake Canal
Sediment Samples
(following 2 pages)

Detroit Edison

Engineering Support Organization

Material Identification Form

Sample Date: 2/13/97 **ESO#:** 97E00130 **Report Date:** 3/10/97

Physical State: Solid (sand like) **Sampled By:** J. Czech

Sample Location: Fermi 2 – General Service Water Intake (sediment sample)

Analysis By: Materials **Method/s:** TCLP Metals

Results: TCLP Metals: As = <1.0; Ba = 6.1; Cd. = <0.1; Cu = <0.1; Cr = <0.1; Pb = <1.0; Hg = <0.2; Se = <1.0; Ag = <1.0; Zn = 0.58

Written By: W. J. Meiers **Approved By :** W. J. Meiers

Comments:

Sample Color: Light Gray

Sample Odor: None

DETROIT EDISON

GRADATION REPORT

Location: ENRICO FERMI 2 Date: 2-21-97

MIK #: N0021 01181

Source of Aggregate: GSW INTAKE SEDIMENT SAMPLE

Spec. Requirement: Spec. Requirement:

	Fine Aggregate				Coarse Aggregate			
Sieve	Weight	%Ret.	%Pass	Spec.	Weight	%Ret.	%Pass.	Spec.
3"								
1-1/2								
1"								
3/4"								
1/2"								
3/8"								
* #4								
* #8	0	0	100					
*#16	1.6	0.7	99.3					
*#30	6.9	3.0	97.0					
*#50	17.9	7.8	92.2					
*#100	39.5	17.1	82.9					
#200	63.4	27.5	72.5					
PAN	71.0							
WASH	159.5		30.9					
TOTAL	230.7							

F.M.	S.G.	F.M.	S.G.
U.W.	O.I.	U.W.	
Remarks:			

Copies:Jim Czech,110 AIB Tested By: R. Truskowski

Reviewed By:

NRC3-09-0014
RAI Question HY4.2.1-8

Enclosure 3

1999 TCLP Metals/Sieve Analysis of Fermi 2
General Service Water Intake Canal
Sediment Samples
(following 2 pages)

Detroit
Edison

Environmental Management and Resources

Waste Identification Form

Sample Date: **EMR#:** 99E00807 **Report Date:** 9/17/1999

Physical State: Soil **Sampled By:** Plant

Sample Location: Fermi II GSW Intake

Analysis By: Materials **Method/s:** TCLP Metals

Results: TCLP see below

Labels Required Non-Hazardous Color:

Odor:

Comments:

Constituent	Results (in ppm)	Limits (in ppm)
Arsenic	<1	5.0
Barium	<1	100.0
Cadmium	<0.1	1.0
Chromiu	<0.1	5.0
Lead	<1	5.0
Mercury	<0.2	0.2
Selenium	<1	1.0
Silver	<1	5.0
Zinc	0.5	—

Written By: ____________ **Approved By:** G. B. Truchan

DETROIT EDISON

GRADATION REPORT

Location: FERMI 1 Date: 6-16-99

Work Order: Project #: Lab #:

Source of Aggregate: Intake Composite Sediment Sample

Spec. Requirement: Spec. Requirement:

Fine Aggregate					Course Aggregate				
Sieve	Weight	%Ret.	%Pass	Spec.	Sieve	Weight	%Ret.	%Pass.	Spec.
3"									
1-1/2									
1"									
3/4"									
1/2"									
3/8"									
* #4	0.6	0.1	99.9	Organic					
* #8	10.3	9.1	90.9	Organic					
*#16	14.3	12.7	87.3	Organic Mix					
*#30	19.7	17.4	82.6	Organic Mix					
*#50	36.2	32.1	67.9	Organic Mix					
*#100	63.8	56.5	43.5	Organic Mix					
*#200	87.9	77.9	22.1						
PAN	112.9								
WASH									
TOTAL	112.9								

F.M.	S.G.	F.M.	S.G.
U.W.	O.I.	U.W.	

Remarks: IF THE MATERIAL NEEDS TO BE RE-TESTED, PLEASE PROVIDE A LARGER SAMPLE.

Copies: Mary Babiera Tested By: Roger Zinke

Approved By:

NRC3-09-0014
RAI Question HY4.2.1-8

Enclosure 4

1999 SPLP Pesticides/Hg/SVOC Analysis of Dredge Basin Samples
(following 33 pages)

TriMatrix Laboratories, Inc.

February 19, 1999

Detroit Edison
Attn: Ms. Mary Babiera
6400 North Dixie Highway
Newport, MI 48166

RE: Dredge Basin - Fermi 2
Maintenance Department
PO: 001104/N0046

Dear Ms. Mary Babiera:

Enclosed is a copy of your laboratory report and invoice for submittal **34951-1.** This submittal was completely received on February 9, 1999. All analyses have been validated and comply with our Quality Control program statistics unless otherwise noted.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

Lorie L. White

Lorie L. White
Project Chemist

Enclosure

5555 Glenwood Hills Parkway SE • PO Box 888692 • Grand Rapids, MI 49588-8692 • (616) 975-4500 • Fax (616) 942-7463

STATEMENT OF DATA QUALIFICATIONS

Analysis: **Project Specific Fraction**
Organochlorine Pesticides
SPLP USEPA-8081

Qualification:

Surrogate spike result(s) for this sample and analysis had a recovery of > 10%, but are below the lower control limit for this method and matrix. All positive results must be considered estimated. All < or non-dectectable results must be considered approximate.

Sample(s) Qualified: 216252 Composite

Qualification:

The secondary surrogate (tetrachloro-m-xylene) % recovery for this sample fell outside the laboratory established control limits. The primary surrogate (decachlorobiphenyl) % recovery for this sample fell within the laboratory control limits. No qualifications are required.

QC Batch Qualified: 42293 for MPB/LFB 115

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STATEMENT OF DATA QUALIFICATIONS

Analysis: **Project Specific Fraction**
GC/MS Semi-Volatiles
SPLP USEPA-8270

Qualification:

One of the surrogates (D6-phenol)% recovery was above the laboratory established control limit. Since sample surrogate results are within the control limits and the sample is non-detect, no qualifications are necessary.

QC Batch Qualified: 42222-MPB 115

Qualification:

The laboratory fortified blank (LFB) recovery for this batch was above the laboratory established control limit for this compound. All results greater than the detection limit should be considered estimated. All results less than the detection limit are acceptable and need no qualification.

QC Batch Qualified: 42222-LFB 115 for 4-Nitrophenol and Phenol

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TriMatrix Laboratories, Inc.

ANALYTICAL REPORT

Detroit Edison
Proj: Dredge Basin - Fermi 2
Maintenance Department
Subm: February 8, 1999 Samples

Submittal Number: 34951- 1
Location: Newport, Michigan
Contact: Lorie L. White
Phone: (616) 975-4500

	Composite	Quantitation Limit	Units
Lab Sample No:	216252		
Mercury, SPLP	<0.0004	0.0004	mg/L
Project Specific Fraction USEPA SPLP 8270	Enclosed		
Project Specific Fraction USEPA 8081 - SPLP	* Enclosed		
Percent Solids	60	0.1	%
PCB Scan USEPA-8081 Scan	Enclosed		
Mercury, Total	0.16	0.10	mg/kg dry

Sampled by:	J. Elsey
Date Sampled:	02/08/99
Time Sampled:	09:35
Date Received:	02/08/99
Time Received:	13:40

* See attached Statement of Data Qualifications.

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TriMatrix Laboratories, Inc.

PROJECT SPECIFIC FRACTION
USEPA SPLP 8270

Detroit Edison	Submittal Number 34951- 1
Proj: Dredge Basin - Fermi 2 Maintenance Department	Date Sampled: 02/08/99 Time: 09:35
	Date Received: 02/08/99 Time: 13:40
Subm: February 8, 1999 Samples	Analysis Date: 02/16/99
Sample: Composite	Lab Sample No: 216252

Parameter	Result mg/L	Parameter	Result mg/L
Acenaphthene	<0.005	Dimethylphthalate	<0.005
Acenaphthylene	<0.005	4,6-Dinitro-2-Methylphenol	<0.020
Aniline	<0.005	2,4-Dinitrophenol	<0.020
Anthracene	<0.005	2,4-Dinitrotoluene	<0.005
Benzoic Acid	<0.050	2,6-Dinitrotoluene	<0.005
Benzo (a) Anthracene	<0.005	Di-n-Octylphthalate	<0.005
Benzo (b) Fluoranthene	<0.005	Fluoranthene	<0.005
Benzo (k) Fluoranthene	<0.005	Fluorene	<0.005
Benzo (g,h,i,) Perylene	<0.005	Hexachlorobenzene	<0.0001
Benzo (a) Pyrene	<0.005	Hexachlorobutadiene	<0.0001
Benzyl Alcohol	<0.050	Hexachlorocyclopentadiene	<0.002
Bis (2-Chloroethoxy)-Methane	<0.005	Hexachloroethane	<0.005
Bis (2-Chloroethyl) Ether	<0.005	Indeno (1,2,3-cd) Pyrene	<0.005
Bis (2-Chloroisopropyl)-Ether	<0.005	Isophorone	<0.005
Bis (2-ethylhexyl)-Phthalate	<0.005	2-Methylnaphthalene	<0.005
4-Bromophenyl Phenylether	<0.005	2-Methylphenol	<0.005
Butyl Benzyl Phthalate	<0.005	4-Methylphenol	<0.005
4-Chloroaniline	<0.020	Naphthalene	<0.005
4-Chloro-3-Methylphenol	<0.005	2-Nitroaniline	<0.020
2-Chloronaphthalene	<0.005	3-Nitroaniline	<0.020
2-Chlorophenol	<0.005	4-Nitroaniline	<0.020
4-Chlorophenylphenyl-Ether	<0.005	Nitrobenzene	<0.005
Chrysene	<0.005	2-Nitrophenol	<0.005
Dibenzo (a,h) Anthracene	<0.005	4-Nitrophenol	<0.020
Dibenzofuran	<0.005	N-Nitroso-di-Phenylamine	<0.005
Di-n-Butylphthalate	<0.005	N-Nitrosodi-n-Propylamine	<0.005
1,2-Dichlorobenzene	<0.005	Pentachlorophenol	<0.020
1,3-Dichlorobenzene	<0.005	Phenanthrene	<0.005
1,4-Dichlorobenzene	<0.005	Phenol	<0.005
3,3'-Dichlorobenzidine	<0.020	Pyrene	<0.005

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PROJECT SPECIFIC FRACTION
USEPA SPLP 8270

Detroit Edison	Submittal Number 34951- 1
Proj: Dredge Basin - Fermi 2	Date Sampled: 02/08/99 Time: 09:35
Maintenance Department	Date Received: 02/08/99 Time: 13:40
Subm: February 8, 1999 Samples	Analysis Date: 02/16/99
Sample: Composite	Lab Sample No: 216252

Parameter	Result mg/L	Parameter	Result mg/L
2,4-Dichlorophenol	<0.005	1,2,4-Trichlorobenzene	<0.005
Diethylphthalate	<0.005	2,4,5-Trichlorophenol	<0.050
2,4-Dimethylphenol	<0.005	2,4,6-Trichlorophenol	<0.005

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Laboratories, Inc.

PROJECT SPECIFIC FRACTION
USEPA 8081 - SPLP

Detroit Edison
Proj: Dredge Basin - Fermi 2
Maintenance Department
Subm: February 8, 1999 Samples
Sample: Composite

Submittal Number 34951- 1
Date Sampled: 02/08/99 Time: 09:35
Date Received: 02/08/99 Time: 13:40
Analysis Date: 02/17/99
Lab Sample No: 216252

Parameter	Result mg/L	Parameter	Result mg/L
Aldrin	<0.001	Endosulfan I	<0.001
Alpha-BHC	<0.001	Endosulfan II	<0.001
Beta-BHC	<0.001	Endosulfan Sulfate	<0.001
Delta-BHC	<0.001	Endrin	<0.001
Lindane	<0.001	Endrin Aldehyde	<0.001
Chlordane (technical)	<0.001	Heptachlor	<0.001
4,4'-DDD	<0.001	Heptachlor Epoxide	<0.001
4,4'-DDE	<0.001	Methoxychlor	<0.001
4,4'-DDT	<0.001	Toxaphene	<0.005
Dieldrin	<0.001		

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TriMatrix Laboratories, Inc.

PCB SCAN
USEPA-8081 SCAN

Detroit Edison	Submittal Number 34951- 1
Proj: Dredge Basin - Fermi 2	Date Sampled: 02/08/99 Time: 09:35
Maintenance Department	Date Received: 02/08/99 Time: 13:40
Subm: February 8, 1999 Samples	Analysis Date: 02/15/99
Sample: Composite	Lab Sample No: 216252

Parameter	Result mg/kg dry	Parameter	Result mg/kg dry
PCB-1016	<0.33	PCB-1248	<0.33
PCB-1221	<0.33	PCB-1254	<0.33
PCB-1232	<0.33	PCB-1260	<0.33
PCB-1242	<0.33		

Page 5 - **End of Analytical Report**

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QUALITY CONTROL REPORT

Parameter: **Mercury, SPLP**
Method: Manual Cold Vapor, Mercury USEPA-7471A SPLP
Units: mg/L

Matrix Spike Recovery

Sample Number	Test Date	QC Batch #	Analyst	Sample Conc	Spike Qty	Sample +Spike	Recovery	QC Limits
216252	02/12/99	42187	DWJ	<0.0004	0.0050	0.00543	109	44-143
216252	02/12/99	42187	DWJ	<0.0004	0.0050	0.00635	127	44-143

Matrix Spike Duplicate

Sample Number	Test Date	QC Batch #	Analyst	Sample+Spike Conc #1	Sample+Spike Conc #2	RPD	QC Limits
216252	02/12/99	42187	DWJ	0.00543	0.00635	16	0- 20

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QUALITY CONTROL REPORT

Parameter: **Mercury, Total**
Method: Cold Vapor, Mercury USEPA-7470A WATER
Units: ug/L

Instrument Blank

Test Date	Analytical Batch Number	Analyst	Blank Conc
02/12/99	139178	DWJ	<0.2
02/15/99	139192	DWJ	<0.2

Laboratory Control Sample

Test Date	Analytical Batch #	Analyst	Spike Qty	Spike Result	Recovery	QC Limits
02/12/99	139178	DWJ	3.0	3.08	103	80-120
02/15/99	139192	DWJ	3.0	3.07	102	80-120

Method Preparation Blank

Test Date	QC Batch #	Analyst	Blank Conc
02/12/99	42187	DWJ	<0.2

Laboratory Fortified Blank

Test Date	QC Batch #	Analyst	Spike Qty	Spike Result	Recovery	QC Limits
02/12/99	42187	DWJ	6.25	6.12	98	76-122

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TriMatrix Laboratories, Inc.

QUALITY CONTROL REPORT

Parameter: **Mercury, Total**
Method: Manual Cold Vapor, Mercury USEPA-7471A SOIL
Units: mg/kg dry

Method Preparation Blank

Test Date	QC Batch #	Analyst	Blank Conc
02/15/99	42195	DWJ	<0.10

Laboratory Fortified Blank

Test Date	QC Batch #	Analyst	Spike Qty	Spike Result	Recovery	QC Limits
02/15/99	42195	DWJ	0.417	0.465	112	85-119

Matrix Spike Recovery

Sample Number	Test Date	QC Batch #	Analyst	Sample Conc	Spike Qty	Sample +Spike	Recovery	QC Limits
216252	02/15/99	42195	DWJ	0.16	0.417	0.589	103	73-136
216252	02/15/99	42195	DWJ	0.16	0.417	0.594	104	73-136

Matrix Spike Duplicate

Sample Number	Test Date	QC Batch #	Analyst	Sample+Spike Conc #1	Sample+Spike Conc #2	RPD	QC Limits
216252	02/15/99	42195	DWJ	0.589	0.594	1	0- 20

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QUALITY CONTROL REPORT

Parameter: **Percent Solids**
Method: Residue-Gravimetric, Dried @ 103-105*C USEPA-160.3 SOIL
Units: %

Instrument Blank

Test Date	Analytical Batch Number	Analyst	Blank Conc
02/09/99	139069	TME	<0.1

Duplicate Percent Difference

Sample Number	Test Date	QC Batch #	Analyst	Sample Conc	Duplicate Conc	RPD	QC Limits
216252	02/09/99	42132	TME	60	58	3	0- 20

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QUALITY CONTROL REPORT

INSTRUMENT BLANK

Fraction: Quality Control Fraction
Method: Semi-Volatiles GC/MS
Analyst: Dawn M. Kaufman Test Date: 02/16/99
Units: ug/L
Analytical Batch: 139222

Parameter	Blank Concentration	Quantitation Limit
Acenaphthene	ND	0.10
Acenaphthylene	ND	0.10
Anthracene	ND	0.10
Benzo (a) Anthracene	ND	0.10
Benzo (b) Fluoranthene	ND	0.10
Benzo (k) Fluoranthene	ND	0.10
Benzo (g,h,i,) Perylene	ND	0.10
Benzo (a) Pyrene	ND	0.10
Bis (2-Chloroethoxy)-Methane	ND	2.0
Bis (2-Chloroethyl) Ether	ND	0.13
Bis (2-Chloroisopropyl)-Ether	ND	1.0
Bis (2-ethylhexyl)-Phthalate	ND	2.0
4-Bromophenyl Phenylether	ND	2.0
Butyl Benzyl Phthalate	ND	1.0
4-Chloroaniline	ND	5.0
4-Chloro-3-Methylphenol	ND	5.0
2-Chloronaphthalene	ND	2.0
2-Chlorophenol	ND	5.0
4-Chlorophenylphenyl-Ether	ND	1.0
Chrysene	ND	0.10
Dibenzo (a,h) Anthracene	ND	0.050
Dibenzofuran	ND	5.0
Di-n-Butylphthalate	ND	1.0
1,2-Dichlorobenzene	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0
3,3'-Dichlorobenzidine	ND	1.0
2,4-Dichlorophenol	ND	5.0
Diethylphthalate	ND	1.0
2,4-Dimethylphenol	ND	2.0
Dimethylphthalate	ND	2.0
4,6-Dinitro-2-Methylphenol	ND	1.0

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QUALITY CONTROL REPORT

INSTRUMENT BLANK

Fraction: Quality Control Fraction
Method: Semi-Volatiles GC/MS
Analyst: Dawn M. Kaufman Test Date: 02/16/99
Units: ug/L
Analytical Batch: 139222

Parameter	Blank Concentration	Quantitation Limit
2,4-Dinitrophenol	ND	19
2,4-Dinitrotoluene	ND	2.0
2,6-Dinitrotoluene	ND	5.0
Di-n-Octylphthalate	ND	2.0
Fluoranthene	ND	0.10
Fluorene	ND	0.10
Hexachlorobenzene	ND	0.10
Hexachlorobutadiene	ND	0.10
Hexachlorocyclopentadiene	ND	2.0
Hexachloroethane	ND	1.0
Indeno (1,2,3-cd) Pyrene	ND	0.10
Isophorone	ND	1.0
2-Methylnaphthalene	ND	0.10
2-Methylphenol	ND	5.0
4-Methylphenol	ND	5.0
Naphthalene	ND	0.10
2-Nitroaniline	ND	2.0
3-Nitroaniline	ND	2.0
4-Nitroaniline	ND	2.0
Nitrobenzene	ND	0.50
2-Nitrophenol	ND	5.0
4-Nitrophenol	ND	5.0
N-Nitroso-di-Phenylamine	ND	5.0
N-Nitrosodi-n-Propylamine	ND	5.0
Pentachlorophenol	ND	0.30
Phenanthrene	ND	0.10
Phenol	ND	0.50
Pyrene	ND	0.10
1,2,4-Trichlorobenzene	ND	2.0
2,4,5-Trichlorophenol	ND	5.0
2,4,6-Trichlorophenol	ND	5.0

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QUALITY CONTROL REPORT

METHOD PREPARATION BLANK

Fraction: Quality Control Fraction
Method: Organochlorine Pesticides
Analyst: Diane L. VanMale
Units: mg/L
QC Batch: 42293-115

Test Date: 02/17/99

Parameter	Blank Concentration	Quantitation Limit
Aldrin	<0.001	0.001
Alpha-BHC	<0.001	0.001
Beta-BHC	<0.001	0.001
Delta-BHC	<0.001	0.001
Lindane	<0.001	0.001
Chlordane (technical)	<0.001	0.001
4,4'-DDD	<0.001	0.001
4,4'-DDE	<0.001	0.001
4,4'-DDT	<0.001	0.001
Dieldrin	<0.001	0.001
Endosulfan I	<0.001	0.001
Endosulfan II	<0.001	0.001
Endosulfan Sulfate	<0.001	0.001
Endrin	<0.001	0.001
Endrin Aldehyde	<0.001	0.001
Heptachlor	<0.001	0.001
Heptachlor Epoxide	<0.001	0.001
Methoxychlor	<0.001	0.001
Toxaphene	<0.005	0.005

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TriMatrix Laboratories, Inc.

34951- 1

QUALITY CONTROL REPORT

LABORATORY FORTIFIED BLANK

Fraction: Quality Control Fraction
Method: Organochlorine Pesticides

Analyst: Diane L. VanMale
Units: mg/L
QC Batch: 42293-115

Test Date: 02/17/99

Parameter	Spike Quantity	Spike Result	Spike % Rec	Control Limits
Aldrin	0.100	0.0818	82	60 - 140
Alpha-BHC	0.100	0.0970	97	60 - 140
Beta-BHC	0.100	0.0886	89	60 - 140
Delta-BHC	0.100	0.0932	93	60 - 140
Lindane	0.100	0.0968	97	13 - 150
4,4'-DDD	0.100	0.101	101	60 - 140
4,4'-DDE	0.100	0.0942	94	60 - 140
4,4'-DDT	0.100	0.0968	97	60 - 140
Dieldrin	0.100	0.104	104	60 - 140
Endosulfan I	0.100	0.0672	67	60 - 140
Endosulfan II	0.100	0.0858	86	60 - 140
Endosulfan Sulfate	0.100	0.0959	96	60 - 140
Endrin	0.100	0.104	104	11 - 169
Endrin Aldehyde	0.100	0.0969	97	60 - 140
Heptachlor	0.100	0.0799	80	28 - 140
Heptachlor Epoxide	0.100	0.0965	97	18 - 148
Methoxychlor	0.100	0.109	109	9 - 161

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QUALITY CONTROL REPORT

INSTRUMENT BLANK

Fraction: Quality Control Fraction
Method: Organochlorine Pesticides
Analyst: Diane L. VanMale
Units: mg/L
Analytical Batch: 139323

Test Date: 02/17/99

Parameter	Blank Concentration	Quantitation Limit
Aldrin	ND	0.001
Alpha-BHC	ND	0.001
Beta-BHC	ND	0.001
Delta-BHC	ND	0.001
Lindane	ND	0.001
Chlordane (technical)	ND	0.001
4,4'-DDD	ND	0.001
4,4'-DDE	ND	0.001
4,4'-DDT	ND	0.001
Dieldrin	ND	0.001
Endosulfan I	ND	0.001
Endosulfan II	ND	0.001
Endosulfan Sulfate	ND	0.001
Endrin	ND	0.001
Endrin Aldehyde	ND	0.001
Heptachlor	ND	0.001
Heptachlor Epoxide	ND	0.001
Methoxychlor	ND	0.001
Toxaphene	ND	0.005

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QUALITY CONTROL REPORT

INSTRUMENT BLANK

Fraction: PCB Scan USEPA-608 Scan
Method: Organochlorine Pesticides & PCBs
Analyst: Diane L. VanMale Test Date: 02/15/99
Units: ug/L
Analytical Batch: 139246

Parameter	Blank Concentration	Quantitation Limit
PCB-1016	ND	0.10
PCB-1221	ND	0.10
PCB-1232	ND	0.10
PCB-1242	ND	0.10
PCB-1248	ND	0.10
PCB-1254	ND	0.10
PCB-1260	ND	0.10

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TriMatrix Laboratories, Inc.

QUALITY CONTROL REPORT

METHOD PREPARATION BLANK

Fraction:	PCB Scan	USEPA-8081 Scan
Method:	Organochlorine Pesticides & PCBs	
Analyst:	Diane L. VanMale	Test Date: 02/15/99
Units:	mg/kg dry	
QC Batch:	42017-112	

Parameter	Blank Concentration	Quantitation Limit
PCB-1016	<0.33	0.33
PCB-1221	<0.33	0.33
PCB-1232	<0.33	0.33
PCB-1242	<0.30	0.30
PCB-1248	<0.33	0.33
PCB-1254	<0.33	0.33
PCB-1260	<0.33	0.33

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QUALITY CONTROL REPORT

LABORATORY FORTIFIED BLANK

Fraction: PCB Scan USEPA-8081 Scan
Method: Organochlorine Pesticides & PCBs
Analyst: Diane L. VanMale Test Date: 02/15/99
Units: mg/kg dry
QC Batch: 42017-112

Parameter	Spike Quantity	Spike Result	Spike % Rec	Control Limits
PCB-1242	0.329	0.336	102	43 - 137

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QUALITY CONTROL REPORT

METHOD PREPARATION BLANK

Fraction: QC SEMI'S 8270 SPLP FULL
Method: Semi-Volatiles GC/MS
Analyst: Dawn M. Kaufman
Units: mg/L
QC Batch: 42222-115

Test Date: 02/16/99

Parameter	Blank Concentration	Quantitation Limit
1,2,4-Trichlorobenzene	<0.005	0.005
1,4-Dichlorobenzene	<0.005	0.005
2,4,5-Trichlorophenol	<0.050	0.050
2,4,6-Trichlorophenol	<0.005	0.005
2,4-Dichlorophenol	<0.005	0.005
2,4-Dimethylphenol	<0.005	0.005
2,4-Dinitrophenol	<0.020	0.020
2,4-Dinitrotoluene	<0.005	0.005
2-Methylnaphthalene	<0.005	0.005
2-Methylphenol	<0.005	0.005
2-Nitrophenol	<0.005	0.005
4,6-Dinitro-2-Methylphenol	<0.020	0.020
4-Chloro-3-Methylphenol	<0.005	0.005
4-Methylphenol	<0.005	0.005
4-Nitrophenol	<0.020	0.020
Acenaphthene	<0.005	0.005
Acenaphthylene	<0.005	0.005
Anthracene	<0.005	0.005
Benzo (a) Anthracene	<0.005	0.005
Benzo (a) Pyrene	<0.005	0.005
Benzo (g,h,i,) Perylene	<0.005	0.005
Bis (2-ethylhexyl)-Phthalate	<0.005	0.005
Chrysene	<0.005	0.005
2-Chlorophenol	<0.005	0.005
Di-n-Butylphthalate	<0.005	0.005
Dibenzo (a,h) Anthracene	<0.005	0.005
Fluoranthene	<0.005	0.005
Fluorene	<0.005	0.005
Hexachlorobenzene	<0.0001	0.0001
Hexachlorobutadiene	<0.0001	0.0001
Indeno (1,2,3-cd) Pyrene	<0.005	0.005
Benzoic Acid	<0.050	0.050
Hexachlorocyclopentadiene	<0.002	0.002
Isophorone	<0.005	0.005
N-Nitrosodi-n-Propylamine	<0.005	0.005

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TriMatrix Laboratories, Inc.

QUALITY CONTROL REPORT

METHOD PREPARATION BLANK

Fraction: QC SEMI'S 8270 SPLP FULL
Method: Semi-Volatiles GC/MS
Analyst: Dawn M. Kaufman Test Date: 02/16/99
Units: mg/L
QC Batch: 42222-115

Parameter	Blank Concentration	Quantitation Limit
Pentachlorophenol	<0.020	0.020
Phenanthrene	<0.005	0.005
Phenol	<0.005	0.005
Pyrene	<0.005	0.005
Butyl Benzyl Phthalate	<0.005	0.005
Di-n-Octylphthalate	<0.005	0.005
1,2-Dichlorobenzene	<0.005	0.005
Dimethylphthalate	<0.005	0.005
Hexachloroethane	<0.005	0.005
Nitrobenzene	<0.005	0.005
Benzyl Alcohol	<0.050	0.050
Bis (2-Chloroethyl) Ether	<0.005	0.005
Bis (2-Chloroisopropyl)-Ether	<0.005	0.005
Bis (2-Chloroethoxy)-Methane	<0.005	0.005
4-Chloroaniline	<0.020	0.020
4-Bromophenyl Phenylether	<0.005	0.005
2-Chloronaphthalene	<0.005	0.005
4-Chlorophenylphenyl-Ether	<0.005	0.005
4-Nitroaniline	<0.020	0.020
3-Nitroaniline	<0.020	0.020
2-Nitroaniline	<0.020	0.020
2,6-Dinitrotoluene	<0.005	0.005
Dibenzofuran	<0.005	0.005
N-Nitroso-di-Phenylamine	<0.005	0.005
Diethylphthalate	<0.005	0.005
3,3'-Dichlorobenzidine	<0.020	0.020
1,3-Dichlorobenzene	<0.005	0.005
Naphthalene	<0.005	0.005

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34951- 1

QUALITY CONTROL REPORT

LABORATORY FORTIFIED BLANK

Fraction: QC SEMI-VOL'S B/N/A-SPLP
Method: Semi-Volatiles GC/MS
Analyst: Dawn M. Kaufman
Test Date: 02/16/99
Units: mg/L
QC Batch: 42222-115

Parameter	Spike Quantity	Spike Result	Spike % Rec	Control Limits
1,2,4-Trichlorobenzene	0.0100	0.0074	74	31 - 123
1,4-Dichlorobenzene	0.0100	0.0066	66	29 - 125
2,4-Dinitrotoluene	0.0100	0.0110	110	39 - 127
2-Chlorophenol	0.0100	0.0086	86	18 - 124
4-Chloro-3-Methylphenol	0.0100	0.0108	108	46 - 113
Acenaphthene	0.0100	0.0095	95	31 - 129
N-Nitrosodi-n-Propylamine	0.0100	0.0095	95	39 - 106
Naphthalene	0.0100	0.0082	82	34 - 125
Pentachlorophenol	0.0100	0.0126	126	14 - 176
4-Nitrophenol	0.0100	0.0074	**74**	4 - 53
Phenol	0.0100	0.0059	**59**	3 - 56
Pyrene	0.0100	0.0110	110	35 - 145

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34951- 1

QUALITY CONTROL REPORT
SURROGATE RECOVERIES

Method: Organochlorine Pesticides & PCBs USEPA-608 WATER

Surrogate Compound List

SUR-1: Tetrachloro-M-xylene
SUR-2: Decachlorobiphenyl

% R = Percent Recovery

	Compounds:	SUR-1	SUR-2
	Control Limits:	32-141	42-131
Sample # / ID	Batch	% R	% R
BLK-001	139246	126	71

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QUALITY CONTROL REPORT
SURROGATE RECOVERIES

Method: Organochlorine Pesticides & PCBs USEPA-8081 SOIL

Surrogate Compound List

SUR-1: Tetrachloro-M-xylene
SUR-2: Decachlorobiphenyl

% R = Percent Recovery

Sample # / ID	Batch	SUR-1	SUR-2
	Control Limits:	41-123	38-135
		% R	% R
MPB-112	42017	98	86
LFB-112	42017	97	88
216252	42017	94	81

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QUALITY CONTROL REPORT
SURROGATE RECOVERIES

Method: Organochlorine Pesticides USEPA-8081 SPLP

Surrogate Compound List

SUR-1: Tetrachloro-M-xylene
SUR-2: Decachlorobiphenyl

% R = Percent Recovery

	Compounds:	SUR-1	SUR-2
	Control Limits:	47-127	15-128
Sample # / ID	Batch	% R	% R
BLK-001	139323	117	81
MPB-115	42293	**46**	56
LFB-115	42293	**46**	49
216252	42293	**26**	**11**

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QUALITY CONTROL REPORT
SURROGATE RECOVERIES

Method: Semi-Volatiles GC/MS USEPA-8270 SPLP

Surrogate Compound List

SUR-1:	2-Fluorobiphenyl	SUR-4:	d6-Phenol
SUR-2:	2-Fluorophenol	SUR-5:	o-Terphenyl
SUR-3:	d5-Nitrobenzene	SUR-6:	2,4,6-Tribromophenol

% R = Percent Recovery

	Compounds:	SUR-1	SUR-2	SUR-3	SUR-4	SUR-5	SUR-6
	Control Limits:	30-107	11- 85	19-115	3- 59	13-131	19-136
Sample # / ID	Batch	% R	% R	% R	% R	% R	% R
MPB-115	42222	87	78	108	**62**	102	98
LFB-115	42222	91	66	97	51	105	120
216252	42222	92	66	97	51	81	91

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METHODS PAGE

Parameter: Project Specific Fraction USEPA 8081 - SPLP
Method: Organochlorine Pesticides & Herbicides
Application: SPLP Reference Citation: USEPA-8081
Analyst: Diane L. VanMale (DLV) Date Analyzed: 02/17/99

Sample Number	Sample Description	Analytical Batch	QC Batch
216252	Composite	139323	42293-115

Parameter: Project Specific Fraction USEPA SPLP 8270
Method: Semi-Volatiles GC/MS
Application: SPLP Reference Citation: USEPA-8270
Analyst: Dawn M. Kaufman (DMK) Date Analyzed: 02/16/99

Sample Number	Sample Description	Analytical Batch	QC Batch
216252	Composite	139222	42222-115

Parameter: Liquid/Liquid Extraction USEPA Method 3510 - SPLP
Method: Separatory Funnel Liquid-Liquid Extract.
Application: SPLP Reference Citation: USEPA-3510B
Analyst: Brian R. Launs (BRL) Date Analyzed: 02/15/99

Sample Number	Sample Description	Analytical Batch	QC Batch
216252	Composite	139133	-115

Parameter: PCB Extraction
Method: Sonication Extraction
Application: SOIL Reference Citation: USEPA-3550A
Analyst: Brian R. Launs (BRL) Date Analyzed: 02/12/99

Sample Number	Sample Description	Analytical Batch	QC Batch
216252	Composite	138646	-112

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METHODS PAGE

Parameter: Semi-Volatile Extraction
Method: Separatory Funnel Liquid-Liquid Extract
Application: SPLP Reference Citation: USEPA-3510B
Analyst: Brian R. Launs (BRL) Date Analyzed: 02/15/99

Sample Number	Sample Description	Analytical Batch	QC Batch
216252	Composite	139009	-115

Parameter: Mercury, SPLP
Method: Manual Cold Vapor, Mercury
Application: SPLP Reference Citation: USEPA-7471A
Analyst: David W. Johnson (DWJ) Date Analyzed: 02/12/99

Sample Number	Sample Description	Analytical Batch	QC Batch
216252	Composite	139178	42187

Parameter: Mercury, Total
Method: Manual Cold Vapor, Mercury
Application: SOIL Reference Citation: USEPA-7471A
Analyst: David W. Johnson (DWJ) Date Analyzed: 02/15/99

Sample Number	Sample Description	Analytical Batch	QC Batch
216252	Composite	139192	42195

Parameter: Digestion Mtd. 245.1/7471 Mercury-Cold Vapor Method
Method: Digestion for Manual Cold-Vapor Mercury
Application: SPLP Reference Citation: USEPA-7470A
Analyst: Denise S. Coffey (DSC) Date Analyzed: 02/11/99

Sample Number	Sample Description	Analytical Batch	QC Batch
216252	Composite	139155	

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METHODS PAGE

Parameter: Digestion Mtd. 245.1/7471 Mercury-Cold Vapor Method
Method: Digestion for Manual Cold-Vapor Mercury
Application: SOIL Reference Citation: USEPA-7471A
Analyst: Marge A. Scott (MSS) Date Analyzed: 02/12/99

Sample Number	Sample Description	Analytical Batch	QC Batch
216252	Composite	139118	

Parameter: PCB Scan USEPA-8081 Scan
Method: Organochlorine Pesticides & PCBs
Application: SOIL Reference Citation: USEPA-8081
Analyst: Diane L. VanMale (DLV) Date Analyzed: 02/15/99

Sample Number	Sample Description	Analytical Batch	QC Batch
216252	Composite	139246	42017-112

Parameter: Percent Solids
Method: Residue-Gravimetric, Dried @ 103-105*C
Application: SOIL Reference Citation: USEPA-160.3
Analyst: Timothy M. Eldridge (TME) Date Analyzed: 02/09/99

Sample Number	Sample Description	Analytical Batch	QC Batch
216252	Composite	139069	42132

Parameter: Synthetic Extraction Leaching Procedure
Method: Synthetic Precipitation Leaching - SPLP
Application: WASTE Reference Citation: USEPA-1312
Analyst: Marge A. Scott (MSS) Date Analyzed: 02/12/99

Sample Number	Sample Description	Analytical Batch	QC Batch
216252	Composite	139120	

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METHODS PAGE

Parameter: SPLP Extraction - GC/MS Semi-Volatiles
Method: Synthetic Precipitation Leaching-SPLP
Application:WASTE Reference Citation: USEPA-1312
Analyst: Jeff Glaser (JPG3) Date Analyzed: 02/09/99

Sample Number	Sample Description	Analytical Batch	QC Batch
216252	Composite	139011	-109

Parameter: SPLP Extraction-Pesticide USEPA Method 1311
Method: Leaching Procedure (SPLP -ORGANICS)
Application:WASTE Reference Citation: USEPA-1311
Analyst: Jeff Glaser (JPG3) Date Analyzed: 02/09/99

Sample Number	Sample Description	Analytical Batch	QC Batch
216252	Composite	139208	-109

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ANALYSIS-PRETREATMENT DATE SUMMARY PAGE

Detroit Edison
Proj: Dredge Basin - Fermi 2
Maintenance Department
Subm: February 8, 1999 Samples
Sample: Composite

Submittal Number 34951- 1
Date Sampled: 02/08/99
Date Received: 02/08/99

Sample No: 216252

	Analysis		Pretreatment	
	Run Date	Hold Date	Run Date	Hold Date
Project Specific Fraction USEPA 8081 - SPLP	02/17/99	03/27/99	02/15/99	02/16/99
Project Specific Fraction USEPA SPLP 8270	02/16/99	03/27/99	02/15/99	02/16/99
Liquid/Liquid Extraction USEPA Method 3510 - SPLP	02/15/99	02/16/99	02/09/99	02/22/99
PCB Extraction	02/12/99	02/22/99		
Semi-Volatile Extraction	02/15/99	02/16/99	02/09/99	02/22/99
Mercury, SPLP	02/12/99	02/24/99	02/11/99	03/12/99
Mercury, Total	02/15/99	02/25/99	02/12/99	03/08/99
Digestion Mtd. 245.1/7471 Mercury-Cold Vapor Method	02/12/99	03/08/99		
Digestion Mtd. 245.1/7471 Mercury-Cold Vapor Method	02/11/99	03/12/99	02/12/99	08/07/99
PCB Scan USEPA-8081 Scan	02/15/99	03/24/99	02/12/99	02/22/99
Percent Solids	02/09/99	03/08/99		
Synthetic Extraction Leaching Procedure	02/12/99	08/07/99		
SPLP Extraction - GC/MS Semi-Volatiles	02/09/99	02/22/99		
SPLP Extraction-Pesticide USEPA Method 1311	02/09/99	02/22/99		

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Chain of Custody Record

COC No. № 51903

Project Manager	Project Name: Det Edison - Fermi 2	For Lab Use Only
Project No.	Sampler (Print): ELSEY	Rack/Tray No.
	Sampler Signature	Lab Project #: 34951-1

Date Sampled	Time Sampled	Matrix*	Composite	Grab	Sample Identification	No. of Containers	Container Type	Analysis Required/Comments	Sample No.	Filtered Date/Time
2/8/99	0910	SLG		X	DREDGE PIT NORTH INLET	2		2'-4' depths	—	
2/8/99	0935	SLG		X	DREDGE PIT SOUTH OUTLET	2		↓	—	
2/8/99		SLG	X		COMPOSITE			SPLP Pest/Hg/SVOC Total Hg, Total PCBs	216252	76-1

Relinquished By:	Date/Time	Received By:	Received to Lab By:	Date/Time	Logged in By:	Date/Time
[signature]	2/8/99 1340				[signature]	2-9-99 5:15 pm

*Matrix: Water (WTR), Wastewater (WW), Soil (SOIL), Sludge (SLG), Air, Oil, Waste (WASTE)

NRC3-09-0014
RAI Question HY4.2.1-8

Enclosure 5

2001 SPLP Pesticides/Hg/SVOC, Total Hg, and Total PCBs
Analysis of Fermi 2 dredge basin
(following 56 pages)

TriMatrix Laboratories, Inc.

September 21, 2001

Detroit Edison
Attn: Mr. Barry Muller
6400 North Dixie Highway
Newport, MI 48166

RE: Detroit Edison-Fermi 2
Pond Sludge Investigation

Dear Mr. Barry Muller

Enclosed is a copy of your laboratory report and invoice for submittal **34951-13.** This submittal was completely received on August 30, 2001. All analyses have been validated and comply with our Quality Control program statistics unless otherwise noted.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

Lorie L. White
Project Chemist

Enclosure

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STATEMENT OF DATA QUALIFICATIONS

Analysis: **Mercury, SPLP**
Manual Cold Vapor, Mercury
SPLP USEPA-7471A

Qualification:

The analysis of the Method Preparation Blank (MPB) for this parameter, method and associated digestion/extraction batch, had a positive value above the project reporting limit. The corresponding sample result is < 5 times the positive MPB value and therefore must be considered estimated.

Sample(s) Qualified: 286798 DB2001C 0-6.5'

Note: This document is included as a part of the analytical report for the above referenced project and submittal, and should be retained as a permanent record thereof.

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CASE NARRATIVE

Analysis: **Project Specific Fraction**
Organochlorine Pesticides
USEPA-8081 SPLP

Narrative:

The laboratory fortified blank (LFB) recovery for this batch was above the laboratory established control limit for this compound. All results greater than the detection limit should be considered estimated. All results less than the detection limit are acceptable and need no qualification.

Explanation:	% Recovery	Control Limits
Beta-BHC	150	60 - 140
Delta-BHC	162	60 - 140
4,4'-DDD	169	60 - 140
4,4'-DDE	156	60 - 140
4,4'-DDT	148	60 - 140
Methoxychlor	167	9 - 161

QC Batch/LFB Narrated: 68326/LFB-106

Analysis: **Project Specific Fraction**
Polychlorinated Biphenyls by GC
USEPA-8082 SOIL

Narrative:

The instrument blank for this analytical batch had a surrogate recovery that was ouside of the upper control limit. Since there are no positive results in the blank, no data requires qualification.

Explanation:	% Recovery for Tetrachloro-m-xylene Surrogate	Control Limits
BLK-001	120	23 - 119

QC Batch Narrated: 176292

Page 1 - **End of Case Narrative**

TriMatrix Laboratories, Inc.

ANALYTICAL REPORT

Detroit Edison		Submittal #:	**34951-13**
Project:	Detroit Edison-Fermi 2 Pond Sludge Investigation	Sampled:	08/28/01 @ 12:10
		Sampler:	Wooster
Submittal:	August 28, 2001 Samples	Received:	08/29/01 @ 15:27

Sample #: **286796**
Sample ID: **DB2001A**
0-10'

Matrix:

Parameter	**Analytical Result**	**Quant. Limit**	**Unit**	**Analysis Date**	**Chem**	**Reference Citation**
Mercury, SPLP	<0.0004	0.0004	mg/L	09/07/01	DSC	USEPA-7471A
Percent Solids	67	0.1	%	08/31/01	MRJ	USEPA-160.3
Mercury, Total	<0.10	0.10	mg/kg dry	09/04/01	MSS	USEPA-7471A

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ANALYTICAL REPORT

Detroit Edison		Submittal #:	**34951-13**
Project:	Detroit Edison-Fermi 2 Pond Sludge Investigation	Sampled:	08/28/01 @ 12:10
		Sampler:	Wooster
Submittal:	August 28, 2001 Samples	Received:	08/29/01 @ 15:27
Sample #:	**286796**	Extracted:	09/06/01 by DJM
Sample ID:	**DB2001A** **0-10'**	Analyzed:	09/07/01 by JMK1
		Ref. Citation:	USEPA-8270C
		Dilution Factor:	1
Matrix:		Batch Numbers:	A-176209, Q-068284

CAS Number	**Project Specific Fraction USEPA SPLP 8270**	**Analytical Result (mg/L)**	**Quantitation Limit (mg/L)**
83-32-9	Acenaphthene	<0.005	0.005
208-96-8	Acenaphthylene	<0.005	0.005
62-53-3	Aniline	<0.005	0.005
120-12-7	Anthracene	<0.005	0.005
65-85-0	Benzoic Acid	<0.050	0.050
56-55-3	Benzo (a) Anthracene	<0.005	0.005
205-99-2	Benzo (b) Fluoranthene	<0.005	0.005
207-08-9	Benzo (k) Fluoranthene	<0.005	0.005
191-24-2	Benzo (g,h,i,) Perylene	<0.005	0.005
50-32-8	Benzo (a) Pyrene	<0.005	0.005
100-51-6	Benzyl Alcohol	<0.050	0.050
111-91-1	Bis (2-Chloroethoxy)-Methane	<0.005	0.005
111-44-4	Bis (2-Chloroethyl) Ether	<0.005	0.005
108-60-1	Bis (2-Chloroisopropyl)-Ether	<0.005	0.005
117-81-7	Bis (2-ethylhexyl)-Phthalate	<0.005	0.005
101-55-3	4-Bromophenyl Phenylether	<0.005	0.005
85-68-7	Butyl Benzyl Phthalate	<0.005	0.005
106-47-8	4-Chloroaniline	<0.020	0.020
59-50-7	4-Chloro-3-Methylphenol	<0.005	0.005
91-58-7	2-Chloronaphthalene	<0.005	0.005
95-57-8	2-Chlorophenol	<0.005	0.005
7005-72-3	4-Chlorophenylphenyl-Ether	<0.005	0.005
218-01-9	Chrysene	<0.005	0.005
53-70-3	Dibenzo (a,h) Anthracene	<0.005	0.005
132-64-9	Dibenzofuran	<0.005	0.005
84-74-2	Di-n-Butylphthalate	<0.005	0.005
95-50-1	1,2-Dichlorobenzene	<0.005	0.005
541-73-1	1,3-Dichlorobenzene	<0.005	0.005
106-46-7	1,4-Dichlorobenzene	<0.005	0.005
91-94-1	3,3'-Dichlorobenzidine	<0.020	0.020

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ANALYTICAL REPORT

Detroit Edison		Submittal #:	**34951-13**
Project:	Detroit Edison-Fermi 2	Sampled:	08/28/01 @ 12:10
	Pond Sludge Investigation	Sampler:	Wooster
Submittal:	August 28, 2001 Samples	Received:	08/29/01 @ 15:27
Sample #:	**286796**	Extracted:	09/06/01 by DJM
Sample ID:	**DB2001A**	Analyzed:	09/07/01 by JMK1
	0-10'	Ref. Citation:	USEPA-8270C
		Dilution Factor:	1
Matrix:		Batch Numbers:	A-176209, Q-068284

CAS Number	**Project Specific Fraction USEPA SPLP 8270**	**Analytical Result (mg/L)**	**Quantitation Limit (mg/L)**
120-83-2	2,4-Dichlorophenol	<0.005	0.005
84-66-2	Diethylphthalate	<0.005	0.005
105-67-9	2,4-Dimethylphenol	<0.005	0.005
131-11-3	Dimethylphthalate	<0.005	0.005
534-52-1	4,6-Dinitro-2-Methylphenol	<0.020	0.020
51-28-5	2,4-Dinitrophenol	<0.020	0.020
121-14-2	2,4-Dinitrotoluene	<0.005	0.005
606-20-2	2,6-Dinitrotoluene	<0.005	0.005
117-84-0	Di-n-Octylphthalate	<0.005	0.005
206-44-0	Fluoranthene	<0.005	0.005
86-73-7	Fluorene	<0.005	0.005
118-74-1	Hexachlorobenzene	<0.0001	0.0001
87-68-3	Hexachlorobutadiene	<0.0001	0.0001
77-47-4	Hexachlorocyclopentadiene	<0.002	0.002
67-72-1	Hexachloroethane	<0.005	0.005
193-39-5	Indeno (1,2,3-cd) Pyrene	<0.005	0.005
78-59-1	Isophorone	<0.005	0.005
91-57-6	2-Methylnaphthalene	<0.005	0.005
95-48-7	2-Methylphenol	<0.005	0.005
106-44-5	4-Methylphenol	<0.005	0.005
91-20-3	Naphthalene	<0.005	0.005
88-74-4	2-Nitroaniline	<0.020	0.020
99-09-2	3-Nitroaniline	<0.020	0.020
100-01-6	4-Nitroaniline	<0.020	0.020
98-95-3	Nitrobenzene	<0.005	0.005
88-75-5	2-Nitrophenol	<0.005	0.005
100-02-7	4-Nitrophenol	<0.020	0.020
86-30-6	N-Nitroso-di-Phenylamine	<0.005	0.005
621-64-7	N-Nitrosodi-n-Propylamine	<0.005	0.005
87-86-5	Pentachlorophenol	<0.020	0.020
85-01-8	Phenanthrene	<0.005	0.005
108-95-2	Phenol	<0.005	0.005
129-00-0	Pyrene	<0.005	0.005

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TriMatrix Laboratories, Inc.

ANALYTICAL REPORT

Detroit Edison		Submittal #:	**34951-13**
Project:	Detroit Edison-Fermi 2	Sampled:	08/28/01 @ 12:10
	Pond Sludge Investigation	Sampler:	Wooster
Submittal:	August 28, 2001 Samples	Received:	08/29/01 @ 15:27
Sample #:	**286796**	Extracted:	09/06/01 by DJM
Sample ID:	**DB2001A**	Analyzed:	09/07/01 by JMK1
	0-10'	Ref. Citation:	USEPA-8270C
		Dilution Factor:	1
Matrix:		Batch Numbers:	A-176209, Q-068284

CAS Number	**Project Specific Fraction USEPA SPLP 8270**	**Analytical Result (mg/L)**	**Quantitation Limit (mg/L)**
120-82-1	1,2,4-Trichlorobenzene	<0.005	0.005
95-95-4	2,4,5-Trichlorophenol	<0.050	0.050
88-06-2	2,4,6-Trichlorophenol	<0.005	0.005

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TriMatrix Laboratories, Inc.

ANALYTICAL REPORT

Detroit Edison		Submittal #:	**34951-13**
Project:	Detroit Edison-Fermi 2	Sampled:	08/28/01 @ 12:10
	Pond Sludge Investigation	Sampler:	Wooster
Submittal:	August 28, 2001 Samples	Received:	08/29/01 @ 15:27
Sample #:	**286796**	Extracted:	09/06/01 by DJM
Sample ID:	**DB2001A**	Analyzed:	09/07/01 by JDM
	0-10'	Ref. Citation:	USEPA-8081A
		Dilution Factor:	1
Matrix:		Batch Numbers:	A-176292, Q-068326

CAS Number	Project Specific Fraction USEPA 8081 - SPLP	Analytical Result (mg/L)	Quantitation Limit (mg/L)
309-00-2	Aldrin	<0.001	0.001
319-84-6	Alpha-BHC	<0.001	0.001
319-85-7	Beta-BHC	<0.001	0.001
319-86-8	Delta-BHC	<0.001	0.001
58-89-9	Lindane	<0.001	0.001
57-74-9	Chlordane (technical)	<0.001	0.001
72-54-8	4,4'-DDD	<0.001	0.001
72-55-9	4,4'-DDE	<0.001	0.001
50-29-3	4,4'-DDT	<0.001	0.001
60-57-1	Dieldrin	<0.001	0.001
115-29-7	Endosulfan I	<0.001	0.001
33213-65-9	Endosulfan II	<0.001	0.001
1031-07-8	Endosulfan Sulfate	<0.001	0.001
72-20-8	Endrin	<0.001	0.001
7421-93-4	Endrin Aldehyde	<0.001	0.001
76-44-8	Heptachlor	<0.001	0.001
1024-57-3	Heptachlor Epoxide	<0.001	0.001
72-43-5	Methoxychlor	<0.001	0.001
8001-35-2	Toxaphene	<0.001	0.001

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TriMatrix Laboratories, Inc.

ANALYTICAL REPORT

Detroit Edison		Submittal #:	**34951-13**
Project:	Detroit Edison-Fermi 2 Pond Sludge Investigation	Sampled:	08/28/01 @ 12:10
		Sampler:	Wooster
Submittal:	August 28, 2001 Samples	Received:	08/29/01 @ 15:27
Sample #:	**286796**	Extracted:	09/04/01 by CMG
Sample ID:	**DB2001A 0-10'**	Analyzed:	09/10/01 by JDM
		Ref. Citation:	USEPA-8082
		Dilution Factor:	1
Matrix:		Batch Numbers:	A-176265, Q-068321

CAS Number	Project Specific Fraction USEPA 8082 in Soil	Analytical Result (mg/kg dry)	Quantitation Limit (mg/kg dry)
12674-11-2	PCB-1016	<0.33	0.33
11104-28-2	PCB-1221	<0.33	0.33
11141-16-5	PCB-1232	<0.33	0.33
53469-21-9	PCB-1242	<0.33	0.33
12672-29-6	PCB-1248	<0.33	0.33
11097-69-1	PCB-1254	<0.33	0.33
11096-82-5	PCB-1260	<0.33	0.33

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TriMatrix Laboratories, Inc.

ANALYTICAL REPORT

Detroit Edison
Project: Detroit Edison-Fermi 2
Pond Sludge Investigation
Submittal: August 28, 2001 Samples

Submittal #: **34951-13**
Sampled: 08/28/01 @ 13:00
Sampler: Wooster
Received: 08/29/01 @ 15:27

Sample #: **286797**
Sample ID: **DB2001B**
0-7.5'

Matrix:

Parameter	Analytical Result	Quant. Limit	Unit	Analysis Date	Chem	Reference Citation
Mercury, SPLP	<0.0004	0.0004	mg/L	09/07/01	DSC	USEPA-7471A
Percent Solids	67	0.1	%	08/31/01	MRJ	USEPA-160.3
Mercury, Total	0.19	0.10	mg/kg dry	09/04/01	MSS	USEPA-7471A

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TriMatrix Laboratories, Inc.

ANALYTICAL REPORT

Detroit Edison		Submittal #:	**34951-13**
Project:	Detroit Edison-Fermi 2 Pond Sludge Investigation	Sampled:	08/28/01 @ 13:00
		Sampler:	Wooster
Submittal:	August 28, 2001 Samples	Received:	08/29/01 @ 15:27
Sample #:	**286797**	Extracted:	09/06/01 by DJM
Sample ID:	**DB2001B 0-7.5'**	Analyzed:	09/07/01 by JMK1
		Ref. Citation:	USEPA-8270C
		Dilution Factor:	1
Matrix:		Batch Numbers:	A-176209, Q-068284

CAS Number	**Project Specific Fraction USEPA SPLP 8270**	**Analytical Result (mg/L)**	**Quantitation Limit (mg/L)**
83-32-9	Acenaphthene	<0.005	0.005
208-96-8	Acenaphthylene	<0.005	0.005
62-53-3	Aniline	<0.005	0.005
120-12-7	Anthracene	<0.005	0.005
65-85-0	Benzoic Acid	<0.050	0.050
56-55-3	Benzo (a) Anthracene	<0.005	0.005
205-99-2	Benzo (b) Fluoranthene	<0.005	0.005
207-08-9	Benzo (k) Fluoranthene	<0.005	0.005
191-24-2	Benzo (g,h,i,) Perylene	<0.005	0.005
50-32-8	Benzo (a) Pyrene	<0.005	0.005
100-51-6	Benzyl Alcohol	<0.050	0.050
111-91-1	Bis (2-Chloroethoxy)-Methane	<0.005	0.005
111-44-4	Bis (2-Chloroethyl) Ether	<0.005	0.005
108-60-1	Bis (2-Chloroisopropyl)-Ether	<0.005	0.005
117-81-7	Bis (2-ethylhexyl)-Phthalate	<0.005	0.005
101-55-3	4-Bromophenyl Phenylether	<0.005	0.005
85-68-7	Butyl Benzyl Phthalate	<0.005	0.005
106-47-8	4-Chloroaniline	<0.020	0.020
59-50-7	4-Chloro-3-Methylphenol	<0.005	0.005
91-58-7	2-Chloronaphthalene	<0.005	0.005
95-57-8	2-Chlorophenol	<0.005	0.005
7005-72-3	4-Chlorophenylphenyl-Ether	<0.005	0.005
218-01-9	Chrysene	<0.005	0.005
53-70-3	Dibenzo (a,h) Anthracene	<0.005	0.005
132-64-9	Dibenzofuran	<0.005	0.005
84-74-2	Di-n-Butylphthalate	<0.005	0.005
95-50-1	1,2-Dichlorobenzene	<0.005	0.005
541-73-1	1,3-Dichlorobenzene	<0.005	0.005
106-46-7	1,4-Dichlorobenzene	<0.005	0.005
91-94-1	3,3'-Dichlorobenzidine	<0.020	0.020

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TriMatrix Laboratories, Inc.

ANALYTICAL REPORT

Detroit Edison		Submittal #:	**34951-13**
Project:	Detroit Edison-Fermi 2	Sampled:	08/28/01 @ 13:00
	Pond Sludge Investigation	Sampler:	Wooster
Submittal:	August 28, 2001 Samples	Received:	08/29/01 @ 15:27
Sample #:	**286797**	Extracted:	09/06/01 by DJM
Sample ID:	**DB2001B**	Analyzed:	09/07/01 by JMK1
	0-7.5'	Ref. Citation:	USEPA-8270C
		Dilution Factor:	1
Matrix:		Batch Numbers:	A-176209, Q-068284

CAS Number	**Project Specific Fraction USEPA SPLP 8270**	**Analytical Result (mg/L)**	**Quantitation Limit (mg/L)**
120-83-2	2,4-Dichlorophenol	<0.005	0.005
84-66-2	Diethylphthalate	<0.005	0.005
105-67-9	2,4-Dimethylphenol	<0.005	0.005
131-11-3	Dimethylphthalate	<0.005	0.005
534-52-1	4,6-Dinitro-2-Methylphenol	<0.020	0.020
51-28-5	2,4-Dinitrophenol	<0.020	0.020
121-14-2	2,4-Dinitrotoluene	<0.005	0.005
606-20-2	2,6-Dinitrotoluene	<0.005	0.005
117-84-0	Di-n-Octylphthalate	<0.005	0.005
206-44-0	Fluoranthene	<0.005	0.005
86-73-7	Fluorene	<0.005	0.005
118-74-1	Hexachlorobenzene	<0.0001	0.0001
87-68-3	Hexachlorobutadiene	<0.0001	0.0001
77-47-4	Hexachlorocyclopentadiene	<0.002	0.002
67-72-1	Hexachloroethane	<0.005	0.005
193-39-5	Indeno (1,2,3-cd) Pyrene	<0.005	0.005
78-59-1	Isophorone	<0.005	0.005
91-57-6	2-Methylnaphthalene	<0.005	0.005
95-48-7	2-Methylphenol	<0.005	0.005
106-44-5	4-Methylphenol	<0.005	0.005
91-20-3	Naphthalene	<0.005	0.005
88-74-4	2-Nitroaniline	<0.020	0.020
99-09-2	3-Nitroaniline	<0.020	0.020
100-01-6	4-Nitroaniline	<0.020	0.020
98-95-3	Nitrobenzene	<0.005	0.005
88-75-5	2-Nitrophenol	<0.005	0.005
100-02-7	4-Nitrophenol	<0.020	0.020
86-30-6	N-Nitroso-di-Phenylamine	<0.005	0.005
621-64-7	N-Nitrosodi-n-Propylamine	<0.005	0.005
87-86-5	Pentachlorophenol	<0.020	0.020
85-01-8	Phenanthrene	<0.005	0.005
108-95-2	Phenol	<0.005	0.005
129-00-0	Pyrene	<0.005	0.005

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TriMatrix Laboratories, Inc.

ANALYTICAL REPORT

Detroit Edison		Submittal #:	**34951-13**
Project:	Detroit Edison-Fermi 2	Sampled:	08/28/01 @ 13:00
	Pond Sludge Investigation	Sampler:	Wooster
Submittal:	August 28, 2001 Samples	Received:	08/29/01 @ 15:27
Sample #:	**286797**	Extracted:	09/06/01 by DJM
Sample ID:	**DB2001B**	Analyzed:	09/07/01 by JMK1
	0-7.5'	Ref. Citation:	USEPA-8270C
		Dilution Factor:	1
Matrix:		Batch Numbers:	A-176209, Q-068284

CAS Number	**Project Specific Fraction USEPA SPLP 8270**	**Analytical Result (mg/L)**	**Quantitation Limit (mg/L)**
120-82-1	1,2,4-Trichlorobenzene	<0.005	0.005
95-95-4	2,4,5-Trichlorophenol	<0.050	0.050
88-06-2	2,4,6-Trichlorophenol	<0.005	0.005

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TriMatrix Laboratories, Inc.

ANALYTICAL REPORT

Detroit Edison		Submittal #:	**34951-13**
Project:	Detroit Edison-Fermi 2 Pond Sludge Investigation	Sampled:	08/28/01 @ 13:00
		Sampler:	Wooster
Submittal:	August 28, 2001 Samples	Received:	08/29/01 @ 15:27
Sample #:	**286797**	Extracted:	09/06/01 by DJM
Sample ID:	**DB2001B** **0-7.5'**	Analyzed:	09/07/01 by JDM
		Ref. Citation:	USEPA-8081A
		Dilution Factor:	1
Matrix:		Batch Numbers:	A-176292, Q-068326

CAS Number	Project Specific Fraction USEPA 8081 - SPLP	Analytical Result (mg/L)	Quantitation Limit (mg/L)
309-00-2	Aldrin	<0.001	0.001
319-84-6	Alpha-BHC	<0.001	0.001
319-85-7	Beta-BHC	<0.001	0.001
319-86-8	Delta-BHC	<0.001	0.001
58-89-9	Lindane	<0.001	0.001
57-74-9	Chlordane (technical)	<0.001	0.001
72-54-8	4,4'-DDD	<0.001	0.001
72-55-9	4,4'-DDE	<0.001	0.001
50-29-3	4,4'-DDT	<0.001	0.001
60-57-1	Dieldrin	<0.001	0.001
115-29-7	Endosulfan I	<0.001	0.001
33213-65-9	Endosulfan II	<0.001	0.001
1031-07-8	Endosulfan Sulfate	<0.001	0.001
72-20-8	Endrin	<0.001	0.001
7421-93-4	Endrin Aldehyde	<0.001	0.001
76-44-8	Heptachlor	<0.001	0.001
1024-57-3	Heptachlor Epoxide	<0.001	0.001
72-43-5	Methoxychlor	<0.001	0.001
8001-35-2	Toxaphene	<0.001	0.001

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ANALYTICAL REPORT

Detroit Edison		Submittal #:	**34951-13**
Project:	Detroit Edison-Fermi 2	Sampled:	08/28/01 @ 13:00
	Pond Sludge Investigation	Sampler:	Wooster
Submittal:	August 28, 2001 Samples	Received:	08/29/01 @ 15:27
Sample #:	**286797**	Extracted:	09/04/01 by CMG
Sample ID:	**DB2001B**	Analyzed:	09/10/01 by JDM
	0-7.5'	Ref. Citation:	USEPA-8082
		Dilution Factor:	1
Matrix:		Batch Numbers:	A-176265, Q-068321

CAS Number	**Project Specific Fraction USEPA 8082 in Soil**	**Analytical Result (mg/kg dry)**	**Quantitation Limit (mg/kg dry)**
12674-11-2	PCB-1016	<0.33	0.33
11104-28-2	PCB-1221	<0.33	0.33
11141-16-5	PCB-1232	<0.33	0.33
53469-21-9	PCB-1242	<0.33	0.33
12672-29-6	PCB-1248	<0.33	0.33
11097-69-1	PCB-1254	<0.33	0.33
11096-82-5	PCB-1260	<0.33	0.33

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ANALYTICAL REPORT

Detroit Edison		Submittal #:	**34951-13**
Project:	Detroit Edison-Fermi 2	Sampled:	08/28/01 @ 13:40
	Pond Sludge Investigation	Sampler:	Wooster
Submittal:	August 28, 2001 Samples	Received:	08/29/01 @ 15:27

Sample #: **286798**
Sample ID: **DB2001C**
0-6.5'

Matrix:

Parameter	**Analytical Result**	**Quant. Limit**	**Unit**	**Analysis Date**	**Chem**	**Reference Citation**
Mercury, SPLP	* 0.0008	0.0004	mg/L	09/07/01	DSC	USEPA-7471A
Percent Solids	74	0.1	%	08/31/01	MRJ	USEPA-160.3
Mercury, Total	0.10	0.10	mg/kg dry	09/04/01	MSS	USEPA-7471A

* See attached Statement of Data Qualifications.

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ANALYTICAL REPORT

Detroit Edison		Submittal #:	**34951-13**
Project:	Detroit Edison-Fermi 2 Pond Sludge Investigation	Sampled:	08/28/01 @ 13:40
		Sampler:	Wooster
Submittal:	August 28, 2001 Samples	Received:	08/29/01 @ 15:27
Sample #:	**286798**	Extracted:	09/06/01 by DJM
Sample ID:	**DB2001C 0-6.5'**	Analyzed:	09/07/01 by JMK1
		Ref. Citation:	USEPA-8270C
		Dilution Factor:	1
Matrix:		Batch Numbers:	A-176209, Q-068284

CAS Number	Project Specific Fraction USEPA SPLP 8270	Analytical Result (mg/L)	Quantitation Limit (mg/L)
83-32-9	Acenaphthene	<0.005	0.005
208-96-8	Acenaphthylene	<0.005	0.005
62-53-3	Aniline	<0.005	0.005
120-12-7	Anthracene	<0.005	0.005
65-85-0	Benzoic Acid	<0.050	0.050
56-55-3	Benzo (a) Anthracene	<0.005	0.005
205-99-2	Benzo (b) Fluoranthene	<0.005	0.005
207-08-9	Benzo (k) Fluoranthene	<0.005	0.005
191-24-2	Benzo (g,h,i,) Perylene	<0.005	0.005
50-32-8	Benzo (a) Pyrene	<0.005	0.005
100-51-6	Benzyl Alcohol	<0.050	0.050
111-91-1	Bis (2-Chloroethoxy)-Methane	<0.005	0.005
111-44-4	Bis (2-Chloroethyl) Ether	<0.005	0.005
108-60-1	Bis (2-Chloroisopropyl)-Ether	<0.005	0.005
117-81-7	Bis (2-ethylhexyl)-Phthalate	<0.005	0.005
101-55-3	4-Bromophenyl Phenylether	<0.005	0.005
85-68-7	Butyl Benzyl Phthalate	<0.005	0.005
106-47-8	4-Chloroaniline	<0.020	0.020
59-50-7	4-Chloro-3-Methylphenol	<0.005	0.005
91-58-7	2-Chloronaphthalene	<0.005	0.005
95-57-8	2-Chlorophenol	<0.005	0.005
7005-72-3	4-Chlorophenylphenyl-Ether	<0.005	0.005
218-01-9	Chrysene	<0.005	0.005
53-70-3	Dibenzo (a,h) Anthracene	<0.005	0.005
132-64-9	Dibenzofuran	<0.005	0.005
84-74-2	Di-n-Butylphthalate	<0.005	0.005
95-50-1	1,2-Dichlorobenzene	<0.005	0.005
541-73-1	1,3-Dichlorobenzene	<0.005	0.005
106-46-7	1,4-Dichlorobenzene	<0.005	0.005
91-94-1	3,3'-Dichlorobenzidine	<0.020	0.020

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TriMatrix Laboratories, Inc.

ANALYTICAL REPORT

Detroit Edison		Submittal #:	**34951-13**
Project:	Detroit Edison-Fermi 2	Sampled:	08/28/01 @ 13:40
	Pond Sludge Investigation	Sampler:	Wooster
Submittal:	August 28, 2001 Samples	Received:	08/29/01 @ 15:27
Sample #:	**286798**	Extracted:	09/06/01 by DJM
Sample ID:	**DB2001C**	Analyzed:	09/07/01 by JMK1
	0-6.5'	Ref. Citation:	USEPA-8270C
		Dilution Factor:	1
Matrix:		Batch Numbers:	A-176209, Q-068284

CAS Number	Project Specific Fraction USEPA SPLP 8270	Analytical Result (mg/L)	Quantitation Limit (mg/L)
120-83-2	2,4-Dichlorophenol	<0.005	0.005
84-66-2	Diethylphthalate	<0.005	0.005
105-67-9	2,4-Dimethylphenol	<0.005	0.005
131-11-3	Dimethylphthalate	<0.005	0.005
534-52-1	4,6-Dinitro-2-Methylphenol	<0.020	0.020
51-28-5	2,4-Dinitrophenol	<0.020	0.020
121-14-2	2,4-Dinitrotoluene	<0.005	0.005
606-20-2	2,6-Dinitrotoluene	<0.005	0.005
117-84-0	Di-n-Octylphthalate	<0.005	0.005
206-44-0	Fluoranthene	<0.005	0.005
86-73-7	Fluorene	<0.005	0.005
118-74-1	Hexachlorobenzene	<0.0001	0.0001
87-68-3	Hexachlorobutadiene	<0.0001	0.0001
77-47-4	Hexachlorocyclopentadiene	<0.002	0.002
67-72-1	Hexachloroethane	<0.005	0.005
193-39-5	Indeno (1,2,3-cd) Pyrene	<0.005	0.005
78-59-1	Isophorone	<0.005	0.005
91-57-6	2-Methylnaphthalene	<0.005	0.005
95-48-7	2-Methylphenol	<0.005	0.005
106-44-5	4-Methylphenol	<0.005	0.005
91-20-3	Naphthalene	<0.005	0.005
88-74-4	2-Nitroaniline	<0.020	0.020
99-09-2	3-Nitroaniline	<0.020	0.020
100-01-6	4-Nitroaniline	<0.020	0.020
98-95-3	Nitrobenzene	<0.005	0.005
88-75-5	2-Nitrophenol	<0.005	0.005
100-02-7	4-Nitrophenol	<0.020	0.020
86-30-6	N-Nitroso-di-Phenylamine	<0.005	0.005
621-64-7	N-Nitrosodi-n-Propylamine	<0.005	0.005
87-86-5	Pentachlorophenol	<0.020	0.020
85-01-8	Phenanthrene	<0.005	0.005
108-95-2	Phenol	<0.005	0.005
129-00-0	Pyrene	<0.005	0.005

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TriMatrix Laboratories, Inc.

ANALYTICAL REPORT

Detroit Edison		Submittal #:	**34951-13**
Project:	Detroit Edison-Fermi 2	Sampled:	08/28/01 @ 13:40
	Pond Sludge Investigation	Sampler:	Wooster
Submittal:	August 28, 2001 Samples	Received:	08/29/01 @ 15:27
Sample #:	**286798**	Extracted:	09/06/01 by DJM
Sample ID:	**DB2001C**	Analyzed:	09/07/01 by JMK1
	0-6.5'	Ref. Citation:	USEPA-8270C
		Dilution Factor:	1
Matrix:		Batch Numbers:	A-176209, Q-068284

CAS Number	**Project Specific Fraction USEPA SPLP 8270**	**Analytical Result (mg/L)**	**Quantitation Limit (mg/L)**
120-82-1	1,2,4-Trichlorobenzene	<0.005	0.005
95-95-4	2,4,5-Trichlorophenol	<0.050	0.050
88-06-2	2,4,6-Trichlorophenol	<0.005	0.005

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TriMatrix Laboratories, Inc.

ANALYTICAL REPORT

Detroit Edison		Submittal #:	**34951-13**
Project:	Detroit Edison-Fermi 2	Sampled:	08/28/01 @ 13:40
	Pond Sludge Investigation	Sampler:	Wooster
Submittal:	August 28, 2001 Samples	Received:	08/29/01 @ 15:27
Sample #:	**286798**	Extracted:	09/06/01 by DJM
Sample ID:	**DB2001C**	Analyzed:	09/07/01 by JDM
	0-6.5'	Ref. Citation:	USEPA-8081A
		Dilution Factor:	1
Matrix:		Batch Numbers:	A-176292, Q-068326

CAS Number	**Project Specific Fraction USEPA 8081 - SPLP**	**Analytical Result (mg/L)**	**Quantitation Limit (mg/L)**
309-00-2	Aldrin	<0.001	0.001
319-84-6	Alpha-BHC	<0.001	0.001
319-85-7	Beta-BHC	<0.001	0.001
319-86-8	Delta-BHC	<0.001	0.001
58-89-9	Lindane	<0.001	0.001
57-74-9	Chlordane (technical)	<0.001	0.001
72-54-8	4,4'-DDD	<0.001	0.001
72-55-9	4,4'-DDE	<0.001	0.001
50-29-3	4,4'-DDT	<0.001	0.001
60-57-1	Dieldrin	<0.001	0.001
115-29-7	Endosulfan I	<0.001	0.001
33213-65-9	Endosulfan II	<0.001	0.001
1031-07-8	Endosulfan Sulfate	<0.001	0.001
72-20-8	Endrin	<0.001	0.001
7421-93-4	Endrin Aldehyde	<0.001	0.001
76-44-8	Heptachlor	<0.001	0.001
1024-57-3	Heptachlor Epoxide	<0.001	0.001
72-43-5	Methoxychlor	<0.001	0.001
8001-35-2	Toxaphene	<0.001	0.001

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TriMatrix Laboratories, Inc.

ANALYTICAL REPORT

Detroit Edison		Submittal #:	**34951-13**
Project:	Detroit Edison-Fermi 2	Sampled:	08/28/01 @ 13:40
	Pond Sludge Investigation	Sampler:	Wooster
Submittal:	August 28, 2001 Samples	Received:	08/29/01 @ 15:27
Sample #:	**286798**	Extracted:	09/04/01 by CMG
Sample ID:	**DB2001C**	Analyzed:	09/10/01 by JDM
	0-6.5'	Ref. Citation:	USEPA-8082
		Dilution Factor:	1
Matrix:		Batch Numbers:	A-176265, Q-068321

CAS Number	**Project Specific Fraction USEPA 8082 in Soil**	**Analytical Result (mg/kg dry)**	**Quantitation Limit (mg/kg dry)**
12674-11-2	PCB-1016	<0.33	0.33
11104-28-2	PCB-1221	<0.33	0.33
11141-16-5	PCB-1232	<0.33	0.33
53469-21-9	PCB-1242	<0.33	0.33
12672-29-6	PCB-1248	<0.33	0.33
11097-69-1	PCB-1254	<0.33	0.33
11096-82-5	PCB-1260	<0.33	0.33

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ANALYTICAL REPORT

Detroit Edison
Project: Detroit Edison-Fermi 2
Pond Sludge Investigation
Submittal: August 28, 2001 Samples

Submittal #: **34951-13**
Sampled: 08/28/01 @ 14:20
Sampler: Wooster
Received: 08/29/01 @ 15:27

Sample #: **286799**
Sample ID: **DB2001D**
0-7.0'

Matrix:

Parameter	Analytical Result	Quant. Limit	Unit	Analysis Date	Chem	Reference Citation
Mercury, SPLP	<0.0004	0.0004	mg/L	09/07/01	DSC	USEPA-7471A
Percent Solids	54	0.1	%	08/31/01	MRJ	USEPA-160.3
Mercury, Total	<0.10	0.10	mg/kg dry	09/04/01	MSS	USEPA-7471A

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TriMatrix Laboratories, Inc.

ANALYTICAL REPORT

Detroit Edison		Submittal #:	**34951-13**
Project:	Detroit Edison-Fermi 2 Pond Sludge Investigation	Sampled:	08/28/01 @ 14:20
		Sampler:	Wooster
Submittal:	August 28, 2001 Samples	Received:	08/29/01 @ 15:27
Sample #:	**286799**	Extracted:	09/06/01 by DJM
Sample ID:	**DB2001D 0-7.0'**	Analyzed:	09/07/01 by JMK1
		Ref. Citation:	USEPA-8270C
		Dilution Factor:	1
Matrix:		Batch Numbers:	A-176209, Q-068284

CAS Number	**Project Specific Fraction USEPA SPLP 8270**	**Analytical Result (mg/L)**	**Quantitation Limit (mg/L)**
83-32-9	Acenaphthene	<0.005	0.005
208-96-8	Acenaphthylene	<0.005	0.005
62-53-3	Aniline	<0.005	0.005
120-12-7	Anthracene	<0.005	0.005
65-85-0	Benzoic Acid	<0.050	0.050
56-55-3	Benzo (a) Anthracene	<0.005	0.005
205-99-2	Benzo (b) Fluoranthene	<0.005	0.005
207-08-9	Benzo (k) Fluoranthene	<0.005	0.005
191-24-2	Benzo (g,h,i,) Perylene	<0.005	0.005
50-32-8	Benzo (a) Pyrene	<0.005	0.005
100-51-6	Benzyl Alcohol	<0.050	0.050
111-91-1	Bis (2-Chloroethoxy)-Methane	<0.005	0.005
111-44-4	Bis (2-Chloroethyl) Ether	<0.005	0.005
108-60-1	Bis (2-Chloroisopropyl)-Ether	<0.005	0.005
117-81-7	Bis (2-ethylhexyl)-Phthalate	<0.005	0.005
101-55-3	4-Bromophenyl Phenylether	<0.005	0.005
85-68-7	Butyl Benzyl Phthalate	<0.005	0.005
106-47-8	4-Chloroaniline	<0.020	0.020
59-50-7	4-Chloro-3-Methylphenol	<0.005	0.005
91-58-7	2-Chloronaphthalene	<0.005	0.005
95-57-8	2-Chlorophenol	<0.005	0.005
7005-72-3	4-Chlorophenylphenyl-Ether	<0.005	0.005
218-01-9	Chrysene	<0.005	0.005
53-70-3	Dibenzo (a,h) Anthracene	<0.005	0.005
132-64-9	Dibenzofuran	<0.005	0.005
84-74-2	Di-n-Butylphthalate	<0.005	0.005
95-50-1	1,2-Dichlorobenzene	<0.005	0.005
541-73-1	1,3-Dichlorobenzene	<0.005	0.005
106-46-7	1,4-Dichlorobenzene	<0.005	0.005
91-94-1	3,3'-Dichlorobenzidine	<0.020	0.020

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ANALYTICAL REPORT

Detroit Edison		Submittal #:	**34951-13**
Project:	Detroit Edison-Fermi 2	Sampled:	08/28/01 @ 14:20
	Pond Sludge Investigation	Sampler:	Wooster
Submittal:	August 28, 2001 Samples	Received:	08/29/01 @ 15:27
Sample #:	**286799**	Extracted:	09/06/01 by DJM
Sample ID:	**DB2001D**	Analyzed:	09/07/01 by JMK1
	0-7.0'	Ref. Citation:	USEPA-8270C
		Dilution Factor:	1
Matrix:		Batch Numbers:	A-176209, Q-068284

CAS Number	**Project Specific Fraction USEPA SPLP 8270**	**Analytical Result (mg/L)**	**Quantitation Limit (mg/L)**
120-83-2	2,4-Dichlorophenol	<0.005	0.005
84-66-2	Diethylphthalate	<0.005	0.005
105-67-9	2,4-Dimethylphenol	<0.005	0.005
131-11-3	Dimethylphthalate	<0.005	0.005
534-52-1	4,6-Dinitro-2-Methylphenol	<0.020	0.020
51-28-5	2,4-Dinitrophenol	<0.020	0.020
121-14-2	2,4-Dinitrotoluene	<0.005	0.005
606-20-2	2,6-Dinitrotoluene	<0.005	0.005
117-84-0	Di-n-Octylphthalate	<0.005	0.005
206-44-0	Fluoranthene	<0.005	0.005
86-73-7	Fluorene	<0.005	0.005
118-74-1	Hexachlorobenzene	<0.0001	0.0001
87-68-3	Hexachlorobutadiene	<0.0001	0.0001
77-47-4	Hexachlorocyclopentadiene	<0.002	0.002
67-72-1	Hexachloroethane	<0.005	0.005
193-39-5	Indeno (1,2,3-cd) Pyrene	<0.005	0.005
78-59-1	Isophorone	<0.005	0.005
91-57-6	2-Methylnaphthalene	<0.005	0.005
95-48-7	2-Methylphenol	<0.005	0.005
106-44-5	4-Methylphenol	<0.005	0.005
91-20-3	Naphthalene	<0.005	0.005
88-74-4	2-Nitroaniline	<0.020	0.020
99-09-2	3-Nitroaniline	<0.020	0.020
100-01-6	4-Nitroaniline	<0.020	0.020
98-95-3	Nitrobenzene	<0.005	0.005
88-75-5	2-Nitrophenol	<0.005	0.005
100-02-7	4-Nitrophenol	<0.020	0.020
86-30-6	N-Nitroso-di-Phenylamine	<0.005	0.005
621-64-7	N-Nitrosodi-n-Propylamine	<0.005	0.005
87-86-5	Pentachlorophenol	<0.020	0.020
85-01-8	Phenanthrene	<0.005	0.005
108-95-2	Phenol	<0.005	0.005
129-00-0	Pyrene	<0.005	0.005

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ANALYTICAL REPORT

Detroit Edison		Submittal #:	**34951-13**
Project:	Detroit Edison-Fermi 2	Sampled:	08/28/01 @ 14:20
	Pond Sludge Investigation	Sampler:	Wooster
Submittal:	August 28, 2001 Samples	Received:	08/29/01 @ 15:27
Sample #:	**286799**	Extracted:	09/06/01 by DJM
Sample ID:	**DB2001D**	Analyzed:	09/07/01 by JMK1
	0-7.0'	Ref. Citation:	USEPA-8270C
		Dilution Factor:	1
Matrix:		Batch Numbers:	A-176209, Q-068284

CAS Number	**Project Specific Fraction USEPA SPLP 8270**	**Analytical Result (mg/L)**	**Quantitation Limit (mg/L)**
120-82-1	1,2,4-Trichlorobenzene	<0.005	0.005
95-95-4	2,4,5-Trichlorophenol	<0.050	0.050
88-06-2	2,4,6-Trichlorophenol	<0.005	0.005

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TriMatrix Laboratories, Inc.

ANALYTICAL REPORT

Detroit Edison		Submittal #:	**34951-13**
Project:	Detroit Edison-Fermi 2	Sampled:	08/28/01 @ 14:20
	Pond Sludge Investigation	Sampler:	Wooster
Submittal:	August 28, 2001 Samples	Received:	08/29/01 @ 15:27
Sample #:	**286799**	Extracted:	09/06/01 by DJM
Sample ID:	**DB2001D**	Analyzed:	09/07/01 by JDM
	0-7.0'	Ref. Citation:	USEPA-8081A
		Dilution Factor:	1
Matrix:		Batch Numbers:	A-176292, Q-068326

CAS Number	**Project Specific Fraction USEPA 8081 - SPLP**	**Analytical Result (mg/L)**	**Quantitation Limit (mg/L)**
309-00-2	Aldrin	<0.001	0.001
319-84-6	Alpha-BHC	<0.001	0.001
319-85-7	Beta-BHC	<0.001	0.001
319-86-8	Delta-BHC	<0.001	0.001
58-89-9	Lindane	<0.001	0.001
57-74-9	Chlordane (technical)	<0.001	0.001
72-54-8	4,4'-DDD	<0.001	0.001
72-55-9	4,4'-DDE	<0.001	0.001
50-29-3	4,4'-DDT	<0.001	0.001
60-57-1	Dieldrin	<0.001	0.001
115-29-7	Endosulfan I	<0.001	0.001
33213-65-9	Endosulfan II	<0.001	0.001
1031-07-8	Endosulfan Sulfate	<0.001	0.001
72-20-8	Endrin	<0.001	0.001
7421-93-4	Endrin Aldehyde	<0.001	0.001
76-44-8	Heptachlor	<0.001	0.001
1024-57-3	Heptachlor Epoxide	<0.001	0.001
72-43-5	Methoxychlor	<0.001	0.001
8001-35-2	Toxaphene	<0.001	0.001

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ANALYTICAL REPORT

Detroit Edison		Submittal #:	**34951-13**
Project:	Detroit Edison-Fermi 2	Sampled:	08/28/01 @ 14:20
	Pond Sludge Investigation	Sampler:	Wooster
Submittal:	August 28, 2001 Samples	Received:	08/29/01 @ 15:27
Sample #:	**286799**	Extracted:	09/04/01 by CMG
Sample ID:	**DB2001D**	Analyzed:	09/10/01 by JDM
	0-7.0'	Ref. Citation:	USEPA-8082
		Dilution Factor:	1
Matrix:		Batch Numbers:	A-176265, Q-068321

CAS Number	Project Specific Fraction USEPA 8082 in Soil	Analytical Result (mg/kg dry)	Quantitation Limit (mg/kg dry)
12674-11-2	PCB-1016	<0.33	0.33
11104-28-2	PCB-1221	<0.33	0.33
11141-16-5	PCB-1232	<0.33	0.33
53469-21-9	PCB-1242	<0.33	0.33
12672-29-6	PCB-1248	<0.33	0.33
11097-69-1	PCB-1254	<0.33	0.33
11096-82-5	PCB-1260	<0.33	0.33

End of Analytical Report

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QUALITY CONTROL REPORT

Parameter: **Mercury, SPLP**
Method: Manual Cold Vapor, Mercury USEPA-7471A SPLP
Units: mg/L

Method Preparation Blank

Test Date	QC Batch #	Analyst	Blank Conc
09/07/01	68319	DSC	**0.0009**

Laboratory Fortified Blank

Test Date	QC Batch #	Analyst	Spike Qty	Spike Result	Recovery	QC Limits
09/07/01	68319	DSC	0.005	0.00474	95	81-128

Matrix Spike Recovery

Sample Number	Test Date	QC Batch #	Analyst	Sample Conc	Spike Qty	Sample +Spike	Recovery	QC Limits
286796	09/07/01	68319	DSC	<0.0004	0.005	0.00452	90	44-143
286796	09/07/01	68319	DSC	<0.0004	0.005	0.00474	95	44-143

Matrix Spike Duplicate

Sample Number	Test Date	QC Batch #	Analyst	Sample+Spike Conc #1	Sample+Spike Conc #2	RPD	QC Limits
286796	09/07/01	68319	DSC	0.00452	0.00474	5	0- 20

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TriMatrix Laboratories, Inc.

QUALITY CONTROL REPORT

Parameter: **Mercury, Total**
Method: Cold Vapor, Mercury USEPA-7470A WATER
Units: ug/L

Instrument Blank

Test Date	Analytical Batch Number	Analyst	Blank Conc
09/04/01	176060	MSS	<0.2
09/04/01	176060	MSS	<0.2
09/07/01	176290	DSC	<0.2
09/07/01	176290	DSC	<0.2

Laboratory Control Sample

Test Date	Analytical Batch #	Analyst	Spike Qty	Spike Result	Recovery	QC Limits
09/04/01	176060	MSS	3.0	3.15	105	80-120
09/04/01	176060	MSS	0.5	0.50	100	80-120
09/07/01	176290	DSC	2.0	2.15	108	80-120
09/07/01	176290	DSC	0.5	0.44	88	80-120

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QUALITY CONTROL REPORT

Parameter: **Mercury, Total**
Method: Manual Cold Vapor, Mercury USEPA-7471A SOIL
Units: mg/kg dry

Method Preparation Blank

Test Date	QC Batch #	Analyst	Blank Conc
09/04/01	68171	MSS	<0.10

Laboratory Fortified Blank

Test Date	QC Batch #	Analyst	Spike Qty	Spike Result	Recovery	QC Limits
09/04/01	68171	MSS	0.417	0.407	98	79-126

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QUALITY CONTROL REPORT

Parameter: **Percent Solids**
Method: Residue-Gravimetric, Dried @ 103-105*C USEPA-160.3 SOIL
Units: %

Instrument Blank

Test Date	Analytical Batch Number	Analyst	Blank Conc
08/31/01	176140	MRJ	<0.1

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QUALITY CONTROL REPORT

METHOD PREPARATION BLANK

Fraction: Quality Control Fraction
Method: Organochlorine Pesticides & Herbicides
Analyst: James D. McFadden Test Date: 09/07/01
Units: mg/L
QC Batch: 68326-106

Parameter	Blank Concentration	Quantitation Limit
Aldrin	<0.001	0.001
Alpha-BHC	<0.001	0.001
Beta-BHC	<0.001	0.001
Delta-BHC	<0.001	0.001
Lindane	<0.001	0.001
Chlordane (technical)	<0.001	0.001
4,4'-DDD	<0.001	0.001
4,4'-DDE	<0.001	0.001
4,4'-DDT	<0.001	0.001
Dieldrin	<0.001	0.001
Endosulfan I	<0.001	0.001
Endosulfan II	<0.001	0.001
Endosulfan Sulfate	<0.001	0.001
Endrin	<0.001	0.001
Endrin Aldehyde	<0.001	0.001
Heptachlor	<0.001	0.001
Heptachlor Epoxide	<0.001	0.001
Methoxychlor	<0.001	0.001
Toxaphene	<0.001	0.001

TriMatrix Laboratories, Inc.

QUALITY CONTROL REPORT

LABORATORY FORTIFIED BLANK

Fraction: Quality Control Fraction
Method: Organochlorine Pesticides & Herbicides
Analyst: James D. McFadden Test Date: 09/07/01
Units: mg/L
QC Batch: 68326-106

Parameter	Spike Quantity	Spike Result	Spike % Rec	Control Limits
Aldrin	0.2	0.169	85	60 - 140
Alpha-BHC	0.2	0.220	110	60 - 140
Beta-BHC	0.2	0.300	**150**	60 - 140
Delta-BHC	0.2	0.324	**162**	60 - 140
Lindane	0.2	0.244	122	13 - 150
4,4'-DDD	0.2	0.338	**169**	60 - 140
4,4'-DDE	0.2	0.311	**156**	60 - 140
4,4'-DDT	0.2	0.295	**148**	60 - 140
Dieldrin	0.2	0.184	92	60 - 140
Endosulfan I	0.2	0.161	81	60 - 140
Endosulfan II	0.2	0.158	79	60 - 140
Endosulfan Sulfate	0.2	0.218	109	60 - 140
Endrin	0.2	0.230	115	11 - 169
Endrin Aldehyde	0.2	0.196	98	60 - 140
Heptachlor	0.2	0.172	86	28 - 140
Heptachlor Epoxide	0.2	0.182	91	18 - 148
Methoxychlor	0.2	0.334	**167**	9 - 161

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QUALITY CONTROL REPORT

INSTRUMENT BLANK

Fraction: Quality Control Fraction
Method: Polychlorinated Biphenyls by GC
Analyst: James D. McFadden Test Date: 09/10/01
Units: mg/kg dry
Analytical Batch: 176265

Parameter	Blank Concentration	Quantitation Limit
PCB-1016	ND	0.10
PCB-1221	ND	0.10
PCB-1232	ND	0.10
PCB-1242	ND	0.10
PCB-1248	ND	0.10
PCB-1254	ND	0.10
PCB-1260	ND	0.10

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TriMatrix Laboratories, Inc.

QUALITY CONTROL REPORT

METHOD PREPARATION BLANK

Fraction: Quality Control Fraction
Method: Polychlorinated Biphenyls by GC
Analyst: James D. McFadden Test Date: 09/10/01
Units: mg/kg dry
QC Batch: 68321-104

Parameter	Blank Concentration	Quantitation Limit
PCB-1016	<0.10	0.10
PCB-1221	<0.10	0.10
PCB-1232	<0.10	0.10
PCB-1242	<0.10	0.10
PCB-1248	<0.10	0.10
PCB-1254	<0.10	0.10
PCB-1260	<0.10	0.10

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TriMatrix Laboratories, Inc.

QUALITY CONTROL REPORT

LABORATORY FORTIFIED BLANK

Fraction: Quality Control Fraction
Method: Polychlorinated Biphenyls by GC
Analyst: James D. McFadden   Test Date: 09/10/01
Units: mg/kg dry
QC Batch: 68321-104

Parameter	Spike Quantity	Spike Result	Spike % Rec	Control Limits
PCB-1260	0.167	0.173	104	64 - 148

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QUALITY CONTROL REPORT

INSTRUMENT BLANK

Fraction: Organochlorine Pest/PCB's USEPA-608
Method: Organochlorine Pesticides & PCBs
Analyst: James D. McFadden Test Date: 09/07/01
Units: ug/L
Analytical Batch: 176292

Parameter	Blank Concentration	Quantitation Limit
4,4'-DDD	ND	1.0
4,4'-DDE	ND	1.0
4,4'-DDT	ND	1.0
Aldrin	ND	1.0
Alpha-BHC	ND	1.0
Beta-BHC	ND	1.0
Delta-BHC	ND	1.0
Dieldrin	ND	1.0
Endosulfan I	ND	1.0
Endosulfan II	ND	1.0
Endosulfan Sulfate	ND	1.0
Endrin	ND	1.0
Endrin Aldehyde	ND	1.0
Lindane	ND	1.0
Heptachlor	ND	1.0
Heptachlor Epoxide	ND	1.0
Methoxychlor	ND	1.0

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QUALITY CONTROL REPORT

INSTRUMENT BLANK

Fraction: QC SEMI'S 8270 SPLP FULL
Method: Semi-Volatiles GC/MS
Analyst: Janet M. Kudirka Test Date: 09/07/01
Units: mg/L
Analytical Batch: 176209

Parameter	Blank Concentration	Quantitation Limit
1,2,4-Trichlorobenzene	ND	0.005
1,4-Dichlorobenzene	ND	0.005
2,4,5-Trichlorophenol	ND	0.050
2,4,6-Trichlorophenol	ND	0.005
2,4-Dichlorophenol	ND	0.005
2,4-Dimethylphenol	ND	0.005
2,4-Dinitrophenol	ND	0.020
2,4-Dinitrotoluene	ND	0.005
2-Methylnaphthalene	ND	0.005
2-Methylphenol	ND	0.005
2-Nitrophenol	ND	0.005
4,6-Dinitro-2-Methylphenol	ND	0.020
4-Chloro-3-Methylphenol	ND	0.005
4-Methylphenol	ND	0.005
4-Nitrophenol	ND	0.020
Acenaphthene	ND	0.005
Acenaphthylene	ND	0.005
Anthracene	ND	0.005
Benzo (a) Anthracene	ND	0.005
Benzo (a) Pyrene	ND	0.005
Benzo (g,h,i,) Perylene	ND	0.005
Bis (2-ethylhexyl)-Phthalate	ND	0.005
Chrysene	ND	0.005
2-Chlorophenol	ND	0.005
Di-n-Butylphthalate	ND	0.005
Dibenzo (a,h) Anthracene	ND	0.005
Fluoranthene	ND	0.005
Fluorene	ND	0.005
Hexachlorobenzene	ND	0.0001
Hexachlorobutadiene	ND	0.0001
Indeno (1,2,3-cd) Pyrene	ND	0.005
Benzoic Acid	ND	0.050
Hexachlorocyclopentadiene	ND	0.002
Isophorone	ND	0.005
N-Nitrosodi-n-Propylamine	ND	0.005

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QUALITY CONTROL REPORT

INSTRUMENT BLANK

Fraction: QC SEMI'S 8270 SPLP FULL
Method: Semi-Volatiles GC/MS
Analyst: Janet M. Kudirka
Test Date: 09/07/01
Units: mg/L
Analytical Batch: 176209

Parameter	Blank Concentration	Quantitation Limit
Pentachlorophenol	ND	0.020
Phenanthrene	ND	0.005
Phenol	ND	0.005
Pyrene	ND	0.005
Butyl Benzyl Phthalate	ND	0.005
Di-n-Octylphthalate	ND	0.005
1,2-Dichlorobenzene	ND	0.005
Dimethylphthalate	ND	0.005
Hexachloroethane	ND	0.005
Nitrobenzene	ND	0.005
Benzyl Alcohol	ND	0.050
Bis (2-Chloroethyl) Ether	ND	0.005
Bis (2-Chloroisopropyl)-Ether	ND	0.005
Bis (2-Chloroethoxy)-Methane	ND	0.005
4-Chloroaniline	ND	0.020
4-Bromophenyl Phenylether	ND	0.005
2-Chloronaphthalene	ND	0.005
4-Chlorophenylphenyl-Ether	ND	0.005
4-Nitroaniline	ND	0.020
3-Nitroaniline	ND	0.020
2-Nitroaniline	ND	0.020
2,6-Dinitrotoluene	ND	0.005
Dibenzofuran	ND	0.005
N-Nitroso-di-Phenylamine	ND	0.005
Diethylphthalate	ND	0.005
3,3'-Dichlorobenzidine	ND	0.020
1,3-Dichlorobenzene	ND	0.005
Naphthalene	ND	0.005

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TriMatrix Laboratories, Inc.

QUALITY CONTROL REPORT

METHOD PREPARATION BLANK

Fraction: QC SEMI'S 8270 SPLP FULL
Method: Semi-Volatiles GC/MS
Analyst: Janet M. Kudirka Test Date: 09/06/01
Units: mg/L
QC Batch: 68284-106

Parameter	Blank Concentration	Quantitation Limit
1,2,4-Trichlorobenzene	<0.005	0.005
1,4-Dichlorobenzene	<0.005	0.005
2,4,5-Trichlorophenol	<0.050	0.050
2,4,6-Trichlorophenol	<0.005	0.005
2,4-Dichlorophenol	<0.005	0.005
2,4-Dimethylphenol	<0.005	0.005
2,4-Dinitrophenol	<0.020	0.020
2,4-Dinitrotoluene	<0.005	0.005
2-Methylnaphthalene	<0.005	0.005
2-Methylphenol	<0.005	0.005
2-Nitrophenol	<0.005	0.005
4,6-Dinitro-2-Methylphenol	<0.020	0.020
4-Chloro-3-Methylphenol	<0.005	0.005
4-Methylphenol	<0.005	0.005
4-Nitrophenol	<0.020	0.020
Acenaphthene	<0.005	0.005
Acenaphthylene	<0.005	0.005
Anthracene	<0.005	0.005
Benzo (a) Anthracene	<0.005	0.005
Benzo (a) Pyrene	<0.005	0.005
Benzo (g,h,i,) Perylene	<0.005	0.005
Bis (2-ethylhexyl)-Phthalate	<0.005	0.005
Chrysene	<0.005	0.005
2-Chlorophenol	<0.005	0.005
Di-n-Butylphthalate	<0.005	0.005
Dibenzo (a,h) Anthracene	<0.005	0.005
Fluoranthene	<0.005	0.005
Fluorene	<0.005	0.005
Hexachlorobenzene	<0.0001	0.0001
Hexachlorobutadiene	<0.0001	0.0001
Indeno (1,2,3-cd) Pyrene	<0.005	0.005
Benzoic Acid	<0.050	0.050
Hexachlorocyclopentadiene	<0.002	0.002
Isophorone	<0.005	0.005
N-Nitrosodi-n-Propylamine	<0.005	0.005

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QUALITY CONTROL REPORT

METHOD PREPARATION BLANK

Fraction: QC SEMI'S 8270 SPLP FULL
Method: Semi-Volatiles GC/MS
Analyst: Janet M. Kudirka
Units: mg/L
QC Batch: 68284-106

Test Date: 09/06/01

Parameter	Blank Concentration	Quantitation Limit
Pentachlorophenol	<0.020	0.020
Phenanthrene	<0.005	0.005
Phenol	<0.005	0.005
Pyrene	<0.005	0.005
Butyl Benzyl Phthalate	<0.005	0.005
Di-n-Octylphthalate	<0.005	0.005
1,2-Dichlorobenzene	<0.005	0.005
Dimethylphthalate	<0.005	0.005
Hexachloroethane	<0.005	0.005
Nitrobenzene	<0.005	0.005
Benzyl Alcohol	<0.050	0.050
Bis (2-Chloroethyl) Ether	<0.005	0.005
Bis (2-Chloroisopropyl)-Ether	<0.005	0.005
Bis (2-Chloroethoxy)-Methane	<0.005	0.005
4-Chloroaniline	<0.020	0.020
4-Bromophenyl Phenylether	<0.005	0.005
2-Chloronaphthalene	<0.005	0.005
4-Chlorophenylphenyl-Ether	<0.005	0.005
4-Nitroaniline	<0.020	0.020
3-Nitroaniline	<0.020	0.020
2-Nitroaniline	<0.020	0.020
2,6-Dinitrotoluene	<0.005	0.005
Dibenzofuran	<0.005	0.005
N-Nitroso-di-Phenylamine	<0.005	0.005
Diethylphthalate	<0.005	0.005
3,3'-Dichlorobenzidine	<0.020	0.020
1,3-Dichlorobenzene	<0.005	0.005
Naphthalene	<0.005	0.005

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QUALITY CONTROL REPORT

LABORATORY FORTIFIED BLANK

Fraction: QC SEMI-VOL'S B/N/A-SPLP
Method: Semi-Volatiles GC/MS
Analyst: Janet M. Kudirka   Test Date: 09/06/01
Units: mg/L
QC Batch: 68284-106

Parameter	Spike Quantity	Spike Result	Spike % Rec	Control Limits
1,2,4-Trichlorobenzene	0.1	0.0870	87	42 - 116
1,4-Dichlorobenzene	0.1	0.0898	90	39 - 120
2,4-Dinitrotoluene	0.1	0.0786	79	38 - 131
2-Chlorophenol	0.1	0.0802	80	12 - 138
4-Chloro-3-Methylphenol	0.1	0.0787	79	42 - 125
Acenaphthene	0.1	0.0896	90	39 - 123
N-Nitrosodi-n-Propylamine	0.1	0.0883	88	33 - 125
Naphthalene	0.1	0.0882	88	46 - 122
Pentachlorophenol	0.1	0.0596	60	14 - 176
4-Nitrophenol	0.1	0.0267	27	3 - 63
Phenol	0.1	0.0473	47	6 - 74
Pyrene	0.1	0.0907	91	44 - 138

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34951- 13

QUALITY CONTROL REPORT
SURROGATE RECOVERIES

Method: Organochlorine Pesticides & PCBs USEPA-608 WATER

Surrogate Compound List

SUR-1: Tetrachloro-m-xylene
SUR-2: Decachlorobiphenyl

% R = Percent Recovery

	Compounds:	SUR-1	SUR-2
	Control Limits:	23-119	16-114
Sample # / ID	Batch	% R	% R
BLK-001	176292	**120**	87

QUALITY CONTROL REPORT
SURROGATE RECOVERIES

Method: Organochlorine Pesticides & Herbicides USEPA-8081A SPLP

Surrogate Compound List

SUR-1: Tetrachloro-m-xylene
SUR-2: Decachlorobiphenyl

% R = Percent Recovery

		Compounds:	SUR-1	SUR-2
		Control Limits:	33-131	15-128
Sample # / ID	Batch		% R	% R
MPB-106	68326		99	77
LFB-106	68326		100	66
286796	68326		96	58
286797	68326		98	48
286798	68326		94	46
286799	68326		94	38

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QUALITY CONTROL REPORT
SURROGATE RECOVERIES

Method: Semi-Volatiles GC/MS USEPA-8270C SPLP

Surrogate Compound List

SUR-1: 2-Fluorobiphenyl	SUR-4: d6-Phenol
SUR-2: 2-Fluorophenol	SUR-5: o-Terphenyl
SUR-3: d5-Nitrobenzene	SUR-6: 2,4,6-Tribromophenol

% R = Percent Recovery

	Compounds:	SUR-1	SUR-2	SUR-3	SUR-4	SUR-5	SUR-6
	Control Limits:	30-107	11- 85	19-115	3- 59	13-131	19-136
Sample # / ID	Batch	% R	% R	% R	% R	% R	% R
MPB-106	68284	97	67	81	39	100	94
LFB-106	68284	83	59	67	39	96	80
286796	68284	66	39	76	28	63	66
286797	68284	73	46	71	39	70	55
286798	68284	60	41	68	33	62	61
286799	68284	71	53	81	46	79	69

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QUALITY CONTROL REPORT
SURROGATE RECOVERIES

Method: Polychlorinated Biphenyls by GC USEPA-8082 SOIL

Surrogate Compound List

SUR-1: Tetrachloro-M-xylene(SUR)
SUR-2: Decachlorobiphenyl

% R = Percent Recovery

	Compounds:	SUR-1	SUR-2
	Control Limits:	49-136	25-151
Sample # / ID	Batch	% R	% R
BLK-001	176265	89	91
MPB-104	68321	96	91
LFB-104	68321	96	93
286796	68321	74	84
286797	68321	85	93
286798	68321	84	96
286799	68321	77	85

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METHODS PAGE

Parameter: Project Specific Fraction USEPA 8082 in Soil
Method: Polychlorinated Biphenyls by GC
Application: SOIL Reference Citation: USEPA-8082
Analyst: James D. McFadden (JDM) Date Analyzed: 09/10/01

Sample Number	Sample Description		Analytical Batch	QC Batch
286796	DB2001A	0-10'	176265	68321-104
286797	DB2001B	0-7.5'	176265	68321-104
286798	DB2001C	0-6.5'	176265	68321-104
286799	DB2001D	0-7.0'	176265	68321-104

Parameter: Project Specific Fraction USEPA 8081 - SPLP
Method: Organochlorine Pesticides & Herbicides
Application: SPLP Reference Citation: USEPA-8081A
Analyst: James D. McFadden (JDM) Date Analyzed: 09/07/01

Sample Number	Sample Description		Analytical Batch	QC Batch
286796	DB2001A	0-10'	176292	68326-106
286797	DB2001B	0-7.5'	176292	68326-106
286798	DB2001C	0-6.5'	176292	68326-106
286799	DB2001D	0-7.0'	176292	68326-106

Parameter: Project Specific Fraction USEPA SPLP 8270
Method: Semi-Volatiles GC/MS
Application: SPLP Reference Citation: USEPA-8270C
Analyst: Janet M. Kudirka (JMK1) Date Analyzed: 09/07/01

Sample Number	Sample Description		Analytical Batch	QC Batch
286796	DB2001A	0-10'	176209	68284-106
286797	DB2001B	0-7.5'	176209	68284-106
286798	DB2001C	0-6.5'	176209	68284-106
286799	DB2001D	0-7.0'	176209	68284-106

Parameter: Liquid/Liquid Extraction USEPA Method 3510 - SPLP
Method: Separatory Funnel Liquid-Liquid Extract.
Application: TCLP Reference Citation: USEPA-3510B
Analyst: Daniel J. Mierendorf (DJM) Date Analyzed: 09/06/01

Sample Number	Sample Description		Analytical Batch	QC Batch
286796	DB2001A	0-10'	176087	-106

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METHODS PAGE

Parameter: Liquid/Liquid Extraction USEPA Method 3510 - SPLP
Method: Separatory Funnel Liquid-Liquid Extract.
Application: TCLP Reference Citation: USEPA-3510B
Analyst: Daniel J. Mierendorf (DJM) Date Analyzed: 09/06/01

Sample Number	Sample Description		Analytical Batch	QC Batch
286797	DB2001B	0-7.5'	176087	-106
286798	DB2001C	0-6.5'	176087	-106
286799	DB2001D	0-7.0'	176087	-106

Parameter: Liquid/Liquid Extraction USEPA Method 8082/3510
Method: Sonication Extraction
Application: SOIL Reference Citation: USEPA-3550B
Analyst: Christopher M. Guile (CMG) Date Analyzed: 09/04/01

Sample Number	Sample Description		Analytical Batch	QC Batch
286796	DB2001A	0-10'	175873	-104
286797	DB2001B	0-7.5'	175873	-104
286798	DB2001C	0-6.5'	175873	-104
286799	DB2001D	0-7.0'	175873	-104

Parameter: Semi-Volatile Extraction
Method: Separatory Funnel Liquid-Liquid Extract
Application: SPLP Reference Citation: USEPA-3510B
Analyst: Daniel J. Mierendorf (DJM) Date Analyzed: 09/06/01

Sample Number	Sample Description		Analytical Batch	QC Batch
286796	DB2001A	0-10'	176086	-106
286797	DB2001B	0-7.5'	176086	-106
286798	DB2001C	0-6.5'	176086	-106
286799	DB2001D	0-7.0'	176086	-106

Parameter: Mercury, SPLP
Method: Manual Cold Vapor, Mercury
Application: SPLP Reference Citation: USEPA-7471A
Analyst: Denise S. Coffey (DSC) Date Analyzed: 09/07/01

Sample Number	Sample Description		Analytical Batch	QC Batch
286796	DB2001A	0-10'	176290	68319

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METHODS PAGE

Parameter: Mercury, SPLP
Method: Manual Cold Vapor, Mercury
Application: SPLP — Reference Citation: USEPA-7471A
Analyst: Denise S. Coffey (DSC) — Date Analyzed: 09/07/01

Sample Number	Sample Description		Analytical Batch	QC Batch
286797	DB2001B	0-7.5'	176290	68319
286798	DB2001C	0-6.5'	176290	68319
286799	DB2001D	0-7.0'	176290	68319

Parameter: Mercury, Total
Method: Manual Cold Vapor, Mercury
Application: SOIL — Reference Citation: USEPA-7471A
Analyst: Marge A. Scott (MSS) — Date Analyzed: 09/04/01

Sample Number	Sample Description		Analytical Batch	QC Batch
286796	DB2001A	0-10'	176060	68171
286797	DB2001B	0-7.5'	176060	68171
286798	DB2001C	0-6.5'	176060	68171
286799	DB2001D	0-7.0'	176060	68171

Parameter: Digestion Mtd. 245.1/7470 — Mercury-Cold Vapor Method
Method: Digestion for Manual Cold-Vapor Mercury
Application: SPLP — Reference Citation: USEPA-7470A
Analyst: Stacy M. Corthals (SMC) — Date Analyzed: 09/06/01

Sample Number	Sample Description		Analytical Batch	QC Batch
286796	DB2001A	0-10'	176223	
286797	DB2001B	0-7.5'	176223	
286798	DB2001C	0-6.5'	176223	
286799	DB2001D	0-7.0'	176223	

Parameter: Digestion Mtd. 245.1/7470 — Mercury-Cold Vapor Method
Method: Digestion for Manual Cold-Vapor Mercury
Application: SOIL — Reference Citation: USEPA-7471A
Analyst: Marge A. Scott (MSS) — Date Analyzed: 09/04/01

Sample Number	Sample Description		Analytical Batch	QC Batch
286796	DB2001A	0-10'	175977	

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METHODS PAGE

Parameter: Digestion Mtd. 245.1/7470 Mercury-Cold Vapor Method
Method: Digestion for Manual Cold-Vapor Mercury
Application: SOIL Reference Citation: USEPA-7471A
Analyst: Marge A. Scott (MSS) Date Analyzed: 09/04/01

Sample Number	Sample Description		Analytical Batch	QC Batch
286797	DB2001B	0-7.5'	175977	
286798	DB2001C	0-6.5'	175977	
286799	DB2001D	0-7.0'	175977	

Parameter: Percent Solids
Method: Residue-Gravimetric, Dried @ 103-105*C
Application: SOIL Reference Citation: USEPA-160.3
Analyst: Michele R. Jones (MRJ) Date Analyzed: 08/31/01

Sample Number	Sample Description		Analytical Batch	QC Batch
286796	DB2001A	0-10'	176140	68230
286797	DB2001B	0-7.5'	176140	68230
286798	DB2001C	0-6.5'	176140	68230
286799	DB2001D	0-7.0'	176140	68230

Parameter: Synthetic Extraction Leaching Procedure
Method: Synthetic Precipitation Leaching - SPLP
Application: LEACH Reference Citation: USEPA-1312
Analyst: Marge A. Scott (MSS) Date Analyzed: 09/04/01

Sample Number	Sample Description		Analytical Batch	QC Batch
286796	DB2001A	0-10'	176001	
286797	DB2001B	0-7.5'	176001	
286798	DB2001C	0-6.5'	176001	
286799	DB2001D	0-7.0'	176001	

Parameter: SPLP Extraction - GC/MS Semi-Volatiles
Method: Synthetic Precipitation Leaching-SPLP
Application: LEACH Reference Citation: USEPA-1312
Analyst: Marge A. Scott (MSSP) Date Analyzed: 09/05/01

Sample Number	Sample Description		Analytical Batch	QC Batch
286796	DB2001A	0-10'	176030	-105

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METHODS PAGE

Parameter: SPLP Extraction - GC/MS Semi-Volatiles
Method: Synthetic Precipitation Leaching-SPLP
Application: LEACH Reference Citation: USEPA-1312
Analyst: Marge A. Scott (MSSP) Date Analyzed: 09/05/01

Sample Number	Sample Description		Analytical Batch	QC Batch
286797	DB2001B	0-7.5'	176030	-105
286798	DB2001C	0-6.5'	176030	-105
286799	DB2001D	0-7.0'	176030	-105

Parameter: SPLP Extraction-Pesticide USEPA Method 1312
Method: Leaching Procedure (SPLP-ORGANICS)
Application: LEACH Reference Citation: USEPA-1312
Analyst: Marge A. Scott (MSSP) Date Analyzed: 09/05/01

Sample Number	Sample Description		Analytical Batch	QC Batch
286796	DB2001A	0-10'	176031	-105
286797	DB2001B	0-7.5'	176031	-105
286798	DB2001C	0-6.5'	176031	-105
286799	DB2001D	0-7.0'	176031	-105

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ANALYSIS-PRETREATMENT DATE SUMMARY PAGE

Detroit Edison
Proj: Detroit Edison-Fermi 2
Pond Sludge Investigation
Subm: August 28, 2001 Samples
Sample: DB2001A 0-10'

Submittal Number 34951- 13
Date Sampled: 08/28/01
Date Received: 08/29/01
Sample No: 286796

	Analysis		Pretreatment	
	Run Date	Hold Date	Run Date	Hold Date
Project Specific Fraction USEPA 8082 in Soil	09/10/01	10/14/01	09/04/01	09/11/01
Project Specific Fraction USEPA 8081 - SPLP	09/07/01	10/16/01	09/06/01	09/12/01
Project Specific Fraction USEPA SPLP 8270	09/07/01	10/16/01	09/06/01	09/12/01
Liquid/Liquid Extraction USEPA Method 3510 - TCLP	09/06/01	09/12/01	09/05/01	09/11/01
Liquid/Liquid Extraction USEPA Method 8082/3510	09/04/01	09/11/01		
Semi-Volatile Extraction	09/06/01	09/12/01	09/05/01	09/11/01
Mercury, SPLP	09/07/01	10/04/01	09/06/01	10/02/01
Mercury, Total	09/04/01	10/02/01	09/04/01	09/25/01
Digestion Mtd. 245.1/7470 Mercury-Cold Vapor Method	09/04/01	09/25/01		
Digestion Mtd. 245.1/7470 Mercury-Cold Vapor Method	09/06/01	10/02/01	09/04/01	02/24/02
Percent Solids	08/31/01	09/25/01		
Synthetic Extraction Leaching Procedure	09/04/01	02/24/02		
SPLP Extraction - GC/MS Semi-Volatiles	09/05/01	09/11/01		
TCLP Extraction-Pesticide USEPA Method 1311	09/05/01	09/11/01		

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ANALYSIS-PRETREATMENT DATE SUMMARY PAGE

Detroit Edison
Proj: Detroit Edison-Fermi 2
Pond Sludge Investigation
Subm: August 28, 2001 Samples
Sample: DB2001B
0-7.5'

Submittal Number 34951- 13
Date Sampled: 08/28/01
Date Received: 08/29/01

Sample No: 286797

	Analysis		Pretreatment	
	Run Date	Hold Date	Run Date	Hold Date
Project Specific Fraction USEPA 8082 in Soil	09/10/01	10/14/01	09/04/01	09/11/01
Project Specific Fraction USEPA 8081 - SPLP	09/07/01	10/16/01	09/06/01	09/12/01
Project Specific Fraction USEPA SPLP 8270	09/07/01	10/16/01	09/06/01	09/12/01
Liquid/Liquid Extraction USEPA Method 3510 - TCLP	09/06/01	09/12/01	09/05/01	09/11/01
Liquid/Liquid Extraction USEPA Method 8082/3510	09/04/01	09/11/01		
Semi-Volatile Extraction	09/06/01	09/12/01	09/05/01	09/11/01
Mercury, SPLP	09/07/01	10/04/01	09/06/01	10/02/01
Mercury, Total	09/04/01	10/02/01	09/04/01	09/25/01
Digestion Mtd. 245.1/7470 Mercury-Cold Vapor Method	09/04/01	09/25/01		
Digestion Mtd. 245.1/7470 Mercury-Cold Vapor Method	09/06/01	10/02/01	09/04/01	02/24/02
Percent Solids	08/31/01	09/25/01		
Synthetic Extraction Leaching Procedure	09/04/01	02/24/02		
SPLP Extraction - GC/MS Semi-Volatiles	09/05/01	09/11/01		
TCLP Extraction-Pesticide USEPA Method 1311	09/05/01	09/11/01		

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ANALYSIS-PRETREATMENT DATE SUMMARY PAGE

Detroit Edison		Submittal Number	34951- 13
Proj: Detroit Edison-Fermi 2		Date Sampled:	08/28/01
Pond Sludge Investigation		Date Received:	08/29/01
Subm: August 28, 2001 Samples			
Sample:	DB2001C 0-6.5'	Sample No:	286798

	Analysis		Pretreatment	
	Run Date	Hold Date	Run Date	Hold Date
Project Specific Fraction USEPA 8082 in Soil	09/10/01	10/14/01	09/04/01	09/11/01
Project Specific Fraction USEPA 8081 - SPLP	09/07/01	10/16/01	09/06/01	09/12/01
Project Specific Fraction USEPA SPLP 8270	09/07/01	10/16/01	09/06/01	09/12/01
Liquid/Liquid Extraction USEPA Method 3510 - TCLP	09/06/01	09/12/01	09/05/01	09/11/01
Liquid/Liquid Extraction USEPA Method 8082/3510	09/04/01	09/11/01		
Semi-Volatile Extraction	09/06/01	09/12/01	09/05/01	09/11/01
Mercury, SPLP	09/07/01	10/04/01	09/06/01	10/02/01
Mercury, Total	09/04/01	10/02/01	09/04/01	09/25/01
Digestion Mtd. 245.1/7470 Mercury-Cold Vapor Method	09/04/01	09/25/01		
Digestion Mtd. 245.1/7470 Mercury-Cold Vapor Method	09/06/01	10/02/01	09/04/01	02/24/02
Percent Solids	08/31/01	09/25/01		
Synthetic Extraction Leaching Procedure	09/04/01	02/24/02		
SPLP Extraction - GC/MS Semi-Volatiles	09/05/01	09/11/01		
TCLP Extraction-Pesticide USEPA Method 1311	09/05/01	09/11/01		

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ANALYSIS-PRETREATMENT DATE SUMMARY PAGE

Detroit Edison
Proj: Detroit Edison-Fermi 2
Pond Sludge Investigation
Subm: August 28, 2001 Samples
Sample: DB2001D
0-7.0'

Submittal Number 34951- 13
Date Sampled: 08/28/01
Date Received: 08/29/01

Sample No: 286799

	Analysis		Pretreatment	
	Run Date	Hold Date	Run Date	Hold Date
Project Specific Fraction USEPA 8082 in Soil	09/10/01	10/14/01	09/04/01	09/11/01
Project Specific Fraction USEPA 8081 - SPLP	09/07/01	10/16/01	09/06/01	09/12/01
Project Specific Fraction USEPA SPLP 8270	09/07/01	10/16/01	09/06/01	09/12/01
Liquid/Liquid Extraction USEPA Method 3510 - TCLP	09/06/01	09/12/01	09/05/01	09/11/01
Liquid/Liquid Extraction USEPA Method 8082/3510	09/04/01	09/11/01		
Semi-Volatile Extraction	09/06/01	09/12/01	09/05/01	09/11/01
Mercury, SPLP	09/07/01	10/04/01	09/06/01	10/02/01
Mercury, Total	09/04/01	10/02/01	09/04/01	09/25/01
Digestion Mtd. 245.1/7470 Mercury-Cold Vapor Method	09/04/01	09/25/01		
Digestion Mtd. 245.1/7470 Mercury-Cold Vapor Method	09/06/01	10/02/01	09/04/01	02/24/02
Percent Solids	08/31/01	09/25/01		
Synthetic Extraction Leaching Procedure	09/04/01	02/24/02		
SPLP Extraction - GC/MS Semi-Volatiles	09/05/01	09/11/01		
TCLP Extraction-Pesticide USEPA Method 1311	09/05/01	09/11/01		

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Chain of Custody Record

COC No. 69688

34957-13

2.0

Project Manager	Project Name	No's Correspond to Bottle Packing List		For Lab Use Only
	Detroit Edison – Fermi II		Attn: Laura White	Rack/Tray No:
Project No.	Sampler (Print): Wooster			Lab Project #
	Sampler Signature: [signature] ESS			

Date Sampled	Time Sampled	Matrix*	Composite	Grab	Sample Identification	No. of Containers	Container Type	Analysis Required/Comments	Sample No.	~~Filtered Date/Time~~ Test Grp
8-28-01	12:10p	Soil		X	DB20001A 0-10'	1	17	Run only silt * portion for Total/SPLP	286796	TG-01
"	1:00pm	"		X	DB20001B 0-7.5'	1	17	Don't use the clay!! *	286797	↓
"	1:40pm	"		X	DB20001C 0-6.5'	1	17	*	286798	↓
"	2:20pm	"		X	DB20001D 0-7.0'	1	17	*	286799	↓

All 4 samples need:
*-SPLP Hg/BNA/Pest
-Total Hg, % solids, PCBs

Hold samples 90 days
May need 6010/6020 for MTR RCRA 8 Metals → SPLP + Total
at a later date per Barry
Muller of DTE-Fermi II.
MW

Relinquished By:	Date/Time	Received By:	Received to Lab By:	Date/Time	Logged in By:	Date/Time
[signature]	8-29-01 3:10P		[signature]	8/29/01 1522	[signature] 8/30/01	8-30-01

*Matrix: Water (WTR), Wastewater (WW), Soil (SOIL), Sludge (SLG), Air, Oil, Waste (WASTE)

NRC3-09-0014
RAI Question HY4.2.1-8

Enclosure 6

2003 PCB/TCLP Metals/Sieve Analysis of Fermi 2 Service Water Intake
(following 4 pages)

Detroit Edison

Environmental Management and Resources

Waste Identification Form

Sample Date 5/14/2003 **EMR#:** 03E00669 **Report Date:** 5/30/2003

Physical State: Solid **Sampled By:** E. Berger

Sample Location: Fermi 2 Nuclear Power Plant - GSW Intake North, AKA 03E00557

Analysis By: Chemical Engineering, **Method/s:** PCB's, TCLP Metals, Sieve analysis

Results: PCB's = <1ppm, TCLP Metals = see below, Sieve analysis = see attached.

Labels Required Color:

Odor:

Comments:

Constituent	Results (in ppm)	Limits (in ppm)
Arsenic	<1	5.0
Barium	<1	100.0
Cadmium	<0.1	1.0
Chromium	<0.1	5.0
Lead	<1	5.0
Mercury	<0.2	0.2
Selenium	<1	1.0
Silver	<1	5.0

Written By: E. Berger

Detroit Edison

Environmental Management and Resources

Waste Identification Form

Sample Date 5/14/2003 **EMR#:** 03E00671 **Report Date:** 5/30/2003

Physical State: Solid **Sampled By:** E. Berger

Sample Location: Fermi 2 Nuclear Power Plant - GSW Intake Center, AKA 03E00559

Analysis By: Chemical Engineering, **Method/s:** PCB's, TCLP Metals, Sieve analysis

Results: PCB's = <1ppm, TCLP Metals = see below, Sieve analysis = see attached.

Labels Required Color:

Odor:

Comments:

Constituent	Results (in ppm)	Limits (in ppm)
Arsenic	<1	5.0
Barium	<1	100.0
Cadmium	<0.1	1.0
Chromium	<0.1	5.0
Lead	<1	5.0
Mercury	<0.2	0.2
Selenium	<1	1.0
Silver	<1	5.0

Written By: E. Berger

Detroit
Edison

Environmental Management and Resources

Waste Identification Form

Sample Date 5/14/2003 **EMR#:** 03E00670 **Report Date:** 5/30/2003

Physical State: Solid **Sampled By:** E. Berger

Sample Location: Fermi 2 Nuclear Power Plant - GSW Intake South, AKA 03E00558

Analysis By: Chemical Engineering, **Method/s:** PCB's, TCLP Metals, Sieve analysis

Results: PCB's = <1ppm, TCLP Metals = see below, Sieve analysis = see attached.

Labels Required Color:

Odor:

Comments:

Constituent	Results (in ppm)	Limits (in ppm)
Arsenic	<1	5.0
Barium	<1	100.0
Cadmium	<0.1	1.0
Chromium	<0.1	5.0
Lead	<1	5.0
Mercury	<0.2	0.2
Selenium	<1	1.0
Silver	<1	5.0

Written By: E. Berger

est Reference No 1
Stack Reference No 27860
DATE 05/29/03
TIME 05:03 Center

Sieve Aperture	Wt Retained (g)	Wt Retained %
4.000	0.00	0.00
8.000	0.08	0.16
16.000	0.62	1.24
30.000	0.94	1.88
50.000	1.70	3.41
100.000	3.26	6.53
200.000	14.78	29.61
Receiver	28.54	57.17

Total Weight 49.92

CENTER

Test Reference No 2
Stack Reference No 27870
DATE 05/29/03
TIME 05:40 South

Sieve Aperture	Wt Retained (g)	Wt Retained %
4.000	0.00	0.00
8.000	0.04	0.08
16.000	0.20	0.40
30.000	0.20	0.40
50.000	0.66	1.33
100.000	2.36	4.76
200.000	17.96	36.21
Receiver	28.24	56.94

Total Weight 49.60

SOUTH

Test Reference No 3
Stack Reference No 27880
DATE 05/29/03
TIME 06:03 North

Sieve Aperture	Wt Retained (g)	Wt Retained %
4.000	0.06	0.12
8.000	0.00	0.00
16.000	0.00	0.00
30.000	0.00	0.00
50.000	0.04	0.08
100.000	0.64	1.28
200.000	36.54	73.29
Receiver	12.72	25.51

Total Weight 49.86

NORTH

NRC3-09-0014
RAI Question HY4.2.1-8

Enclosure 7

2004 PNA/PCB/TCLP Metals/Sieve Analysis of Fermi 2 Sediment Samples
(following 22 pages)

RTI
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Environmental, Chemical & Metallurgical Testing

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Report of Analytical Services

Detroit Edison
Attn: Esmeralda Zamarron
7940 Livernois (H-136WSC)
Detroit, MI 48210

RTI Project#:	04-3874
Date Reported:	07/02/04
Date Completed:	07/02/04
Permit#:	
Date Received:	06/28/04
PO #:	751772
Report Number:	04-3874-1
Fax:	313-897-0160

Project Title: 8270-PNA, 8082-PCB, TCLP Metals, Sieve Analysis
Project Description: 8 Sediment Samples
Project Name/#: Fermi Sediment
Project Remarks:

Sample Summary

	Sample ID	RTI Sample#	Sample Matrix	Date Collected
1	04E00543	04-3874-001	Sediment	06/28/04
2	04E00544	04-3874-002	Sediment	06/28/04
3	04E00545	04-3874-003	Sediment	06/28/04
4	04E00546	04-3874-004	Sediment	06/28/04
5	04E00547	04-3874-005	Sediment	06/28/04
6	04E00548	04-3874-006	Sediment	06/28/04
7	04E00549	04-3874-007	Sediment	06/28/04
8	04E00550	04-3874-008	Sediment	06/28/04

Approved by : Charles O'Bryan   Date: 7/2/04

Chuck O Bryan, Director of Quality

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Environmental, Chemical & Metallurgical Testing

RESULTS OF ANALYSIS

Client: Detroit Edison		**RTI Project#:**	04-3874
Project: Fermi Sediment	**Report Number:** 04-3874-1	**Page:**	

Analyte	Result	PQL	Units

Sample ID: 04-3874-001; 04E00543

8270 Scan-PNA's (Soil)

Method(s): 3545, 8270 **Date Prepared:** 06/30/04 **Date Analyzed:** 07/01/04 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Acenaphthene	ND	600	ug/kg
Acenaphthylene	ND	600	ug/kg
Anthracene	ND	600	ug/kg
Benzo(a)anthracene	ND	600	ug/kg
Benzo(a)pyrene	ND	600	ug/kg
Benzo(b)fluoranthene	ND	600	ug/kg
Benzo(ghi)Perylene	ND	600	ug/kg
Benzo(k)fluoranthene	ND	600	ug/kg
Chrysene	ND	600	ug/kg
Dibenzo(a,h)anthracene	ND	600	ug/kg
Fluoranthene	ND	600	ug/kg
Fluorene	ND	600	ug/kg
Indeno(1,2,3-cd)pyrene	ND	600	ug/kg
2-Methylnaphthalene	ND	600	ug/kg
Naphthalene	ND	600	ug/kg
Phenanthrene	ND	600	ug/kg
Pyrene	ND	600	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
2-Fluorobiphenyl (Surr)	56.0	30 - 115	
Nitrobenzene-d5 (surr.)	62.0	23 - 120	
Terphenyl-d14 (surr.)	66.0	18 - 137	

8082 PCB's (Soil)

Method(s): 3545, 8082 **Date Prepared:** 06/30/04 **Date Analyzed:** 06/30/04 **Analyzed by:** MB

Analyte	Result	PQL	Units
Aroclor 1016	ND	30	ug/kg
Aroclor 1221	ND	30	ug/kg
Aroclor 1232	ND	30	ug/kg
Aroclor 1242	ND	30	ug/kg
Aroclor 1248	ND	30	ug/kg

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Client: Detroit Edison		**RTI Project#:**	04-3874
Project: Fermi Sediment	**Report Number:** 04-3874-1	**Page:**	Page 3 of 21

continued from previous page...

Sample ID: 04-3874-001; 04E00543

Analyte	Result	PQL	Units
Aroclor 1254	ND	30	ug/kg
Aroclor 1260	ND	30	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	78	30 - 115	

Metals Analysis-TCLP

Method(s): 1311 3020, 6020 **Date Prepared:** 07/01/04 **Date Analyzed:** 07/01/04 **Analyzed by:** AV

Analyte	Result	PQL	Units
Arsenic, As	ND	0.05	mg/L
Barium, Ba	**0.39**	0.05	mg/L
Cadmium, Cd	ND	0.05	mg/L
Chromium, Cr	ND	0.05	mg/L
Lead, Pb	ND	0.05	mg/L
Selenium, Se	ND	0.05	mg/L
Silver, Ag	ND	0.05	mg/L
Copper, Cu	ND	0.05	mg/L
Zinc, Zn	**0.21**	0.05	mg/L
Manganese, Mn	**3.80**	0.05	mg/L
Nickel, Ni	ND	0.05	mg/L

Hg Analysis-TCLP

Method(s): 1311, 7470 **Date Prepared:** 07/01/04 **Date Analyzed:** 07/01/04 **Analyzed by:** JE

Analyte	Result	PQL	Units
Mercury, Hg	ND	0.0007	mg/L

Sieve Analysis

Method(s): **Date Analyzed:** 07/02/04 **Analyzed by:** CO

Analyte	Result	PQL	Units
Ten (10)	**74**	0.10	% Retained
Forty (40)	**13**	0.10	% Retained
One Hundred (100)	**6.9**	0.10	% Retained
Two Hundred (200)	**4.5**	0.10	% Retained

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Client:	Detroit Edison		RTI Project#:	04-3874
Project:	Fermi Sediment	Report Number: 04-3874-1	Page:	Page 4 of 21

Sample ID: 04-3874-002; 04E00544

8270 Scan-PNA's (Soil)

Method(s): 3545, 8270 **Date Prepared:** 06/30/04 **Date Analyzed:** 07/01/04 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Acenaphthene	ND	430	ug/kg
Acenaphthylene	ND	430	ug/kg
Anthracene	ND	430	ug/kg
Benzo(a)anthracene	ND	430	ug/kg
Benzo(a)pyrene	ND	430	ug/kg
Benzo(b)fluoranthene	ND	430	ug/kg
Benzo(ghi)Perylene	ND	430	ug/kg
Benzo(k)fluoranthene	ND	430	ug/kg
Chrysene	ND	430	ug/kg
Dibenzo(a,h)anthracene	ND	430	ug/kg
Fluoranthene	ND	430	ug/kg
Fluorene	ND	430	ug/kg
Indeno(1,2,3-cd)pyrene	ND	430	ug/kg
2-Methylnaphthalene	ND	430	ug/kg
Naphthalene	ND	430	ug/kg
Phenanthrene	ND	430	ug/kg
Pyrene	ND	430	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
2-Fluorobiphenyl (Surr)	54.0	30 - 115	
Nitrobenzene-d5 (surr.)	62.0	23 - 120	
Terphenyl-d14 (surr.)	58.0	18 - 137	

8082 PCB's (Soil)

Method(s): 3545, 8082 **Date Prepared:** 06/30/04 **Date Analyzed:** 06/30/04 **Analyzed by:** MB

Analyte	Result	PQL	Units
Aroclor 1016	ND	21	ug/kg
Aroclor 1221	ND	21	ug/kg
Aroclor 1232	ND	21	ug/kg
Aroclor 1242	ND	21	ug/kg
Aroclor 1248	ND	21	ug/kg
Aroclor 1254	ND	21	ug/kg
Aroclor 1260	ND	21	ug/kg

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Client: Detroit Edison		**RTI Project#:**	04-3874
Project: Fermi Sediment	**Report Number:** 04-3874-1	**Page:**	Page 5 of 21

Analyte	Result	PQL	Units

continued from previous page...

Sample ID: 04-3874-002; 04E00544

Surrogate Recovery Data

Compound	%Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	100	30 - 115	

Metals Analysis-TCLP

Method(s): 1311 3020, 6020 **Date Prepared:** 07/01/04 **Date Analyzed:** 07/01/04 **Analyzed by:** AV

Arsenic, As	ND	0.05	mg/L
Barium, Ba	**0.42**	0.05	mg/L
Cadmium, Cd	ND	0.05	mg/L
Chromium, Cr	ND	0.05	mg/L
Lead, Pb	ND	0.05	mg/L
Selenium, Se	ND	0.05	mg/L
Silver, Ag	ND	0.05	mg/L
Copper, Cu	ND	0.05	mg/L
Zinc, Zn	**0.21**	0.05	mg/L
Manganese, Mn	**3.56**	0.05	mg/L
Nickel, Ni	ND	0.05	mg/L

Hg Analysis-TCLP

Method(s): 1311, 7470 **Date Prepared:** 07/01/04 **Date Analyzed:** 07/01/04 **Analyzed by:** JE

Mercury, Hg	ND	0.0005	mg/L

Sieve Analysis

Method(s): **Date Analyzed:** 07/02/04 **Analyzed by:** CO

Ten (10)	**43**	0.10	% Retained
Forty (40)	**23**	0.10	% Retained
One Hundred (100)	**9.6**	0.10	% Retained
Two Hundred (200)	**18**	0.10	% Retained

Client: Detroit Edison		**RTI Project#:**	04-3874
Project: Fermi Sediment	**Report Number:** 04-3874-1	**Page:**	Page 6 of 21

Analyte	Result	PQL	Units

Sample ID: 04-3874-003; 04E00545

8270 Scan-PNA's (Soil)

Method(s): 3545, 8270 **Date Prepared:** 06/30/04 **Date Analyzed:** 07/01/04 **Analyzed by:** JG3

Acenaphthene	ND	490	ug/kg
Acenaphthylene	ND	490	ug/kg
Anthracene	ND	490	ug/kg
Benzo(a)anthracene	ND	490	ug/kg
Benzo(a)pyrene	ND	490	ug/kg
Benzo(b)fluoranthene	ND	490	ug/kg
Benzo(ghi)Perylene	ND	490	ug/kg
Benzo(k)fluoranthene	ND	490	ug/kg
Chrysene	ND	490	ug/kg
Dibenzo(a,h)anthracene	ND	490	ug/kg
Fluoranthene	ND	490	ug/kg
Fluorene	ND	490	ug/kg
Indeno(1,2,3-cd)pyrene	ND	490	ug/kg
2-Methylnaphthalene	ND	490	ug/kg
Naphthalene	ND	490	ug/kg
Phenanthrene	ND	490	ug/kg
Pyrene	ND	490	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
2-Fluorobiphenyl (Surr)	46.0	30 - 115	
Nitrobenzene-d5 (surr.)	49.0	23 - 120	
Terphenyl-d14 (surr.)	56.0	18 - 137	

8082 PCB's (Soil)

Method(s): 3545, 8082 **Date Prepared:** 06/30/04 **Date Analyzed:** 06/30/04 **Analyzed by:** MB

Aroclor 1016	ND	25	ug/kg
Aroclor 1221	ND	25	ug/kg
Aroclor 1232	ND	25	ug/kg
Aroclor 1242	ND	25	ug/kg
Aroclor 1248	ND	25	ug/kg
Aroclor 1254	ND	25	ug/kg
Aroclor 1260	ND	25	ug/kg

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Client: Detroit Edison		**RTI Project#:**	04-3874
Project: Fermi Sediment	**Report Number:** 04-3874-1	**Page:**	

Analyte	Result	PQL	Units

continued from previous page...

Sample ID: 04-3874-003; 04E00545

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	110	30 - 115	

Metals Analysis-TCLP

Method(s): 1311 3020, 6020 **Date Prepared:** 07/01/04 **Date Analyzed:** 07/01/04 **Analyzed by:** AV

Analyte	Result	PQL	Units
Arsenic, As	ND	0.05	mg/L
Barium, Ba	**0.45**	0.05	mg/L
Cadmium, Cd	ND	0.05	mg/L
Chromium, Cr	ND	0.05	mg/L
Lead, Pb	ND	0.05	mg/L
Selenium, Se	ND	0.05	mg/L
Silver, Ag	ND	0.05	mg/L
Copper, Cu	ND	0.05	mg/L
Zinc, Zn	**0.25**	0.05	mg/L
Manganese, Mn	**4.20**	0.05	mg/L
Nickel, Ni	ND	0.05	mg/L

Hg Analysis-TCLP

Method(s): 1311, 7470 **Date Prepared:** 07/01/04 **Date Analyzed:** 07/01/04 **Analyzed by:** JE

Analyte	Result	PQL	Units
Mercury, Hg	ND	0.0006	mg/L

Sieve Analysis

Method(s): **Date Analyzed:** 07/02/04 **Analyzed by:** CO

Analyte	Result	PQL	Units
Ten (10)	**45**	0.10	% Retained
Forty (40)	**27**	0.10	% Retained
One Hundred (100)	**7.9**	0.10	% Retained
Two Hundred (200)	**11**	0.10	% Retained

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Client:	Detroit Edison		RTI Project#:	04-3874
Project:	Fermi Sediment	Report Number: 04-3874-1	Page:	Page 8 of 21

Analyte	Result	PQL	Units

Sample ID: 04-3874-004; 04E00546

8270 Scan-PNA's (Soil)

Method(s): 3545, 8270 **Date Prepared:** 06/30/04 **Date Analyzed:** 07/01/04 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Acenaphthene	ND	400	ug/kg
Acenaphthylene	ND	400	ug/kg
Anthracene	ND	400	ug/kg
Benzo(a)anthracene	ND	400	ug/kg
Benzo(a)pyrene	ND	400	ug/kg
Benzo(b)fluoranthene	ND	400	ug/kg
Benzo(ghi)Perylene	ND	400	ug/kg
Benzo(k)fluoranthene	ND	400	ug/kg
Chrysene	ND	400	ug/kg
Dibenzo(a,h)anthracene	ND	400	ug/kg
Fluoranthene	ND	400	ug/kg
Fluorene	ND	400	ug/kg
Indeno(1,2,3-cd)pyrene	ND	400	ug/kg
2-Methylnaphthalene	ND	400	ug/kg
Naphthalene	ND	400	ug/kg
Phenanthrene	ND	400	ug/kg
Pyrene	ND	400	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
2-Fluorobiphenyl (Surr)	49.0	30 - 115	
Nitrobenzene-d5 (surr.)	54.0	23 - 120	
Terphenyl-d14 (surr.)	51.0	18 - 137	

8082 PCB's (Soil)

Method(s): 3545, 8082 **Date Prepared:** 06/30/04 **Date Analyzed:** 06/30/04 **Analyzed by:** MB

Analyte	Result	PQL	Units
Aroclor 1016	ND	20	ug/kg
Aroclor 1221	ND	20	ug/kg
Aroclor 1232	ND	20	ug/kg
Aroclor 1242	ND	20	ug/kg
Aroclor 1248	ND	20	ug/kg
Aroclor 1254	ND	20	ug/kg
Aroclor 1260	ND	20	ug/kg

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Environmental, Chemical & Metallurgical Testing

Client: Detroit Edison		**RTI Project#:**	04-3874
Project: Fermi Sediment	**Report Number:** 04-3874-1	**Page:**	

Analyte	Result	PQL	Units

continued from previous page...

Sample ID: 04-3874-004; 04E00546

Surrogate Recovery Data

Compound	%Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	96	30 - 115	

Metals Analysis-TCLP

Method(s): 1311 3020, 6020 **Date Prepared:** 07/01/04 **Date Analyzed:** 07/01/04 **Analyzed by:** AV

Arsenic, As	ND	0.05	mg/L
Barium, Ba	**0.43**	0.05	mg/L
Cadmium, Cd	ND	0.05	mg/L
Chromium, Cr	ND	0.05	mg/L
Lead, Pb	ND	0.05	mg/L
Selenium, Se	ND	0.05	mg/L
Silver, Ag	ND	0.05	mg/L
Copper, Cu	ND	0.05	mg/L
Zinc, Zn	**0.27**	0.05	mg/L
Manganese, Mn	**3.60**	0.05	mg/L
Nickel, Ni	**0.08**	0.05	mg/L

Hg Analysis-TCLP

Method(s): 1311, 7470 **Date Prepared:** 07/01/04 **Date Analyzed:** 07/01/04 **Analyzed by:** JE

Mercury, Hg	ND	0.0005	mg/L

Sieve Analysis

Method(s): **Date Analyzed:** 07/02/04 **Analyzed by:** CO

Ten (10)	**14**	0.10	% Retained
Forty (40)	**26**	0.10	% Retained
One Hundred (100)	**12**	0.10	% Retained
Two Hundred (200)	**30**	0.10	% Retained

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Client: Detroit Edison		**RTI Project#:**	04-3874
Project: Fermi Sediment	**Report Number:** 04-3874-1	**Page:**	Page 10 of 21

Analyte	Result	PQL	Units

Sample ID: 04-3874-005; 04E00547

8270 Scan-PNA's (Soil)

Method(s): 3545, 8270 **Date Prepared:** 06/30/04 **Date Analyzed:** 07/01/04 **Analyzed by:** JG3

Acenaphthene	ND	410	ug/kg
Acenaphthylene	ND	410	ug/kg
Anthracene	ND	410	ug/kg
Benzo(a)anthracene	ND	410	ug/kg
Benzo(a)pyrene	ND	410	ug/kg
Benzo(b)fluoranthene	ND	410	ug/kg
Benzo(ghi)Perylene	ND	410	ug/kg
Benzo(k)fluoranthene	ND	410	ug/kg
Chrysene	ND	410	ug/kg
Dibenzo(a,h)anthracene	ND	410	ug/kg
Fluoranthene	ND	410	ug/kg
Fluorene	ND	410	ug/kg
Indeno(1,2,3-cd)pyrene	ND	410	ug/kg
2-Methylnaphthalene	ND	410	ug/kg
Naphthalene	ND	410	ug/kg
Phenanthrene	ND	410	ug/kg
Pyrene	ND	410	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
2-Fluorobiphenyl (Surr)	52.0	30 - 115	
Nitrobenzene-d5 (surr.)	58.0	23 - 120	
Terphenyl-d14 (surr.)	54.0	18 - 137	

8082 PCB's (Soil)

Method(s): 3545, 8082 **Date Prepared:** 06/30/04 **Date Analyzed:** 06/30/04 **Analyzed by:** MB

Aroclor 1016	ND	20	ug/kg
Aroclor 1221	ND	20	ug/kg
Aroclor 1232	ND	20	ug/kg
Aroclor 1242	ND	20	ug/kg
Aroclor 1248	ND	20	ug/kg
Aroclor 1254	ND	20	ug/kg
Aroclor 1260	ND	20	ug/kg

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Environmental, Chemical & Metallurgical Testing

Client: Detroit Edison		**RTI Project#:**	04-3874
Project: Fermi Sediment	**Report Number:** 04-3874-1	**Page:**	Page 11 of 21

Analyte	Result	PQL	Units

continued from previous page...

Sample ID: 04-3874-005; 04E00547

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	97	30 - 115	

Metals Analysis-TCLP

Method(s): 1311 3020, 6020 **Date Prepared:** 07/01/04 **Date Analyzed:** 07/01/04 **Analyzed by:** AV

Arsenic, As	ND	0.05	mg/L
Barium, Ba	**0.46**	0.05	mg/L
Cadmium, Cd	ND	0.05	mg/L
Chromium, Cr	ND	0.05	mg/L
Lead, Pb	ND	0.05	mg/L
Selenium, Se	ND	0.05	mg/L
Silver, Ag	ND	0.05	mg/L
Copper, Cu	ND	0.05	mg/L
Zinc, Zn	**0.27**	0.05	mg/L
Manganese, Mn	**4.10**	0.05	mg/L
Nickel, Ni	**0.06**	0.05	mg/L

Hg Analysis-TCLP

Method(s): 1311, 7470 **Date Prepared:** 07/01/04 **Date Analyzed:** 07/01/04 **Analyzed by:** JE

Mercury, Hg	ND	0.0005	mg/L

Sieve Analysis

Method(s): **Date Analyzed:** 07/02/04 **Analyzed by:** CO

Ten (10)	**75**	0.10	% Retained
Forty (40)	**14**	0.10	% Retained
One Hundred (100)	**2.3**	0.10	% Retained
Two Hundred (200)	**3.0**	0.10	% Retained

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Environmental, Chemical & Metallurgical Testing

Client: Detroit Edison		**RTI Project#:**	04-3874
Project: Fermi Sediment	**Report Number:** 04-3874-1	**Page:**	

Analyte	Result	PQL	Units

Sample ID: 04-3874-006; 04E00548

8270 Scan-PNA's (Soil)

Method(s): 3545, 8270 **Date Prepared:** 06/30/04 **Date Analyzed:** 07/01/04 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Acenaphthene	ND	450	ug/kg
Acenaphthylene	ND	450	ug/kg
Anthracene	ND	450	ug/kg
Benzo(a)anthracene	ND	450	ug/kg
Benzo(a)pyrene	ND	450	ug/kg
Benzo(b)fluoranthene	ND	450	ug/kg
Benzo(ghi)Perylene	ND	450	ug/kg
Benzo(k)fluoranthene	ND	450	ug/kg
Chrysene	ND	450	ug/kg
Dibenzo(a,h)anthracene	ND	450	ug/kg
Fluoranthene	ND	450	ug/kg
Fluorene	ND	450	ug/kg
Indeno(1,2,3-cd)pyrene	ND	450	ug/kg
2-Methylnaphthalene	ND	450	ug/kg
Naphthalene	ND	450	ug/kg
Phenanthrene	ND	450	ug/kg
Pyrene	ND	450	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
2-Fluorobiphenyl (Surr)	49.0	30 - 115	
Nitrobenzene-d5 (surr.)	58.0	23 - 120	
Terphenyl-d14 (surr.)	50.0	18 - 137	

8082 PCB's (Soil)

Method(s): 3545, 8082 **Date Prepared:** 06/30/04 **Date Analyzed:** 06/30/04 **Analyzed by:** MB

Analyte	Result	PQL	Units
Aroclor 1016	ND	23	ug/kg
Aroclor 1221	ND	23	ug/kg
Aroclor 1232	ND	23	ug/kg
Aroclor 1242	ND	23	ug/kg
Aroclor 1248	ND	23	ug/kg
Aroclor 1254	ND	23	ug/kg
Aroclor 1260	ND	23	ug/kg

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RTI LABORATORIES, INC.
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Client: Detroit Edison		**RTI Project#:** 04-3874
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Analyte	Result	PQL	Units

continued from previous page...

Sample ID: 04-3874-006; 04E00548

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	100	30 - 115	

Metals Analysis-TCLP

Method(s): 1311 3020, 6020 **Date Prepared:** 07/01/04 **Date Analyzed:** 07/01/04 **Analyzed by:** AV

Arsenic, As	ND	0.05	mg/L
Barium, Ba	**0.42**	0.05	mg/L
Cadmium, Cd	ND	0.05	mg/L
Chromium, Cr	ND	0.05	mg/L
Lead, Pb	ND	0.05	mg/L
Selenium, Se	ND	0.05	mg/L
Silver, Ag	ND	0.05	mg/L
Copper, Cu	ND	0.05	mg/L
Zinc, Zn	**0.25**	0.05	mg/L
Manganese, Mn	**3.50**	0.05	mg/L
Nickel, Ni	ND	0.05	mg/L

Hg Analysis-TCLP

Method(s): 1311, 7470 **Date Prepared:** 07/01/04 **Date Analyzed:** 07/01/04 **Analyzed by:** JE

Mercury, Hg	ND	0.0005	mg/L

Sieve Analysis

Method(s): **Date Analyzed:** 07/02/04 **Analyzed by:** CO

Ten (10)	**63**	0.10	% Retained
Forty (40)	**22**	0.10	% Retained
One Hundred (100)	**4.2**	0.10	% Retained
Two Hundred (200)	**4.7**	0.10	% Retained

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Client: Detroit Edison		**RTI Project#:**	04-3874
Project: Fermi Sediment	**Report Number:** 04-3874-1	**Page:**	

Analyte	Result	PQL	Units

Sample ID: 04-3874-007; 04E00549

8270 Scan-PNA's (Soil)

Method(s): 3545, 8270 **Date Prepared:** 06/30/04 **Date Analyzed:** 07/01/04 **Analyzed by:** JG3

Analyte	Result	PQL	Units
Acenaphthene	ND	300	ug/kg
Acenaphthylene	ND	300	ug/kg
Anthracene	ND	300	ug/kg
Benzo(a)anthracene	ND	300	ug/kg
Benzo(a)pyrene	ND	300	ug/kg
Benzo(b)fluoranthene	ND	300	ug/kg
Benzo(ghi)Perylene	ND	300	ug/kg
Benzo(k)fluoranthene	ND	300	ug/kg
Chrysene	ND	300	ug/kg
Dibenzo(a,h)anthracene	ND	300	ug/kg
Fluoranthene	ND	300	ug/kg
Fluorene	ND	300	ug/kg
Indeno(1,2,3-cd)pyrene	ND	300	ug/kg
2-Methylnaphthalene	ND	300	ug/kg
Naphthalene	ND	300	ug/kg
Phenanthrene	ND	300	ug/kg
Pyrene	ND	300	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
2-Fluorobiphenyl (Surr)	45.0	30 - 115	
Nitrobenzene-d5 (surr.)	46.0	23 - 120	
Terphenyl-d14 (surr.)	50.0	18 - 137	

8082 PCB's (Soil)

Method(s): 3545, 8082 **Date Prepared:** 06/30/04 **Date Analyzed:** 06/30/04 **Analyzed by:** MB

Analyte	Result	PQL	Units
Aroclor 1016	ND	15	ug/kg
Aroclor 1221	ND	15	ug/kg
Aroclor 1232	ND	15	ug/kg
Aroclor 1242	ND	15	ug/kg
Aroclor 1248	ND	15	ug/kg
Aroclor 1254	ND	15	ug/kg
Aroclor 1260	ND	15	ug/kg

Client: Detroit Edison		**RTI Project#:**	04-3874
Project: Fermi Sediment	**Report Number:** 04-3874-1	**Page:**	

Analyte	Result	PQL	Units

continued from previous page...

Sample ID: 04-3874-007; 04E00549

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	110	30 - 115	

Metals Analysis-TCLP

Method(s): 1311 3020, 6020 **Date Prepared:** 07/01/04 **Date Analyzed:** 07/01/04 **Analyzed by:** AV

Arsenic, As	ND	0.05	mg/L
Barium, Ba	**0.41**	0.05	mg/L
Cadmium, Cd	ND	0.05	mg/L
Chromium, Cr	ND	0.05	mg/L
Lead, Pb	ND	0.05	mg/L
Selenium, Se	ND	0.05	mg/L
Silver, Ag	ND	0.05	mg/L
Copper, Cu	ND	0.05	mg/L
Zinc, Zn	**0.28**	0.05	mg/L
Manganese, Mn	**3.41**	0.05	mg/L
Nickel, Ni	ND	0.05	mg/L

Hg Analysis-TCLP

Method(s): 1311, 7470 **Date Prepared:** 07/01/04 **Date Analyzed:** 07/01/04 **Analyzed by:** JE

Mercury, Hg	ND	0.0004	mg/L

Sieve Analysis

Method(s): **Date Analyzed:** 07/02/04 **Analyzed by:** CO

Ten (10)	**0.40**	0.10	% Retained
Forty (40)	**23**	0.10	% Retained
One Hundred (100)	**9.2**	0.10	% Retained
Two Hundred (200)	**60**	0.10	% Retained

RTI LABORATORIES, INC.
Environmental, Chemical & Metallurgical Testing

Client: Detroit Edison		**RTI Project#:**	04-3874
Project: Fermi Sediment	**Report Number:** 04-3874-1	**Page:**	Page 16 of 21

Analyte	Result	PQL	Units

Sample ID: 04-3874-008; 04E00550

8270 Scan-PNA's (Soil)

Method(s): 3545, 8270 **Date Prepared:** 06/30/04 **Date Analyzed:** 07/01/04 **Analyzed by:** JG3

Acenaphthene	ND	310	ug/kg
Acenaphthylene	ND	310	ug/kg
Anthracene	ND	310	ug/kg
Benzo(a)anthracene	ND	310	ug/kg
Benzo(a)pyrene	ND	310	ug/kg
Benzo(b)fluoranthene	ND	310	ug/kg
Benzo(ghi)Perylene	ND	310	ug/kg
Benzo(k)fluoranthene	ND	310	ug/kg
Chrysene	ND	310	ug/kg
Dibenzo(a,h)anthracene	ND	310	ug/kg
Fluoranthene	ND	310	ug/kg
Fluorene	ND	310	ug/kg
Indeno(1,2,3-cd)pyrene	ND	310	ug/kg
2-Methylnaphthalene	ND	310	ug/kg
Naphthalene	ND	310	ug/kg
Phenanthrene	ND	310	ug/kg
Pyrene	ND	310	ug/kg

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
2-Fluorobiphenyl (Surr)	**50.0**	30 - 115	
Nitrobenzene-d5 (surr.)	**53.0**	23 - 120	
Terphenyl-d14 (surr.)	**56.0**	18 - 137	

8082 PCB's (Soil)

Method(s): 3545, 8082 **Date Prepared:** 06/30/04 **Date Analyzed:** 06/30/04 **Analyzed by:** MB

Aroclor 1016	ND	16	ug/kg
Aroclor 1221	ND	16	ug/kg
Aroclor 1232	ND	16	ug/kg
Aroclor 1242	ND	16	ug/kg
Aroclor 1248	ND	16	ug/kg
Aroclor 1254	ND	16	ug/kg
Aroclor 1260	ND	16	ug/kg

Client: Detroit Edison		RTI Project#: 04-3874
Project: Fermi Sediment	Report Number: 04-3874-1	Page: Page 17 of 21

Analyte	Result	PQL	Units

continued from previous page...

Sample ID: 04-3874-008; 04E00550

Surrogate Recovery Data

Compound	% Recovery	Acceptable Limits(%)	Qualifier
Decachlorobiphenyl (Surr)	100	30 - 115	

Metals Analysis-TCLP

Method(s): 1311 3020, 6020 **Date Prepared:** 07/01/04 **Date Analyzed:** 07/01/04 **Analyzed by:** AV

Arsenic, As	ND	0.05	mg/L
Barium, Ba	**0.35**	0.05	mg/L
Cadmium, Cd	ND	0.05	mg/L
Chromium, Cr	ND	0.05	mg/L
Lead, Pb	ND	0.05	mg/L
Selenium, Se	ND	0.05	mg/L
Silver, Ag	ND	0.05	mg/L
Copper, Cu	ND	0.05	mg/L
Zinc, Zn	**0.18**	0.05	mg/L
Manganese, Mn	**3.66**	0.05	mg/L
Nickel, Ni	ND	0.05	mg/L

Hg Analysis-TCLP

Method(s): 1311, 7470 **Date Prepared:** 07/01/04 **Date Analyzed:** 07/01/04 **Analyzed by:** JE

Mercury, Hg	ND	0.0004	mg/L

Sieve Analysis

Method(s): **Date Analyzed:** 07/02/04 **Analyzed by:** CO

Ten (10)	**2.5**	0.10	% Retained
Forty (40)	**22**	0.10	% Retained
One Hundred (100)	**14**	0.10	% Retained
Two Hundred (200)	**52**	0.10	% Retained

Client:	Detroit Edison			RTI Project#:	04-3874
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Quality Control (QC) Data

Blank(s)

	Analyte	Batch#	Blank Result	Units
1	Organic Extraction	WS04-06471		
2	Organic Extraction	WS04-06470		
3	Mercury, Hg	WS04-06569	ND	mg/l

8082 PCB's (Soil)

8	Decachlorobiphenyl (Surr)	WS04-06517	102	%Rec

All other parameters in this testgroup are non-detect at the MDL.

8270 Scan-PNA's (Soil)

All parameters in this testgroup are non-detect at the MDL.

Metals Analysis-TCLP

All parameters in this testgroup are non-detect at the MDL.

Laboratory Control Sample(s) (LCS)

	Analyte	Batch#	%Recovery	Limits
1	Mercury, Hg	WS04-06569	95.6	

8082 PCB's (Soil)

1	Aroclor 1254	WS04-06517	102	70 to 130
2	Decachlorobiphenyl (Surr)	WS04-06517	100	70 to 130

8270

1	1,4-Dichlorobenzene	WS04-06546	64	20 to 124
2	N-Nitrosodi-n-propylamine	WS04-06546	68	10 to 230
3	1,2,4-Trichlorobenzene	WS04-06546	68	44 to 142
4	Acenaphthene	WS04-06546	60	47 to 145
5	2,4-Dinitrotoluene	WS04-06546	60	39 to 139
6	Pyrene	WS04-06546	68	52 to 115

Metals Analysis-TCLP

1	Arsenic, As	WS04-06564	119	
2	Barium, Ba	WS04-06564	111	

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Client: Detroit Edison		**RTI Project#:**	04-3874
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	Analyte	Batch#	%Recovery	Limits

Metals Analysis-TCLP

	Analyte	Batch#	%Recovery	Limits
3	Cadmium, Cd	WS04-06564	111	
4	Chromium, Cr	WS04-06564	108	
5	Lead, Pb	WS04-06564	114	
6	Selenium, Se	WS04-06564	117	
7	Silver, Ag	WS04-06564	109	
8	Copper, Cu	WS04-06564	107	
9	Zinc, Zn	WS04-06564	115	
10	Manganese, Mn	WS04-06564	107	
11	Nickel, Ni	WS04-06564	103	

Client: Detroit Edison		**RTI Project#:**	04-3874
Project: Fermi Sediment	**Report Number:** 04-3874-1	**Page:**	Page 20 of 21

Matrix Spike/Matrix Spike Duplicate(s) (MS/MSD)

	Analyte	Spiked Sample ID#	Sample Result	Spike Added	Units	MS Result	MSD Result	MS %Recv.	MSD %Recv.	%RPD	MS/MSD Limits
	Matrix: **Sediment**										
1	Mercury, Hg	04-3874-008	0	0.005	mg/l	0.00487	0.00487	97.4	97.4	0	
	8082 PCB's (Soil)										
1	Aroclor 1254	04-3874-002	0	1	ug/kg	1.04338	0.979	104	97.9	6.4	70 to 130
2	Decachlorobiphenyl (Surr)	04-3874-002	100	0.15	ug/kg	0.1569	0.1479	105	98.6	5.9	70 to 130
	8270										
1	1,2,4-Trichlorobenzene	04-3874-001	0	25	mg/kg	15	14	60	56	6.9	44 to 142
2	1,4-Dichlorobenzene	04-3874-001	0	25	mg/kg	15	13	60	52	14.3	20 to 124
3	2,4-Dinitrotoluene	04-3874-001	0	25	mg/kg	14	13	56	52	7.4	39 to 139
4	Acenaphthene	04-3874-001	0	25	mg/kg	14	13	56	52	7.4	47 to 145
5	N-Nitrosodi-n-propylamine	04-3874-001	0	25	mg/kg	16	15	64	60	6.5	10 to 230
6	Pyrene	04-3874-001	0	25	mg/kg	15	13	60	52	14.3	52 to 115
	Metals Analysis-TCLP										
1	Arsenic, As	04-3874-001	0	1		1.2	1.2	120	120	0	
2	Barium, Ba	04-3874-001	0.39	1		1.4	1.46	101	107	4.2	
3	Cadmium, Cd	04-3874-001	0	1		1	1	100	100	0	
4	Chromium, Cr	04-3874-001	0	1		0.89	0.87	89	87	2.3	
5	Copper, Cu	04-3874-001	0	1		0.86	0.89	83.1	86.1	3.4	
6	Lead, Pb	04-3874-001	0	1		0.95	0.97	94.2	96.2	2.1	
7	Manganese, Mn	04-3874-001	3.8	1		4.4	4.5	60	70	2.2	
8	Nickel, Ni	04-3874-001	0.03	1		0.86	0.89	83	86	3.4	
9	Selenium, Se	04-3874-001	0	1		1.16	1.19	116	119	2.6	
10	Silver, Ag	04-3874-001	0	1		1	1	100	100	0	
11	Zinc, Zn	04-3874-001	0.21	1		1.25	1.3	104	109	3.9	

* Data point outside established quality control limits.

Client:	Detroit Edison			**RTI Project#:**	04-3874
Project:	Fermi Sediment	**Report Number:**	04-3874-1	**Page:**	Page 21 of 21

Notes:

E:	Exceedance of acceptable limit	**MDL:**	Method detection limit
mg/kg:	milligram per kilogram	**B:**	Analyte detected in both the sample and the Laboratory Method Blank
mg/L:	milligram per liter	**DIL:**	Diluted out (below level of detection)
ug/kg:	microgram per kilogram	**Q:**	Sample held beyond acceptable holding time
ug/L:	microgram per liter	**PQL:**	Practical quantitation level; lowest level of reportable detection for this sample
N/A:	Not applicable	**Y:**	The laboratory analysis was from an unpreserved or improperly preserved sample. The data may not be accurate
ND:	None detected or less than PQL		
H:	result higher than the High Limit	**MI:**	Matrix interferences prevent accurate determination
L:	result lower than the Low Limit	**DUP:**	Values confirmed by duplicate analysis of sample

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E-mail: info@rtilab.com • Website: www.rtilab.com

CHAIN OF CUSTODY

PO # 751712
RTI Lab # 04-3879 (LAB ONLY)

REPORT TO: CONTACT NAME: E. Zamarron
BILL TO: E. Zamarron
COMPANY: Detroit Edison
ADDRESS:
CITY, STATE, ZIP:
PHONE:
FAX:

SUBMITTING COMPANY: Detroit Edison
PROJECT NAME: Fermi Sediment
PROJECT NO.:

SPECIAL INSTRUCTIONS / COMMENTS: * As, Ba, Cd, Cr, Cu, Pb, Mn, Hg, Ni, Se, Ag, Zn

ANALYSIS DESIRED: Sieve US Standard (10, 40, 100, 200); TCLP Metals*; PCB; PNA

	SAMPLE I.D.	DATE	TIME	GRAB	COMPOSITE	NO. OF CONTAINERS	SAMPLE TYPE (water, soil, air, sludge, etc.)	PRESERVATION Y	PRESERVATION N	Sieve US Standard	TCLP Metals*	PCB	PNA					LAB WEIGHT	SOIL WEIGHT	TOTAL WEIGHT	Comments on Sample (include Major Contaminants)
1	04E00543	6/28/04	15:00	X			Sediment		X	X	X	X	X								
2	04E00544	↓	15:11	↓			↓		↓	↓	↓	↓	↓								
3	04E00545	↓	15:19	↓			↓		↓	↓	↓	↓	↓								
4	04E00546	↓	15:25	↓			↓		↓	↓	↓	↓	↓								
5	04E00547	↓	15:30	↓			↓		↓	↓	↓	↓	↓								
6	04E00548	↓	15:35	↓			↓		↓	↓	↓	↓	↓								
7	04E00549	↓	15:40	↓			↓		↓	↓	↓	↓	↓								
8	04E00550	↓	15:45	↓			↓		↓	↓	↓	↓	↓								

COLLECTED BY:	DATE / TIME:	RECEIVED BY:
Esmeralda Zamarron	6/28/04 17:00	
RELINQUISHED BY:	DATE / TIME: 6-28-04 17:00	RECEIVED BY: [signature]
RELINQUISHED BY:	DATE / TIME:	RECEIVED BY:
RELINQUISHED BY:	DATE / TIME:	RECEIVED BY:

ADDITIONAL REMARKS:

SAMPLE CONDITION UPON LAB RECEIPT (LAB ONLY)

- Seals Intact Upon Receipt ☐ Yes ☐ No ☐ N/A
- Broken Containers ☐ Yes ☐ No ☐ Samples Stored @ 4°C
- All Containers Labeled ☐ Yes ☐ No ☐ Lab Received Samples On Ice

REQUIRED TURNAROUND TIME: ASAP
Date Results Needed By: ASAP

☐ Routine ☒ Rush ☐ Internal Rush

BLANK TYPE RECEIVED
Methanol ____
Water ____

NRC3-09-0014
RAI Question HY4.2.1-8

Enclosure 8

Fermi 2 Dredge Basin History
Summary Report
(following 1 page)

JULY 9, 2004

DREDGE BASIN HISTORY

History:

- In 1993, approximately 25,000 cubic yards of previously settled dredged material was removed from the dredge basin and placed on site off Fox Road. Work was performed under Work Request 00Z931736.

- In 1995, Fermi 2 requested approval from the Department of Natural Resources to remove spoils form the basin and utilize it west of the cooling towers for silvaculture (growing trees). See Detroit Edison's letter June 8, 1995 and the response letter from the DNR dated July 28, 1995.

- In 1997, samples were taken from the intake canal and analyzed for TCLP Metals (As, Ba, Cd, Cr, Cu, Pb, Hg, Se, Ag, and Zn). Sample results were non-detectable. Sieve testing was also conducted on the intake canal sediment samples (see attached sample results).

- In 1999, samples were taken from the intake canal and analyzed for TCLP Metals (As, Ba, Cd, Cr, Cu, Pb, Hg, Se, Ag, and Zn). Sample results were non-detectable. Sieve testing was also conducted on the intake canal sediment samples (see attached sample results).

- In 1999, approximately 9,500 cubic yards of previously settled dredged material was removed from the dredge basin (see drawing 6A721-2102). This was only a partial dig of the North East corner (approximately 300' x 250') of the basin. The spoils were used to construct a new earth berm for noise abatement west of the firing range. Also, spoils were placed off Fox Road and this area was seeded with rye grass. A Soil Erosion Sedimentation Control Permit #1785 was obtained (see attached). Work was contracted under Purchase Order 331948; and was performed under Work Request 000Z982526. Samples were taken from the dredge basin and analyzed for SPLP Pesticides/Hg/SVOC, Total Hg, and Total PCB's (see attached sample results).

- In 2002, Fermi 2 removed approximately 60,000 cubic yards of previously settled dredge basin materials (see drawing 6A721-2104). This cleaning of the basin made room for future dredge spoils. The spoils were relocated in the following two areas;

    - ***GTOC Parking lot:*** Approximately 55,000 cubic yards of previously dredged spoils from the dredge basin was relocated to the old contractor gravel parking lot west of the GTOC (see drawing 6A721-2101). This area was seeded with rye grass to create a pheasant habitat.

    - ***Fermi 2 Firing Range:*** Approximately 5,000 cubic yards of previously dredged spoils were used to raise the sides of the berm to the height of the backstop area (see Drawing 1). Also, the spoils were used to construct a new earth berm for noise abatement. Immediately, after placement of material and grading, seeding of rye grass was placed to mitigate erosion.

Samples were taken in 2001 from the dredge basin and analyzed for SPLP Pesticides/Hg/SVOC, Total Hg, and Total PCBs (see attached sample results). A Soil Erosion Sedimentation Control Permit #2467, Building Permit and an NPDES Notice of Coverage was obtained (see attached). The work was performed under Work Request 000Z003687.

Attachment 14
NRC3-09-0014

Response to RAI letter related to Fermi 3 ER

RAI Question HY5.3.2-2

<u>NRC RAI HY5.3.2-2</u>

Provide the input and output files (in electronic form) for the CORMIX thermal plume analysis.

<u>Supporting Information</u>

The input and output files are needed to allow performance of confirmatory analyses for the EIS.

<u>Response</u>

Electronic files used for the CORMIX thermal plume analysis are being provided in this letter as an enclosed CD. An inventory of the files on that CD is provided in Appendix C to this letter.

<u>Proposed COLA Revision</u>

None

Attachment 15
NRC3-09-0014

Response to RAI letter related to Fermi 3 ER

RAI Question NO3.7-1

NRC RAI NO3.7-1

Provide the configuration for the proposed Fermi 3 switchyard including the types and number of equipment (e.g., 2 transformers at 500 MVA each, 4 circuit breakers, etc.).

Supporting Information

Detailed information on the proposed switchyard was not provided in the ER and is needed to conduct the noise impact analysis for the EIS.

Response

When evaluating the potential noise impact from the new switchyard, it is necessary to know the number and type of large components present in the switchyard. Smaller components such as current transformers, potential transformers, and batteries are not considered significant noise contributors and are not included in the noise impact evaluation.

With respect to larger components, the Fermi 3 switchyard will contain two 345 kV buses and eight 345 kV (3000 A, 63 kA) minimum interrupting current breakers with associated disconnects as shown in Final Safety Analysis Report (FSAR) Figure 8.2-201. The Fermi 3 output is delivered to the 345 kV switchyard through the unit main step-up transformers located adjacent to the power block. The 345 kV switchyard for Fermi 3 does not require any transformers.

Proposed COLA Revision

None

Attachment 16
NRC3-09-0014

Response to RAI letter related to Fermi 3 ER

RAI Question NO4.4.1-1

NRC RAI NO4.4.1-1

Provide the configuration noise modeling analysis for construction on a typical and "worst" day (day with the highest levels of construction emissions).

Supporting Information

Noise modeling for construction that assumes a reasonable combination of the number of heavy equipment operating and load factor for the average and worst day is needed for the impact analysis to be presented in the EIS.

Response

Construction noise predictions discussed in ER Section 4.4.1.1.3 take into account the type and quantity of equipment, the typical usage of each piece of equipment and typical sound levels of the equipment used during each phase of construction. Since construction activity is variable in nature, a conservative estimate of predicted construction noise emissions has been developed.

Methods for selecting and applying "acoustic usage factors" and "acoustic max factors" as detailed in *Power Plant Construction Noise Guide,* Report No. 3321, 1977 (ER Reference 4.4-7) were applied to determine the average sound levels for equipment listed in ER Table 4.4-1. The acoustic usage factor is a representation of the amount of time a piece of equipment would be used during a typical 7-10 hour shift. The acoustic max factor is a decibel equivalent adjustment to the equipment sound level to account for the amount of time it would typically be used at its maximum sound level (e.g., at maximum speed and power). The acoustic usage factors for the equipment listed in ER Table 4.4-1 generally varied between 6 percent for equipment that would be used infrequently (e.g., concrete saw) and 100 percent for equipment that would be expected to operate continuously (e.g., diesel generator). The acoustic max factors generally varied between -3 dB for equipment that may be used frequently at maximum speed/power (e.g., welder, grinder) and -14 dB for equipment that would be used infrequently at maximum speed/power (e.g., pile driving). After applying the acoustic usage and max factor adjustments, the resulting sound levels are listed in ER Table 4.4-1.

Construction sound levels during an "average" and a "worst" day have been estimated to supplement the information previously provided in ER Table 4.4-1. An "average" day could include noise contributions from all construction activities, with the exception of pile driving. However, many major areas of construction activities, such as the reactor building area and the NDCT area, are located at distances greater than 1000 feet from the nearest receptor. Using the average sound levels from individual equipment listed in ER Table 4.4-1, the calculated Overall Average sound level, excluding pile driving, is 64 dBA. Thus, the "average" day would be expected to experience noise levels generally lower than 64 dBA at the nearest receptor.

The average sound level of pile driving alone is expected to be approximately 63 dBA at a distance of 1000 feet, which would be expected to dominate construction noise when it occurs. Therefore, a Maximum sound level can be calculated that would be representative of a "worst" day. The Maximum sound level would be expected to include pile driving noise, as well as other equipment sources listed in ER Table 4.4-1. The calculated Maximum construction sound level at a distance of 1000 feet is 67 dBA.

Proposed COLA Revision

ER Section 4.4.1.1.4 and Table 4.4-1 will be revised as shown in the attached markup.

Markup of Detroit Edison COLA

(following 4 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in the next appropriate update of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAI's, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be different than presented here.

4.4 Socioeconomic Impacts

This section discusses the potential for socioeconomic impacts resulting from the construction of Fermi 3. The information is organized as follows: Subsection 4.4.1 describes the physical impacts of construction on the area, Subsection 4.4.2 describes the social and economic impacts of construction, and Subsection 4.4.3 describes environmental justice issues within the region. Refer to Subsection 2.5.1, Subsection 2.5.2, and Subsection 2.5.4 for the baseline socioeconomic information upon which these construction impact assessments are made.

Generally, the social and economic impacts of power plant construction are a function of the size of the construction workforce, wages paid, and the number of relocating workers relative to the available community facilities and services. While precise estimates of these key variables are not yet available, reasonable assumptions appropriate for evaluating the socioeconomic impacts on the region can be made and are described below.

The construction duration will be lengthy and, including the relocation of certain facilities related to Fermi 2, should last approximately 10 years. For purposes of this analysis, the assumed construction dates are 2011 through 2020, with the peak construction employment occurring in 2017. The Chapter 4 introduction provides an overview of the Fermi 3 construction schedule and key construction activities.

4.4.1 Physical Impacts

Construction activities can cause temporary and localized physical impacts such as noise, odors, vehicle exhaust, fugitive dust, and vibration and shock from blasting. This section addresses these potential physical construction impacts that may affect people and buildings. Impacts on roads, aesthetics, and recreational opportunities are discussed in Subsection 4.4.2.

4.4.1.1 Noise

4.4.1.1.1 Applicable Regulations and Criteria

Fermi 3 is located in unincorporated Frenchtown Township, in Monroe County. There are no extant city, county, or state regulations regarding construction noise emissions. Detroit Edison intends to comply with NRC and EPA guidance for implementing the Noise Control Act of 1972, as amended, and the Quiet ~~Communication~~ Act of 1978. Communtities

Human response to sound is highly individualized. Annoyance is the most common issue regarding community noise. The percentage of people claiming to be annoyed by noise will generally increase as environmental sound levels increase. Various references (Reference 4.4-1 through Reference 4.4-4) discuss the subjectivity of changes in sound level. Based on these, a 3 dB change in a continuous broadband noise is generally considered "just barely perceptible" to the average listener. A 5 dB change is generally considered "clearly noticeable" and a 10 dB change is generally considered a doubling (or halving) of the apparent loudness.

4.4.1.1.2 **Construction Activities**

Major construction phases will consist of site preparation, excavation and foundation construction, building and equipment erection, and site clean-up/facility start-up. Noise emissions will vary with each phase of construction depending on the construction activity and the associated construction equipment required for each phase. Site preparation will require the use of heavy diesel-powered earth moving equipment. Examples of this equipment include bulldozers, scrapers, dump trucks, graders, and front end loaders. Noise emissions during site preparation will be dominated by the diesel engine noise. Foundation construction primarily will involve concrete handling equipment such as concrete trucks, mixers, vibrators, pumps, and pile driving equipment. Some earth moving equipment will also be required to backfill the foundations. Foundation construction activities will primarily be centered at the power block equipment area. The equipment and building installation will involve diesel-powered earth moving equipment, mobile cranes, equipment delivery, impact wrenches, saws, drills, and air compressors. Again, these activities will primarily be centered at the power block equipment area. Site cleanup and facility startup will generally result in lower noise emissions than the preceding construction phases.

4.4.1.1.3 **Construction Equipment Noise Emissions**

The variable nature of construction noise is best represented by an average sound level. The average sound levels account for the type and quantity of equipment, the typical usage of each piece of equipment, and typical sound levels of the equipment used during each phase of construction. The typical types of equipment, equipment usage, and equipment noise emissions (at a distance of 50 feet) for each phase of construction are listed in Table 4.4-1. Estimates of the construction equipment usage and noise levels are based on information provided in Reference 4.4-5 through Reference 4.4-7.

4.4.1.1.4 **Potential Impacts**

The variable nature of construction activity makes it difficult to predict construction noise emissions. While the average noise level is representative of construction activities, certain activities will produce temporary elevations in the noise level. Contrastingly, decreased noise emissions will occur during reduced construction activities. The closest distance between site construction areas along the west boundary of the facility and the nearest noise-sensitive receptors is approximately 1000 feet. The estimated sound levels from construction equipment at a distance of 1000 feet are provided in Table 4.4-1. Add Insert 1 Here.

Although the cumulative sound level of construction activities has the potential to cause an adverse impact, not all of the noisiest activities listed in Subsection 4.4.1.1.2 will take place in the construction areas closest to noise-sensitive receptors. Moreover, noisier activities are expected to be limited to daytime hours to minimize the noise impact. Accordingly, it is concluded that while there will be certain periods during construction that MODERATE impacts to the nearest noise-sensitive receptors to the site would be expected, the net noise impact during the course of construction is anticipated to be SMALL.

In the area of noise control, standard control measures for construction equipment, such as the use of silencers on diesel powered equipment exhausts, are expected to be employed to limit the noise

Insert 1:

The estimated overall average sound level (excluding pile driving noise) and the maximum sound level (including pile driving noise) are also included in Table 4.4-1. The overall average and maximum sound levels are based on the conservative assumption that all the equipment listed in Table 4.4-1 is operating simultaneously at a distance of 1000 feet from the nearest receptor. Simultaneous operation of all equipment listed in the Table 4.4-1 would be an infrequent occurrence. Additionally, many major areas of construction, such as the reactor building area and the NDCT area, are located at distances greater than 1000 feet from the nearest receptor. Construction sound levels at the nearest receptor on a typical construction day would be expected to be below 64 dBA.

Table 4.4-1 Estimated Construction Equipment Noise Emissions

Equipment	L_{eq} [1,2,3] @ 50 ft (dBA)	L_{eq} @ 1000 ft (dBA)
Backhoe	80	54
Grader	82	56
Dozer	83	57
Front End Loader	83	57
Compactor	80	54
Trencher	74	48
Pile Driver	89	63
Truck, Large	77	51
Concrete Vibrator	67	41
Concrete Saw	68	42
Mobile Crane	70	44
Stationary Crane	68	42
Diesel Generator	79	53
Air Compressor	76	50
Welder	68	42
Grinder	75	49
Forklift	76	50
Manlift	76	50

Notes:
1. Average sound pressure level at 50 feet horizontal distance from the equipment.
2. Based on information provided in Reference 4.4-7 and information available from previous similar projects.
3. Energy average sound pressure level at 50 feet horizontal distance from the equipment for work shift of 7 – 10 hours.

4. Excluding Pile Driving Noise
5. Including Pile Driving Noise

Overall Average[4]	**N/A**	**<64**
Maximum[5]	**N/A**	**67**

Attachment 17
NRC3-09-0014

Response to RAI letter related to Fermi 3 ER

RAI Question NO5.8.1-1

NRC RAI NO5.8.1-1

Provide the noise modeling analysis for operations associated with the new locations for the NDCT, switchyard, and transmission lines.

Supporting Information

An impact analysis for operations that considers: (1) the newly proposed location for the NDCT; (2) site-specific switchyard configuration information; and (3) new transmission lines (Fermi 3 to Milan) is needed for the impact analysis to be presented in the EIS.

Response

The acoustical model was updated to reflect the new location (see NRC3-09-0020 submitted August 26, 2009 for further discussion on the Revised Fermi 3 Site Plan) for the Natural Draft Cooling Tower (NDCT). While the sound levels for the main transformer and the unit and reserve auxiliary transformers located adjacent to the Fermi 3 building were incorporated into the acoustical model, the site-specific switchyard was not included in the acoustical model because it will not contain any significant sources of facility noise, e.g., transformers (see Section 5.8.1.3.2 for further discussion on facility noise sources).

Noise emissions from on-site transmission lines were also included in the updated acoustical model. Noise along the edges of rights-of-way from off-site transmission lines (i.e., Fermi 3 to Milan) is discussed in ER Section 3.7.4.

The updated acoustical model also resulted in changes to the predicted noise contours shown in the revised ER Figure 5.8-1. Additionally, the acoustical model was also updated so that noise levels within wooded areas of the Fermi site were not predicted. This update to the acoustical model is appropriate since its purpose is to predict the effect of the wooded areas on propagated facility noise, and not to predict the noise levels within the on-site wooded areas.

The largest predicted increase—6 dB during the quietest nighttime hours—is at receptor NML-2. While this change in sound level is generally considered noticeable, the day-night sound levels (L_{dn}) shown in ER Table 5.8-2 will not change as a result of the modeling updates. Additionally, according to *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*, NUREG-1437, Volume 1 (ER Reference 5.8-1), "Noise level increases larger than 10 dB(A) would be expected to lead to interference with outdoor speech communication, particularly in rural areas or low-population areas where the day-night background noise level is in the range of 45-55 dB(A)" (see ER Section 5.8.1.3.1 for more discussion). Since the largest expected increase during the quietest nighttime hours is less than 10 dB(A), and since there will be no change in the L_{dn} at the nearest noise-sensitive receptors, the potential noise impacts due to Fermi 3 operation are expected to be SMALL in accordance with ER Section 5.10.

Proposed COLA Revision

ER Section 5.8.1.3.4, Table 5.8-1 and Figure 5.8-1 will be revised as shown in the attached markup.

Markup of Detroit Edison COLA

(following 5 pages)

The following markup represents how Detroit Edison intends to reflect this RAI response in the next appropriate update of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAI's, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be different than presented here.

The Occupational Safety and Health Administration (OSHA) has established worker noise exposure limits (Reference 5.8-7). The OSHA worker noise exposure limits are based on a worker's noise exposure over a specific time period. When worker noise exposure exceeds the permissible noise exposure, feasible engineering or administrative controls must be implemented to reduce the noise exposure. Fermi 3 will comply with OSHA requirements for personnel hearing protection.

5.8.1.3.2 **Facility Noise Sources**

Primary audible noise sources associated with normal station operation include the transformers, the cooling systems (natural draft cooling tower), and transmission lines.

Noise emissions from cooling systems equipment are discussed in Subsection 3.4.~~2.~~ 1.6

The IEEE C57.12.~~90~~ 00 (Reference 5.8-8) sound levels (near field at 1-3 feet from the equipment) for the transformers are expected to be 90 dB(A) for the main transformers and 86 dB(A) for the unit and reserve auxiliary transformers.

Noise emissions from the transmission line are discussed in Subsection 3.7.~~3.~~ 4

5.8.1.3.3 **Operational Noise Emissions**

Environmental noise emissions for normal station operation are modeled in accordance with ISO 9613, Parts 1 and 2 (Reference 5.8-9 and Reference 5.8-10), using noise prediction software (Cadna/A version 3.6.119). The model simulates the outdoor propagation of sound from each noise source and accounts for sound wave divergence; absorption from the atmosphere, the ground, and areas of dense foliage; sound directivity; and shielding due to interceding barriers and topography. A database is developed which specifies the location, octave band sound levels, and sound directivity of each noise source. A receptor grid is specified which covers the entire area of interest. The model calculates the overall A-weighted sound pressure levels within the receptor grid based on the octave band sound level contribution of each noise source. Finally, a noise contour plot is produced based on the overall sound pressure levels within the receptor grid, including specific receptor locations.

The estimated sound levels from normal station operation (Fermi 3 equipment only) are shown graphically on the noise contour plot of Figure 5.8-1. Sound levels at the nearest noise sensitive receptors (see Subsection 2.5.5) resulting from normal station operation are provided in Table 5.8-1 and Table 5.8-2.

5.8.1.3.4 **Potential Impacts**

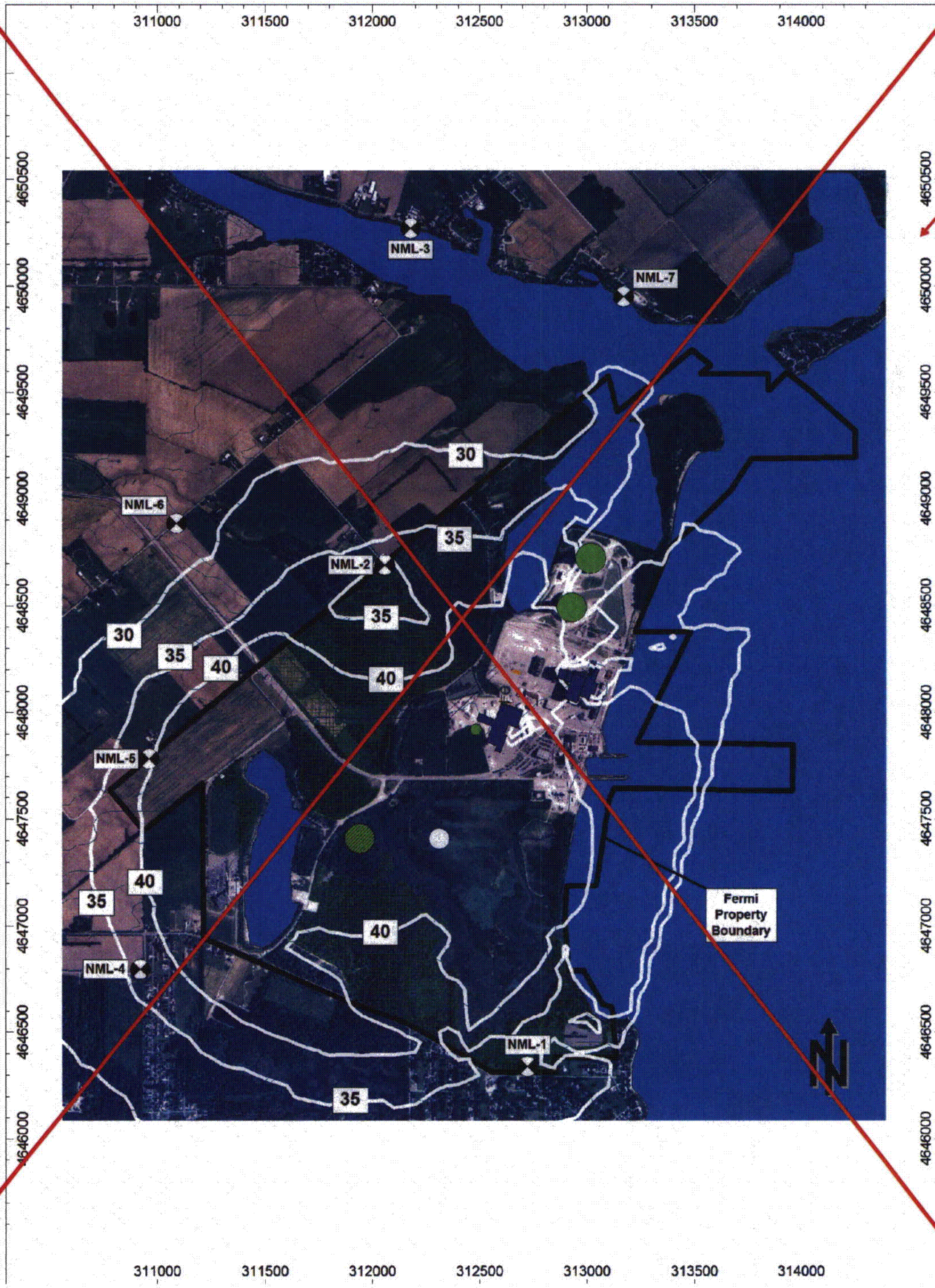
Table 5.8-1 provides the lowest ambient sound level with Fermi 2 (only) in operation based on the results of the ambient sound level survey presented in Subsection 2.5.5. As stated in Subsection 2.5.5, the Noise Monitoring Locations (NML) represent the nearest noise-sensitive receptors within a 5-mile radius of the Fermi facility. The expected ambient sound levels, as well as the increases in ambient sound levels, resulting from Fermi 3 operation are also presented in Table 5.8-1. The maximum expected increase in ambient sound level of ~~3~~ 6 dB is expected to occur at receptor~~s~~ NML-2 ~~and NML-5.~~ This increase is a ~~barely perceptible~~ generally noticable change in ambient sound

Table 5.8-1 Estimated Facility Noise Impacts – Increase in Ambient Sound Level (Cooling Systems and Transformers)

Receptor[1]	Predicted Fermi 3 Sound Level (dB(A)) Includes Cooling Systems and Transformer Noise Contributions	Lowest Nighttime Ambient Hourly Sound Level (dB(A))	Predicted Future Ambient Sound Level (dB(A)) during Fermi 3 Operation	Predicted Increase in Ambient Sound Level (dB) due to Fermi 3 Operation
NML-1	~~30~~ $\boxed{29}$	34	~~36~~ $\boxed{35}$	~~2~~ $\boxed{1}$
NML-2	~~33~~ $\boxed{37}$	32	~~35~~ $\boxed{38}$	~~3~~ $\boxed{6}$
NML-3	~~26~~ $\boxed{27}$	32	33	1
NML-4	~~36~~ $\boxed{31}$	40	~~42~~ $\boxed{41}$	~~2~~ $\boxed{1}$
NML-5	~~39~~ $\boxed{35}$	39	~~42~~ $\boxed{41}$	~~3~~ $\boxed{2}$
NML-6	~~28~~ $\boxed{31}$	42	42	0
NML-7	27	37	38	1

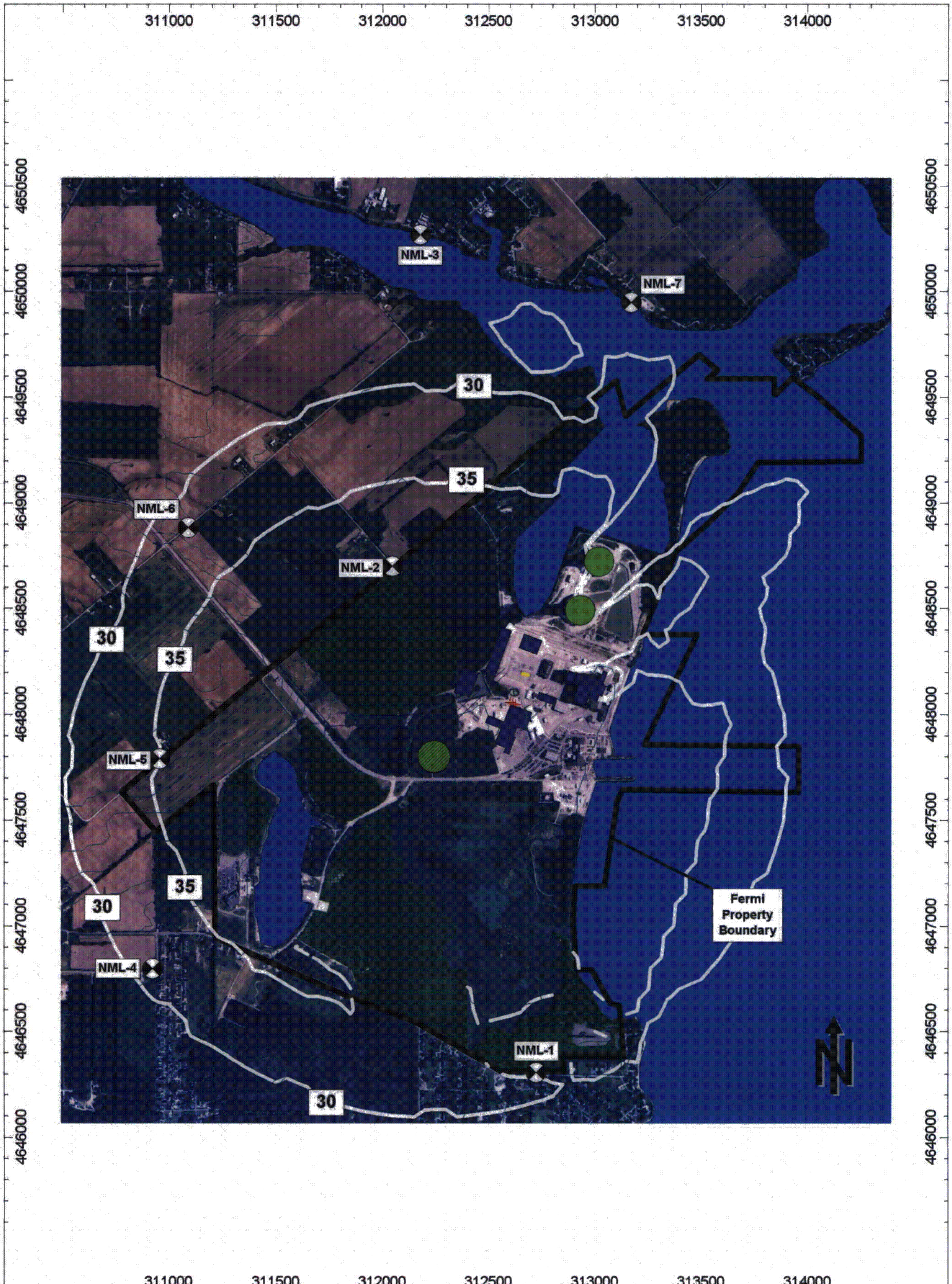
1. See Figure 2.5-~~34~~ $\boxed{32}$ for Receptor Locations.

Figure 5.8-1 Estimated Environmental Noise Emissions—A-Weighted Sound Pressure Level Contours (dB(A))—Resulting from Normal Operation (Fermi 3 Cooling Systems and Transformers)



Add Insert 1 (New Figure 5.8-1)

Insert 1: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NML-4
NML-1
30
35
Fermi Property Boundary
N

that needs are known well in advance. Negative traffic impacts in Monroe County have the potential to be MODERATE during operation, especially during the refueling outages, though a staggering of work times would help reduce the severity of impacts. As discussed in Subsection 5.8.2.4.2, traffic impacts on the level of service near the Fermi site will be studied in the future and in cooperation with the Michigan Department of Transportation and the Monroe County Road Commission, once a number of project decisions affecting traffic impacts have been made. Given the location of the Fermi site in a CBG that is neither low income nor minority, and in a county having only one minority and one low income CBG, there is no reason to expect that any low income or minority areas within the county or region would be disproportionately affected by negative impacts from the project. Subsistence living activities on or near the site are also not an issue.

5.8.5 **References**

5.8-1 U.S. Nuclear Regulatory Commission, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," NUREG-1437, Vol. 1, 1996.

5.8-2 U.S. Environmental Protection Agency, "Toward a National Strategy for Noise Control," Publication No. 550/9-77, 1997, http://www.nonoise.org/epa/Roll11/roll11doc28.pdf, accessed 18 September 2007.

5.8-3 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., "ASHRAE Handbook – Fundamentals, Chapter 7: Sound and Vibration," 2001.

5.8-4 Bies, D.A. and C.H. Handsen., "Engineering Noise Control," London: Unwin Hyman, 1988.

5.8-5 Egan, M.D., "Architectural Acoustics," McGraw-Hill Publishing Co., 1988.

5.8-6 Bolt, Beranek and Newman, Inc., "Fundamentals and Abatement of Highway Traffic Noise," Report No. PB-222-703, prepared for the Federal Highway Administration, 1973.

5.8-7 Occupational Safety and Health Administration, "Occupational Noise Exposure," 29 CFR 1910.95, 2007.

5.8-8 Institute of Electrical and Electronics Engineers, "Standard ~~Test Code~~ General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers," C57.12.00, Chapter 13, 2000.

5.8-9 International Organization for Standardization, "Acoustics — Attenuation of Sound during Propagation Outdoors — Part 1: Calculation of the Absorption of Sound by the Atmosphere," 9613-1,1993.

5.8-10 International Organization for Standardization, "Acoustics — Attenuation of Sound during Propagation Outdoors — Part 2: General Method of Calculation," 9613-1,1993.

5.8-11 U.S. Environmental Protection Agency, "US EPA Green Book," 2008, http://www.epa.gov/air/oaqps/greenbk/, accessed 3 April 2008.

Attachment 18
NRC3-09-0014

Response to RAI letter related to Fermi 3 ER

RAI Question TE4.3.1-5

NRC RAI TE4.3.1-5

Provide a topographic map (1-foot contours) of the Fermi site that includes areas that would be developed and that could be used for onsite mitigation.

Supporting Information

The potential for onsite wetlands impacts mitigation is in part dependent on small variations in topography. One-foot contour data would facilitate the analysis in the EIS of onsite mitigation potential and overall impacts to wetlands.

Response

The requested topographic map (1-foot contours) of the Fermi site will be available on or before September 30, 2009 for review by NRC staff and their contractors at several Detroit Edison locations.

Proposed COLA Revision

None

Attachment 19
NRC3-09-0014

Response to RAI letter related to Fermi 3 ER

RAI Question TR7.4-1

NRC RAI TR7.4-1

Provide documentation that supports the contention that "the ESBWR design incorporates provisions to minimize crud buildup" as stated in Section 7.4.2 of the ER.

Supporting Information

Development of the source term for transportation accidents in the ER assumes that crud buildup in the ESBWR design will not exceed that in existing BWR reactors, but no supporting evidence was given.

Response

The design provisions to minimize crud build-up in the ESBWR design are described in ESBWR DCD, Revision 6, Section 5.2.3.2.2. The design provisions are described in two subsections; "Fuel Performance Considerations", which states that feedwater iron level limitations (see Environmental Report (ER) Table 5.2-5) effectively preclude buildup of significant deposits on fuel elements, and "Radiation Field Buildup", which states that cobalt content has been reduced in alloys used in fuel assemblies limits the formation of soluble Co^{60}, the primary source of radiation fields in most BWRs.

Proposed COLA Revision

Fermi 3 COLA Part 3, ER Section 7.4.2 will be revised as reflected in the attached markup.

Markup of Detroit Edison COLA
(following 1 page)

The following markup represents how Detroit Edison intends to reflect this RAI response in a future submittal of the Fermi 3 COLA. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be different than presented here.

The RADTRAN 5 accident risk calculations documented in Reference 7.4-1 used unit radionuclide inventories (curies/metric ton of uranium [Ci/MTU]) for the spent fuel shipments for the advanced LWRs. The resulting risk estimates were multiplied by the expected annual spent fuel shipments (MTU/yr) to derive estimates of the annual risks associated with spent fuel shipments from each potential advanced LWR. The amounts of spent fuel shipped per year were assumed to be equivalent to the annual discharge quantities: 32.76 MTU/yr for the ESBWR from Reference 7.4-2. The value normalized to the Reference LWR net electrical generation is 20.3 MTU/reference reactor year (Reference 7.4-1).

The analysis in Reference 7.4-1 used the release fractions for current generation LWR fuels to approximate the impacts from the advanced LWR spent fuel shipments. This assumes that the fuel materials and containment systems (i.e., cladding, fuel coatings) behave similarly to current LWR fuel under applied mechanical and thermal conditions.

As discussed in Reference 7.4-3, a bounding value for crud surface activity for boiling water reactor (BWR) fuel rods is 595 x 10^{-6} Ci/cm^2 (2.20 x 10^7 Bq/cm^2). This value is based on measurements taken from operating BWRs. Because ESBWR operational parameters are similar to operating BWRs, this bounding value is appropriate for the ESBWR. Furthermore, based on previous BWR operational experience, the ESBWR design incorporates provisions to minimize crud buildup, which further justifies use of this bounding value. The crud surface activity used for the analysis in Reference 7.4-1 was 1.01 x 10^{14} Bq/MTU. Using ESBWR bounding fuel rod dimensions, uranium loading, and the 595 x 10^{-6} Ci/cm^2 (2.20 x 10^7 Bq/cm^2) bounding crud surface activity from NUREG/CR-6672, the ESBWR crud surface activity is calculated to be 1.48 x 10^{13} Bq/MTU, more than a factor of six less than that used in Reference 7.4-1. Therefore, the impacts of crud and activation products on spent fuel transportation accidents are enveloped by the analysis in Reference 7.4-1 and can be considered as SMALL.

, described in ESBWR DCD Section 5.2.3.2.2 for "Radiation Field Buildup"

Route-specific accident rates (accidents per km) were derived for the RADTRAN 5 accident risk analysis presented in Reference 7.4-1. In Reference 7.4-1, the approach used to develop accident rates for spent fuel shipments is as follows. The TRAGIS data (used in Reference 7.4-1) provide estimates of the distance traveled in each state along a route and the type of highway (interstate, state highway, or other). Reference 7.4-4 provided accident rates for each state that are a function of highway type. The approach taken to estimate route-specific accident rates was to multiply the state-level accident or fatality rates by the distances traveled in each state on the corresponding highway type and then sum over all the states on each route. For example, for interstate highways, the interstate distances and interstate accident rates were used. For non-interstate highway travel, either the "Primary" or "Other" accident rates given in Reference 7.4-4 were used. This approach allowed computation of route-specific accident rates.

The estimated distances used in the RADTRAN analysis in Reference 7.4-1 are bounding for the Fermi site as shown in Section 3.8. Transportation accident risk analysis in RADTRAN 5 is performed using an accident severity and package release model. The user can define up to 30 severity categories, with each category increasing in magnitude. Severity categories are related to fire, puncture, crush, and immersion environments created in vehicular accidents. For this analysis (Reference 7.4-1), the 19 severity categories defined by Sprung, et. al. were adopted. For