EXECUTIVE SUMMARY

Three Mile Island Nuclear Station Unit 1

Effluent and Off Site Dose Report for the Period of January 1, 1992 through June 30, 1992

This report summarizes the radioactive liquid and gaseous releases (effluents) from Three Mile Island Unit 1 and the calculated maximum hypothetical radiation exposure to the public resulting from these releases. This report covers the period of operation from January 1, through June 30, 1992.

Radiological releases from the plant are monitored by installed plant radiation monitors which survey the plant stack for gaseous releases and liquid discharges to the Susquehanna River for liquid releases. These monitors and associated sample analyses provide a means to accurately determine the type and quantities of radioactive materials being released to the environment.

Calculations of the maximum hypothetical dose to an individual and the total population around Three Mile Island due to radioactive releases from the plant are made utilizing environmental conditions existing at the time of the release. Susquehanna River flow data are used to calculate the maximum hypothetical doses to an individual and the population downstream of TMI due to liquid releases. Actual or "real-time" meteorological data from an onsite tower is used to determine the doses resulting from gaseous releases from the plant. The use of real-time meteorological information permits the determination of both the direction in which the release traveled and the dispersion of radioactive material in the environment.

Utilizing gaseous effluent data and real-time meteorology, the maximum hypothetical dose to any individual and to the total population within 50 miles of the plant is calculated. Similarly, Susquehanna River flow and liquid effluent data are used to calculate a maximum hypothetical dose to an individual and a population dose from liquid effluents for any shoreline exposure down to the Chesapeake Bay. Exposure to the public from consumption of water and fish withdrawn from the Susquehanna River downstream of the plant is also calculated.

Dose calculations for liquid and gaseous effluents are performed using a mathematical model which is based on the methods defined by the U.S. Nuclear Regulatory Commission.

The maximum hypothetical doses are conservative overestimates of the actual off site doses which are likely to occur. For example, the dose does not take into consideration the removal of radioactive material from the river water by precipitation of insoluble salts, absorption onto river sediment, biological removal, or removal during processing by water companies prior to distribution and consumption.

Liquid discharges made during the reporting period January 1 through June 30, 1992 consisted of 66.8 curies of tritium, and 0.02 curies of other beta and gamma emitters, predominately Co-58, Cs-134 and Cs-137. The quantities of effluents are similar to average semiannual releases from Unit 1 operations.

During the reporting period January 1 through June 30, 1992, the maximum hypothetical calculated whole body dose to an individual due to liquid effluents from Three Mile Island Unit 1 was about 0.06 millirem. The maximum hypothetical calculated dose to any organ of an individual was 0.09 millirem to the liver.

Airborne discharges made during this same time period consisted of 0.08 curies of tritium, 30.5 curies of noble gases, and 0.00006 curies of iodines and particulates. These quantities of effluents are also similar to semiannual releases from previous Unit 1 operation, since 1985 restart.

The maximum hypothetical calculated dose to any individual from noble gases was 0.002 mrem to the skin and 0.0007 mrem to the whole body. Airborne radioiodine, tritium and particulates are calculated to produce 0.001 mrem to the thyroid of the maximum hypothetical individual.

The total maximum hypothetical whole body dose of 0.06 mrem, received by any individual from effluents from the Three Mile Island Nuclear Station Unit 1 during the reporting period is 2,400 times lower than the dose the average individual in the Three Mile Island area receives from natural background, including natural radon, during the same time period. Natural background averages about 50 millirem whole body semiannually in the Three Mile Island area. In addition, the average equivalent semiannual dose to the total body from natural radon is about 100 millirem.

The calculated whole body population dose from all plant releases is 0.596 person-rem. This is 550,000 times lower than the dose attributed to natural background radiation for the reporting period. The doses which could have been received by the maximum hypothetical individual are each 2.0 percent or less of the annual limits established by the Nuclear Regulatory Commission in Appendix I of 10 CFR 50.

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EFFLUENT & WASTE DISPOSAL SEMIANNU . REPORT

SUPPLEMENTAL INFORMATION

FACILITY: TMI UNIT 1 LICENSE: DPR 50-289

1. REGULATORY LIMITS - - - REFER TO TMI UNIT 1 TECHNICAL SPECIFICATIONS

A. FISSION AND ACTIVATION GASES:
B. IODINES:
C. PARTICULATES, HALF-LIVES > 8 DAYS:
D. LIQUID EFFLUENTS:

2. MAXIMUM PERMISSIBLE CONCENTRATIONS - - - 10 CFR 20, APPENDIX B TABLE II

PROVIDE THE MPCS USED IN DETERMINING ALLOWABLE RELEASE RATES OR CONCENTRATIONS.

A. FISSION AND ACTIVATION GASES:
B. IODINES:
C. PARTICULATES, HALF-LIVES > 8 DAYS:
D. LIQUID EFFLUENTS:

3. AVERAGE ENERGY

PROVIDE THE AVERAGE ENERGY (E-BAR) OF THE RADIONUCLIDE MIXTURE IN RELEASES OF FISSION AND ACTIVATION GASES IF APPLICABLE

E-BAR BETA = 3.06E-01
E-BAR GAMMA = 5.37E-01
E-BAR BETA AND GAMMA = 8.43E-01

4. MEASUREMENTS AND APPROXIMATIONS OF TOTAL RADIOACTIVITY

PROVIDE THE METHODS USED TO MEASURE OR APPROXIMATE THE TOTAL RADIOACTIVITY I. EFFLUENTS AND THE METHODS USED TO DETERMINE RADIONUCLIDE COMPOSITION:

A. FISSION AND ACTIVATION GASES: HPGE SPECTROMETRY, LIQUID SCINTILLATION
B. IODINES: HPGE SPECTROMETRY
C. PARTICULATES HPGE SPECTROMETRY, GAS FLOW PROPORTIONAL, BETA SPECTROMETRY
D. LIQUID EFFLUENTS: HPGE SPECTROMETRY, LIQUID SCINTILLATION

5. BATCH RELEASES

PROVIDE THE FOLLOWING INFORMATION RELATING TO BATCH RELEASES OF RADIOACTIVITY MATERIALS IN LIQUID AND GASEOUS EFFLUENTS.

A. LIQUID (ALL TIMES IN MINUTES)	QUARTER 1	QUARTER 2
1. NUMBER OF BATCH RELEASES:	12	13
2. TOTAL TIME PERIOD FOR BATCH RELEASES:	5705.	5429.
3. MAXIMUM TIME PERIOD FOR A BATCH RELEASE:	814.	655.
4. AVERAGE TIME PERIOD FOR BATCH RELEASES:	475.	418.
5. MINIMUM TIME PERIOD FOR A BATCH RELEASE:	270.	95.
6. AVERAGE STREAM FLOW DURING PERIODS OF RELEASE OF EFFLUENT INTO A FLOWING STREAM: (CFM)	2.74E+06	2.18E+06

B. GASEOUS (ALL TIMES IN MINUTES)		
1. NUMBER OF BATCH RELEASES:	11	14
2. TOTAL TIME PERIOD FOR BATCH RELEASES:	7766.	34980.
3. MAXIMUM TIME PERIOD FOR A BATCH RELEASE:	820.	25800.
4. AVERAGE TIME PERIOD FOR BATCH RELEASES:	706.	2499.
5. MINIMUM TIME PERIOD FOR A BATCH RELEASE:	4.	5.

6. ABNORMAL RELEASES

A. LIQUID		
1. NUMBER OF RELEASES:	-0-	-0-
2. TOTAL ACTIVITY RELEASED: (CURIES)	N/A	N/A
B. GASEOUS		
1. NUMBER OF RELEASES:	-0-	-0-
2. TOTAL ACTIVITY RELEASED: (CURIES)	N/A	N/A

TABLE 1A

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1992)
GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

	UNIT	QUARTER 1	QUARTER 2	EST. TOTAL ERROR, %
A. FISSION AND ACTIVATION GASES				
1. TOTAL RELEASE	Ci	6.49E+00	2.40E+01	2.50E+01
2. AVG. RELEASE RATE FOR PERIOD	uCi/sec	8.34E-01	3.05E+00	
3. PERCENT OF TECH. SPECIFICATION LIMIT	%	*	*	
B. IODINES				
1. TOTAL IODINE I-131	Ci	4.10E-06	7.99E-06	2.50E+01
2. AVG. RELEASE RATE FOR PERIOD	uCi/sec	5.27E-07	1.02E-06	
3. PERCENT OF TECH. SPECIFICATION LIMIT	%	*	*	
C. PARTICULATES				
1. PART. WITH HALF-LIVES > 8 DAYS	Ci	8.77E-06	2.04E-06	2.50E+01
2. AVG. RELEASE RATE FOR PERIOD	uCi/sec	1.13E-06	2.60E-07	
3. PERCENT OF TECH. SPECIFICATION LIMIT	%	*	*	
4. GROSS ALPHA RADIOACTIVITY	Ci	<1.00E-11	<1.00E-11	
D. TRITIUM				
1. TOTAL RELEASE	Ci	2.88E-03	7.51E-02	2.50E+01
2. AVG. RELEASE RATE FOR PERIOD	uCi/sec	3.71E-04	9.55E-03	
3. PERCENT OF TECH. SPECIFICATION LIMIT	%	*	*	

NOTE: ALL LESS THAN VALUES (<) ARE IN uCi/ml.

TECH. SPEC. LIMITS: LISTED ON DOSE SUMMARY TABLE.

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TABLE 1C

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1992)
GASEOUS EFFLUENTS-GROUND-LEVEL RELEASES

		CONTINUOUS MODE		BATCH MODE	
NUCLIDES RELEASED	UNIT	QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2
1. FISSION GASES					
AR 41	Ci	<3.00E-07	<3.00E-07	2.61E-03	2.90E-03
KR 85M	Ci	<5.00E-08	3.74E-03	5.15E-04	<5.00E-08
KR 85	Ci	<8.00E-06	<6.00E-[illegible]	1.67E-01	6.61E-01
KR 87	Ci	6.26E-05	3.04E-03	8.24E-05	<8.00E-08
KR 88	Ci	<1.00E-07	6.34E-03	6.21E-04	<1.00E-07
XE 131M	Ci	<3.00E-07	<3.00E-07	3.48E-03	1.95E-01
XE 133M	Ci	2.27E-04	3.61E-03	2.08E-03	1.21E-01
XE 133	Ci	4.41E+00	1.54E-01	4.23E-01	2.28E+01
XE 135M	Ci	2.80E-03	6.49E-03	<5.00E-07	<5.00E-07
XE 135	Ci	1.46E+00	2.98E-02	1.02E-02	2.75E-03
XE 138	Ci	<3.00E-07	<3.00E-07	<3.00E-07	<3.00E-07
TOTAL FOR PERIOD	Ci	5.88E+00	2.07E-01	6.09E-01	2.38E+01
2. IODINES					
I 131	Ci	4.10E-06	7.94E-06	4.19E-09	4.90E-08
I 132	Ci	<1.00E-10	<1.00E-10	<1.00E-08	1.95E-09
I 133	Ci	2.78E-05	1.07E-05	6.14E-09	1.80E-08
I 135	Ci	<1.00E-10	<1.00E-10	<1.00E-10	<1.00E-10
TOTAL FOR PERIOD	Ci	3.19E-05	1.86E-05	1.03E-08	6.89E-08
3. PARTICULATES					
MN 54	Ci	<1.00E-1[illegible]	<1.00E-12	<1.00E-12	7.71E-08
CO 58	Ci	[illegible].[illegible]E-06	<1.00E-12	<1.00E-12	8.60E-08
CS 134	Ci	<1.00E-11	<1.00E-11	<1.00E-08	4.38E-07
CS 137	Ci	<1.00E-11	<1.00E-11	<1.00E-08	1.44E-06

NOTE: ALL LESS THAN VALUES (<) ARE IN uCi/ml.

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TABLE 2A

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1992)
LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

	UNIT	QUARTER 1	QUARTER 2	EST. TOTAL ERROR, %
A. FISSION AND ACTIVATION PRODUCTS				
1. TOTAL RELEASE (EX. H-3, GASES, ALPHA)	Ci	1.41E-02	5.74E-03	2.50E+01
2. AVG. DILUTED CONC. DURING PERIOD	uCi/ml	1.23E-09	4.79E-10	
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
B. TRITIUM				
1. TOTAL RELEASE	Ci	1.77E+01	4.91E+01	2.50E+01
2. AVG. DILUTED CONC. DURING PERIOD	uCi/ml	1.54E-06	4.10E-06	
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
C. DISSOLVED AND ENTRAINED GASES				
1. TOTAL RELEASE	Ci	<1.00E-04	3.55E-05	2.50E+01
2. AVG. DILUTED CONC. DURING PERIOD	uCi/ml	0.00E+00	2.96E-12	
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
D. GROSS ALPHA RADIOACTIVITY				
1. TOTAL RELEASE	Ci	<1.00E-07	<1.00E-07	2.50E+01
E. VOL. OF WASTE RELEASED (NO DIL.)	LITERS	6.83E+06	5.93E+06	1.00E+01
F. VOL. OF DILUTION WATER IN PERIOD	LITERS	1.15E+10	1.20E+10	1.00E+01

NOTE: ALL LESS THAN VALUES (<) ARE IN uCi/ml.

* % TECH. SPEC. LIMITS: LISTED ON DOSE SUMMARY TABLE.

C311-92-21.

TABLE 28

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1992)
LIQUID EFFLUENTS

		CONTINUOUS MODE		BATCH MODE	
NUCLIDES RELEASED	UNIT	QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2
CR 51	Ci	<5.00E-07	<5.00E-07	<5.00E-07	<5.00E-07
MN 54	Ci	<5.00E-07	<5.00E-07	3.14E-05	1.82E-05
FE 55	Ci	<1.00E-06	<1.00E-06	1.03E-03	6.64E-04
FE 59	Ci	<5.00E-07	<5.00E-07	2.88E-06	<5.00E-07
CO 57	Ci	<5.00E-07	<5.00E-07	5.49E-05	9.63E-06
CO 58	Ci	<5.00E-07	<5.00E-07	1.05E-02	1.76E-03
CO 60	Ci	<5.00E-07	<5.00E-07	2.10E-04	1.26E-04
ZN 65	Ci	<5.00E-07	<5.00E-07	<5.00E-07	<5.00E-07
SR 89	Ci	<5.00E-08	<5.00E-08	<5.00E-08	1.02E-05
SR 90	Ci	1.43E-05	2.41E-05	1.53E-06	2.89E-06
ZR 95	Ci	<5.00E-07	<5.00E-07	<5.00E-07	<5.00E-07
NB 95	Ci	<5.00E-07	<5.00E-07	3.38E-05	<5.00E-07
MO 99	Ci	<5.00E-07	<5.00E-07	<5.00E-07	<5.00E-07
TC 99M	Ci	<5.00E-07	<5.00E-07	<5.00E-07	<5.00E-07
AG 110M	Ci	<5.00E-07	<5.00E-07	4.31E-05	2.73E-04
SB 125	Ci	<5.00E-07	<5.00E-07	7.11E-04	9.32E-05
I 131	Ci	<1.00E-06	<1.00E-06	<1.00E-06	<1.00E-06
CS 134	Ci	2.39E-05	1.02E-04	4.48E-04	6.49E-04
CS 137	Ci	3.18E-04	7.78E-04	7.30E-04	1.23E-03
BA 140	Ci	<5.00E-07	<5.00E-07	<5.00E-07	<5.00E-07
LA 140	Ci	<5.00E-07	<5.00E-07	<5.00E-07	<5.00E-07
CE 141	Ci	<5.00E-07	<5.00E-07	<5.00E-07	<5.00E-07
TOTAL FOR PERIOD	Ci	3.56E-04	9.04E-04	1.37E-02	4.84E-03
XE 133	Ci	<1.00E-04	0E-04	<1.00E-04	3.55E-05

NOTE: ALL LESS THAN VALUES (<) ARE IN uCi/ml.

TABLE 3A
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. Solid waste shipped off-site 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 Ci	98.4 m3 147.04 Ci	5%
b. Dry compressible waste, contaminated equipment, etc.	m^3 Ci	134.7 m3 .136 Ci	5%
c. Irradiated components, control rods, etc.	m^3 Ci	N/A	N/A
d. Other (describe) Oil for Incineration	m^3 Ci	.85 m3 .014 Ci	5%

2. Estimate of major nuclide composition (by type of waste)		
a. Cs137	64.9 %	
Cs134	24.6 %	
Ni63	6.55 %	
Fe55	1.64 %	
b. Co58	30.8 %	
Cs137	27.2 %	
Cr51	15.5 %	
Ce144	5.99 %	
Fe55	4.25 %	
c.	%	
	%	
	%	
	%	
	%	
	%	
d. H3	99 %	
Co58	.04 %	
Ag110m	.003%	
Ni63	.0023%	

3. Solid Waste Disposition Number of Shipments	Mode of Transportation	Destination
See Attached		

B. Irradiated Fuel Shipments (Disposition)

Number of Shipments	Mode of Transportation	Destination
N/A		

SHIPMENTS	MODE	DESTINATION

Table A.3.a

*4 Shipments - Tractor - Flatbed - SEG - Oak Ridge, TN.
3 Shipments - Tractor - Closed Van - U.S. Ecology - Richland
3 Shipments - Tractor - Cask (HN-100 Series 3) - Chem. Nuclear - Barnwell
1 Shipment - Tractor - Flatbed - U.S. Ecology - Richland

Table A.3.b

*4 Shipments - Tractor - Flatbed - SEG - Oak Ridge, TN.
2 Shipments - Tractor - Flatbed - U.S. Ecology - Richland

Table A.3.d

*1 Shipment - Tractor - Flatbed - SEG - Oak Ridge, TN.

Waste Shipped as Follows:

Table 1.a

One Hundred Eighty (180) Steel Drums at 7.5 Ft^3 each.
*Six (6) Steel Liners at 170 Ft^3 each.
Two (2) Steel Liners at 170 Ft^3 each.
Two (2) Steel Liners at 178 Ft^3 each - solidified with cement.
Three (3) High Integrity Containers at 135.8 Ft^3 each.

Table 1.b

*Four (4) Steel Boxes 8' x 8' x 20' at 1040 Ft^3 each.
*Four (4) Steel Boxes at 92 Ft^3 each.
Three (3) Steel Boxes at 44 Ft^3 each.
One (1) Steel Box at 98 Ft^3.

Table 1.d

*Four (4) Steel Drums at 7.5 Ft^3 each.

*Material sent to off-site waste processor for volume reduction.

INTERPRETATION OF DOSE SUMMARY TABLE

The Dose Summary Table presents the maximum hypothetical doses to an individual and the general population resulting from the release of gaseous and liquid effluents from TMI-1 during the first half reporting period of 1992.

A. Liquid (Individual)

The first two lines present the maximum hypothetical dose to an individual. Presented are the whole body and critical organ doses. Calculations are performed on the four age groups and eight organs recommended in Regulatory Guide 1.109. The pathways considered for TMI are the consumption of drinking water and fish and standing on the shoreline influenced by TMI effluents. The latter two pathways are considered to be the primary recreational activities associated with the Susquehanna River in the vicinity of TMI. The "receptor" would be that individual who consumes water from the Susquehanna River and fish residing in the plant discharge, while occupying an area of shoreline influenced by the plant discharge.

After calculating the doses to all age groups for all eight organs resulting from the three pathways described above, the Dose Summary Table presents the maximum whole body dose and affected age group along with the organ and associated age group that received the largest dose.

For the first half of 1992 the calculated maximum whole body dose received by anyone would have been 6.24E-2 mrem to an adult. Similarly, the maximum organ dose would have been 8.96E-2 mrem to the liver of a teen.

B. Gaseous (Individual)

There are six major pathways considered in the dose calculations for gaseous effluents. These are: (1) plume, (2) inhalation, consumption of (3) cow milk, (4) vegetables, (5) meat, and (6) standing on contaminated ground.

Lines 3 and 4 present the maximum plume exposure at or beyond the site boundary. The notation of "air dose" is interpreted to mean that these doses are not to an individual, but are considered to be the maximum doses that would have occurred at or beyond the site boundary. The Dose Summary Table presents the distance in meters to the location in the affected sector (compass point) where the theoretical maximum plume exposures occurred. It should be noted that real-time meteorology was used in all dose calculations for gaseous effluents. Lines 5 and 6 present the doses which could actually be received by an individual from the noble gas effluents for the first half of 1992. The calculated maximum whole body dose received by anyone from noble gases would have been 6.75E-4 mrem. Similarly, the maximum dose to the skin would have been 1.75E-3 mrem.

The iodines and particulates section described in line 7 represents the maximum exposed organ due to iodine and particulates. The dose presented in this section again reflects the maximum exposed organ for the appropriate age group.

The first half of 1992 iodines and particulates would have resulted in a maximum dose of 1.38E-3 mrem to the thyroid of an infant residing 560 meters from the site in the W sector. No other organ of any age group would have received a greater dose.

C. Liquid and Gaseous (Population)

Lines 8 - 11 present the person-rem doses resulting from the liquid and gaseous effluents. These doses are summed over all pathways and the affected populations. Liquid person-rem is based upon the population encompassed within the region from the TMI outfall extending down to the Chesapeake Bay. The person-rem for gaseous effluents are based upon the 1980 population and consider the population out to a distance of 50 miles around TMI. Population doses are summed over all distances and sectors to give an aggregate dose.

Based upon the calculations performed for the first half of 1992, liquid effluents resulted in a whole body population dose of 5.91E-1 person-rem. The maximum critical organ population dose to the liver was 6.06E-1 person-rem. Gaseous effluents resulted in a whole body population dose of 4.61E-3 person-rem. And the maximum critical organ population dose to the thyroid was 7.71E-3 person-rem.

C311-92-2123

TABLE 1

UNIT 1
SUMMARY OF MAXIMUM INDIVIDUAL DOSES FOR UNIT 2 FROM
January 1, 1992 through June 30, 1992

Effluent	Applicable Organ	Estimated Dose (mrem)	Age Group	Location Dist (m)	Dir (toward)	% of Applicable Limit		Technical Specification Limits (mrem)	
						Quarterly	Annual	Quarterly	Annual
(1) Liquid	Total Body	6.24E-2	Adult	Receptor 1		4.16E0	2.08E0	1.5	3.0
(2) Liquid	Bone	8.96E-2	Teen	Receptor 1		1.79E0	8.96E-1	5.0	10.0
(3) Noble Gas	Air Dose (gamma-mrad)	1.52E-3	---	160	WNW	3.04E-2	1.52E-2	5.0	10.0
(4) Noble Gas	Air Dose (beta-mrad)	2.64E-3	---	3000	SSW	2.64E-2	1.32E-2	10.0	20.0
(5) Noble Gas	Total Body	6.76E-4	All	3400	SSW	---	---	---	---
(6) Noble Gas	Skin	1.75E-3	All	3400	SSW	---	---	---	---
(7) Iodine & Particulates	Thyroid	1.38E-3	Infant	560	W	1.84E-2	9.20E-3	7.5	15.0

SUMMARY OF MAXIMUM POPULATION DOSES FOR UNIT 1 FROM
January 1, 1992 through June 30, 1992

Effluent	Applicable Organ	Estimated Population Dose (person-rem)
(8) Liquid	Total Body	5.91E-1
(9) Liquid	Liver	6.06E-1
(10) Gaseous	Total Body	4.61E-3
(11) Gaseous	Thyroid	7.71E-3

Attachment 1
C311-92-2123

Nuclear

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June 11, 1992
C311-92-2076

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Dear Sir:

Subject: Three Mile Island Nuclear Station, Unit 1 (TMI-1)
Operating License No. DPR-50
Docket No. 50-289
GPU Nuclear Response to NRC Questions on
Three Mile Island Offsite Dose Calculation Manual

NRC letter dated March 19, 1992, provided results of the NRC review of the Three Mile Island Offsite Dose Calculation Manual (ODCM), Revision 0. Attached is the GPU Nuclear response to the NRC items contained in the referenced NRC letter. Since the NRC review, GPU Nuclear has issued Revisions 1 and 2 of the ODCM. Revision 2 was issued on May 22, 1992; a copy is included for your use.

Sincerely,

T. G. Broughton
Vice President and Director, TMI-1

DVH/emf

cc: TMI-1 Senior Project Manager
TMI Senior Resident Inspector

ATTACHMENT I

CATEGORY A

NRC Item 1 - Section 1.2.1 should be revised to correct or clarify the methodology to determine liquid effluent monitor setpoints and flow rates. The present methodology for monitor RM-L6 can be interpreted to permit each radionuclide to contribute 10% of the 10 CFR 20 limits to offsite concentrations. (3.2)

GPU Nuclear Response - ODCM Section 1.2.1 has been revised to clarify the methodology for monitoring liquid releases.

NRC Item 2 - Sections 1.2.2 and 1.2.3 should be revised to unambiguously require that all radionuclides are accounted for, not I-131 only. (3.2).

GPU Nuclear Response - ODCM Section 1.2.2 was revised to state that the inputs for equation 1.1 shall include all radionuclides. Section 1.2.3 was revised to state that RM-L10 is no longer in service.

CATEGORY B

NRC Item 1 - Section 1.1 should identify the analyses used to determine the mixture of radionuclides to which the noble gas effluent monitors are calibrated. (3.4).

GPU Nuclear Response - The correct reference is Section 4.1. ODCM Section 4.1 has been revised to use Xe-133 equivalent as the basis of the setpoint concentration.

NRC Item 2 - In Sections 4.2 and 5.1.2, the controlling dose rate should be the dose rate to a child instead of an infant. (3.6.2)

GPU Nuclear Response - GPU Nuclear Technical Specifications Request (TSCR) No. 194, submitted on May 19, 1992, requested a change to Technical Specification 3.22.2.1 to reflect dose rate to a child. In addition, ODCM Sections 4.2 and 5.1.2 have been revised accordingly.

NRC Item 3 - n Section 2.1, the definitions of FD and FR, respectively, should identify the periods over which the plant dilution flowrate and river flowrate are determined. (3.7)

GPU Nuclear Response - The definitions of FD and FR have been revised to add "...during the period of release,...".

ATTACHMENT I

NRC Item 4 - Based on Table 4.3, maximum X/Q given for the station vent should apparently be 7.17E-7 sec/m^3 at 2413 m in the NNE.

GPU Nuclear Response - ODCM Section 5.2.1 has been revised to 7.17E-7 for the maximum X/Q.

NRC Item 5 - Section 2.3 should contain a commitment to include a comprehensive statement of differences from the methodology of Section 2.1 with reported doses if an alternative method is used for a comprehensive of doses due to liquid effluents. (3.7)

GPU Nuclear Response - ODCM Section 2.3 was revised to include a statement on the use of SEEDS (Simplified Environmental Effluent Dose System) as an alternative dose calculational methodology.

NRC Item 6 - Section 5.4 should contain a commitment to include a comprehensive statement of differences from the methodology of Section 5 with reported doses if an alternative method is used for a comprehensive assessment of doses due to gaseous effluents other than noble gases. (3.8.3)

GPU Nuclear Response - ODCM Section 5.4 was revised to include a statement on the use of SEEDS as an alternative dose calculation methodology.

NRC Item 7 - Sections 2.2 and 5.3, respectively, for projecting doses due to liquid and gaseous effluents, should include methodology to include a margin, based on operating data, for anticipated operational occurrences. (3.9)

GPU Nuclear Response - ODCM Sections 2.2 and 5.3 have been revised to include a description of methodology for projecting doses based on operating data.

NRC Item 8 - A Surveillance Requirement 4.22.4.2, requiring doses due to direct radiation to be determined in accordance with the methodology and parameters in the ODCM, should be added to the technical specifications. (3.11)

GPU Nuclear Response - TSCR No. 194, submitted by GPU Nuclear letter C311-92-2066, dated May 19, 1992, revised Surveillance 4.22.4.2.1 to include this requirement.

NRC Item 9 - The required methodology and data to determine the contribution of direct radiation to the dose limits of 40 CFR 190 should be added to the ODCM. For completeness, the dose contributions due to other nearby uranium fuel cycle sources should also be addressed in the ODCM. (3.11)

GPU Nuclear Response - This is now addressed in ODCM Section 7.1.

ATTACHMENT I

NRC Item 10 - The Interlaboratory Comparison Program should be described in the ODCM. Also, to clarify the requirement, it would be advisable to reword the Technical Specification's Surveillance Requirement 4.23.3 to match the Surveillance Requirement of recent revisions of NUREG-0472. (3.13)

GPU Nuclear Response - This is now addressed in ODCM Section 8.3.

CATEGORY C

NRC Item 1 - In Section 1.1, "proportional" and "inversely proportional" should be interchanged in the definition of c. (3.2)

GPU Nuclear Response - The definition of c has been revised to correct this issue.

NRC Item 2 - Section 1.1 should include an expression identifying the total concentration to which the effluent monitors are calibrated (i.e., $c = \Sigma c_i$). (3.4)

GPU Nuclear Response - The correct reference is Section 4.1. ODCM Section 4.1 has been revised to use Xe-133 equivalent as the basis of the setpoint concentration.

NRC Item 3 - The 500 mrem/yr, 3000 mrem/yr, and 15 mrem/yr in the definitions for Equations 4.1.1, 4.12, and 4.2, respectively, should be identified as dose rates instead of doses. (3.4)

GPU Nuclear Response - ODCM Equations 4.1.1, 4.12, and 4.2 have been revised to identify dose rates.

NRC Item 4 - Reference to "Controls" and "Section II..." should be replaced or supplemented with appropriate technical specifications references. (3.4, 3.6.1)

GPU Nuclear Response - This item was previously incorporated in ODCM Revision 1.

NRC Item 5 - Section 1.3 should be more specific about what parts of Section 1.1 and 1.2 are used to implement the requirements stated in Section 1.3. (3.5)

GPU Nuclear Response - The item for Section 1.1 is addressed in NRC Item C.1 above. The item for Section 1.2 is addressed in NRC Item A.1.

ATTACHMENT I

NRC Item 6 - The right side of Equation 5.2.2 should contain a summation over dose pathways. (3.8.3)

GPU Nuclear Response - A summation sign has been added to equation 5.2.2.

NRC Item 7 - For consistency with Section 1.2 of the ODCM and Technical Specification 3.2.1.1, the liquid effluent monitors shown in Figure 1.2 should be labeled RM-L6, RM-L10, and RM-L12, respectively, instead of RML-6, RML-10, and RML-12. (3.1)

GPU Nuclear Response - This is an editorial comment and was not incorporated. However, it will be considered in future revisions of the ODCM.

NRC Item 8 - For consistency with Section 4.3 of the ODCM and Technical Specification Table 3.21-2, the gaseous effluent monitors in ODCM Figure 4.1 should be labeled RM-7, RM-9, ..., respectively, instead of RMA-7, RMA-9, ... (3.3)

GPU Nuclear Response - Figure 4.1 was revised to incorporate this editorial comment.