

EFFLUENT & WASTE DISPOSAL SEMIANNUAL REPORT

SUPPLEMENTAL INFORMATION

FACILITY: TMI UNIT 1

LICENSE: DFR 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 = 2.27E-01
E-BAR GAMMA = 2.63E-01
E-BAR BETA AND GAMMA = 4.90E-01

4. MEASUREMENTS AND APPROXIMATIONS OF TOTAL RADIOACTIVITY

PROVIDE THE METHODS USED TO MEASURE OR APPROXIMATE THE TOTAL RADIOACTIVITY IN 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 3

QUARTER 4

1. NUMBER OF BATCH RELEASES:	36	23
2. TOTAL TIME PERIOD FOR BATCH RELEASES:	15587	6343
3. MAXIMUM TIME PERIOD FOR A BATCH RELEASE:	1284	495
4. AVERAGE TIME PERIOD FOR BATCH RELEASES:	433	276
5. MINIMUM TIME PERIOD FOR A BATCH RELEASE:	30	95
6. AVERAGE STREAM FLOW DURING PERIODS OF RELEASE OF EFFLUENT INTO A FLOWING STREAM: (CFM)	2.75E+05	7.56E+05

B. GASEOUS (ALL TIMES IN MINUTES)

1. NUMBER OF BATCH RELEASES:	20	14
2. TOTAL TIME PERIOD FOR BATCH RELEASES:	14422	8867
3. MAXIMUM TIME PERIOD FOR A BATCH RELEASE:	1690	832
4. AVERAGE TIME PERIOD FOR BATCH RELEASES:	721	633
5. MINIMUM TIME PERIOD FOR A BATCH RELEASE:	1	1

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 (1991)
GASEOUS EFFLUENTS SUMMATION OF ALL RELEASES

	UNIT	QUARTER 3	QUARTER 4	EST. TOTAL ERROR, %
A. FISSION AND ACTIVATION GASES				
1. TOTAL RELEASE	Ci	9.09E+01	2.02E+00	2.50E+01
2. AVG. RELEASE RATE FOR PERIOD	uCi/sec	1.14E+01	2.55E-01	
3. PERCENT OF TECH. SPECIFICATION LIMIT	%	*	*	
B. IODINES				
1. TOTAL IODINE I 131	Ci	8.62E-04	1.28E-05	2.50E+01
2. AVG. RELEASE RATE FOR PERIOD	uCi/sec	1.08E-04	1.61E-06	
3. PERCENT OF TECH. SPECIFICATION LIMIT	%	*	*	
C. PARTICULATES				
1. PART. WITH HALF LIVES > 8 DAYS	Ci	3.65E-09	<1.00E-04	2.50E+01
2. AVG. RELEASE RATE FOR PERIOD	uCi/sec	4.59E-10	NA	
3. PERCENT OF TECH. SPECIFICATION LIMIT	%	*	NA	
4. GROSS ALPHA RADIOACTIVITY	Ci	<1.00E-11	<1.00E-11	
D. TRITIUM				
1. TOTAL RELEASE	Ci	3.24E+00	2.32E-03	2.50E+01
2. AVG. RELEASE RATE FOR PERIOD	uCi/sec	4.08E-01	2.92E-04	
3. PERCENT OF TECH. SPECIFICATION LIMIT	%	*	*	

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

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

TABLE 1C
EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT (1991)
GASEOUS EFFLUENTS GROUND LEVEL RELEASES

NUCLIDES RELEASED	UNIT	CONTINUOUS MODE		BATCH MODE	
		QUARTER 3	QUARTER 4	QUARTER 3	QUARTER 4
1. FISSION GASES					
AR 41	C1	4.34E-01	<3.00E-07	2.25E-01	7.33E-03
KR 85	C1	9.81E-03	<8.00E-06	2.09E+00	8.53E-01
KR 85M	C1	4.91E-01	3.68E-06	5.75E-02	3.63E-03
KR 87	C1	7.16E-01	<8.00E-08	5.32E-06	9.36E-04
KR 88	C1	1.15E+00	<1.00E-07	3.81E-02	5.11E-03
XE 131M	C1	<3.00E-07	<3.00E-07	1.67E-01	5.65E-02
XE 133	C1	1.07E+01	1.50E-03	6.13E+01	9.87E-01
XE 133M	C1	1.39E-01	<2.00E-07	4.29E-01	1.59E-02
XE 135	C1	5.51E+00	5.28E-03	2.28E+00	8.65E-02
XE 135M	C1	3.72E+00	1.37E-03	3.23E-05	<5.00E-07
XE 138	C1	1.47E+00	<3.00E-07	1.22E-05	<3.00E-07
TOTAL FOR PERIOD	C1	2.43E+01	8.16E-03	6.66E+01	2.02E+00
2. IODINES					
I 131	C1	8.58E-04	1.23E-05	4.22E-06	5.00E-07
I 132	C1	<1.00E-10	<1.00E-10	7.91E-07	<1.00E-08
I 133	C1	2.51E-03	1.75E-05	5.71E-06	<1.00E-08
I 135	C1	7.79E-05	<1.00E-10	1.15E-06	<1.00E-10
TOTAL FOR PERIOD	C1	3.44E-03	2.97E-05	1.19E-05	5.00E-07
3. PARTICULATES					
CS 134	C1	<1.00E-11	<1.00E-11	<1.00E-08	<1.00E-08
CS 137	C1	<1.00E-11	<1.00E-11	3.65E-09	<1.00E-08

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

TABLE-2A
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1991)
LIQUID EFFLUENTS SUMMATION OF ALL RELEASES

	UNIT	QUARTER 3	QUARTER 4	EST. TOTAL ERROR, %
A. FISSION AND ACTIVATION PRODUCTS				
1. TOTAL RELEASE (EX. H 3, GASES, ALPHA)	Ci	1.80E-02	1.46E-02	2.50E+01
2. AVG. DILUTED CONC. DURING PERIOD	uCi/ml	1.70E-09	1.18E-09	
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
B. TRITIUM				
1. TOTAL RELEASE	Ci	1.12E+02	2.13E+01	2.50E+01
2. AVG. DILUTED CONC. DURING PERIOD	uCi/ml	1.06E-05	1.73E-06	
3. PERCENT OF APPLICABLE LIMIT	%	*	*	
C. DISSOLVED AND ENTRAINED GASES				
1. TOTAL RELEASE	Ci	4.52E-03	1.90E-03	2.50E+01
2. AVG. DILUTED CONC. DURING PERIOD	uCi/ml	4.27E-10	1.54E-10	
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				
RELEASEL (NO DIL.)	LITERS	1.02E+07	1.48E+07	1.00E+01
F. VOL. OF DILUTION				
WATER IN PERIOD	LITERS	1.06E+10	1.23E+10	1.00E+01

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

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

TABLE 2B
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1991)
LIQUID EFFLUENTS

			CONTINUOUS MODE		BATCH MODE	
NUCLIDES RELEASED	UNIT		QUARTER 3	QUARTER 4	QUARTER 3	QUARTER 4
CR 51	Ci		<5.00E-07	<5.00E-07	<5.00E-07	<5.00E-07
MN 54	Ci		<5.00E-07	<5.00E-07	3.54E-06	<5.00E-07
FE 55	Ci		5.84E-05	<1.00E-06	4.43E-03	<1.00E-06
CO 58	Ci		1.22E-04	4.22E-04	6.39E-03	6.29E-04
FE 59	Ci		<5.00E-07	<5.00E-07	<5.00E-07	<5.00E-07
CO 60	Ci		1.00E-06	<5.00E-07	2.11E-04	2.53E-05
ZN 65	Ci		<5.00E-07	<5.00E-07	<5.00E-07	<5.00E-07
SR 89	Ci		2.71E-07	<5.00E-08	<5.00E-08	1.82E-05
SR 90	Ci		6.34E-08	6.30E-06	1.79E-05	<5.00E-08
NB 95	Ci		<5.00E-07	<5.00E-07	<5.00E-07	<5.00E-07
ZR 95	Ci		<5.00E-07	<5.00E-07	<5.00E-07	<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	1.05E-04	9.65E-06
SB 125	Ci		<5.00E-07	<5.00E-07	1.22E-06	9.93E-06
I 131	Ci		5.36E-05	4.38E-03	3.48E-06	1.15E-03
I 133	Ci		<5.00E-07	<5.00E-07	<5.00E-07	7.92E-07
CS 134	Ci		1.39E-04	2.88E-03	1.92E-03	3.60E-04
CS 137	Ci		2.17E-04	3.86E-03	4.28E-03	8.28E-04
BA 140	Ci		<5.00E-07	<5.00E-07	<5.00E-07	<5.00E-07
LA 140	Ci		<5.00E-07	<5.00E-07	2.21E-06	<5.00E-07
CE 141	Ci		<5.00E-07	<5.00E-07	<5.00E-07	<5.00E-07
TOTAL FOR PERIOD	Ci		5.91E-04	1.15E-02	1.74E-02	3.04E-03
XE-131M	Ci		<1.00E-04	<1.00E-04	3.79E-05	<1.00E-04
XE-133	Ci		<1.00E-04	<1.00E-04	4.45E-03	1.90E-03
XE-135	Ci		<1.00E-04	<1.00E-04	2.58E-05	<1.00E-04

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	40.4 m ³ 371.99 Ci	5%
b. Dry compressible waste, contaminated equipment, etc.	m ³ Ci	428.4 m ³ .743 Ci	5%
c. Irradiated components, control rods, etc.	m ³ Ci	N/A	N/A
d. Other (describe)	m ³ Ci	N/A	N/A

2. Estimate of major nuclide composition (by type of waste)		
a. Co58	50.4 %	
Cr51	25.5 %	
Ce144	9.87 %	
Nb95	6.29 %	
b. Co58	21.4 %	
Ni63	20.3 %	
Cs137	17.01 %	
Fe55	14.8 %	
Ce144	3.89 %	
c.	%	
	%	
	%	
	%	
	%	
d.	%	
	%	
	%	
	%	

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		

TABLE 3A (Continued)

TMI-1 EFFLUENT & WASTE DISPOSAL SEMI-ANNUAL REPORT

July 1, 1991 through December 31, 19A.1.a - Material Shipped as follows:

- *Six (6) Steel Liners at 170 Ft.³ Each
- Two (2) Steel Liners at 178 Ft.³ Each - Solidified with Cement
- One (1) EA-50 High Integrity Containers - 49.9 Ft.³

A.1.b

- *Fourteen (14) 8' x 8' x 20' Cargo Containers at 1,040 Ft.³ Each
- *Four (4) Steel Boxes at 44 Ft.³ Each
- One (1) Steel Box at 44 Ft.³
- *One (1) 8' x 8' x 40' Cargo Containers at 350 Ft.³

Table A.3.a

<u>No. of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
One (1) Shipment	Tractor - Flatbed	U. S. Ecology - Hanford
One (1) Shipment	Tractor - Cask (3-82B)	U. S. Ecology - Hanford
*Three (3) Shipments	Tractor - Flatbed	Scientific Ecology Group Oak Ridge, TN

Table A.3.b

<u>No. of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
*Ten (10) Shipments	Tractor-Flatbed	Scientific Ecology Group Oak Ridge, TN
One (1) Shipment	Tractor-Flatbed	U. S. Ecology, Hanford
*One (1) Shipment	Tractor-Flatbed	Alaron

*Material Sent to a 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 second half reporting period of 1991.

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 second half of 1991 the calculated maximum whole body dose received by anyone would have been $2.12\text{E-}1$ mrem to an adult. Similarly, the maximum organ dose would have been $2.99\text{E-}1$ mrem to the liver of a teen.

B. Gaseous (Individual)

There are seven major pathways considered in the dose calculations for gaseous effluents. These are: (1) plume, (2) inhalation, consumption of (3) cow milk, (4) goat milk, (5) vegetables, (6) meat, and (7) 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 second half of 1991. The calculated maximum whole body dose received by anyone from noble gases would have been $7.40\text{E-}2$ mrem. Similarly, the maximum dose to the skin would have been $1.42\text{E-}1$ 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 second half 1991 iodines and particulates would have resulted in a maximum dose of $1.83\text{E-}1$ mrem to the thyroid of an infant residing 700 meters from the site in the E 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 second half of 1991, liquid effluents resulted in a whole body population dose of $6.43\text{E}0$ person-rem. The maximum critical organ population dose to the thyroid was $1.08\text{E}1$ person-rem. Gaseous effluents resulted in a whole body population dose of $4.18\text{E-}2$ person-rem. And the maximum critical organ population dose to the thyroid was $5.06\text{E-}1$ person-rem.

TABLE 1

UNIT 1
Second Half 1991 Dose Report

SUMMARY OF MAXIMUM INDIVIDUAL DOSES FOR UNIT 1 FROM
July 1, 1991 through December 31, 1991

Effluent	Applicable Organ	Estimated Dose (mrem)	Age Group	Location		% of Applicable Limit		Technical Specification Limits (mrem)	
				Dist (m)	Dir (toward)	Quarterly	Annual	Quarterly	Annual
(1) Liquid	Total Body	2.12E-1	Adult	Receptor 1		1.41E1	7.07E0	1.5	3.0
(2) Liquid	Liver	2.99E-1	Teen	Receptor 1		5.98E0	2.99E0	5.0	10.0
(3) Noble Gas	Air Dose (gamma-mrad)	4.04E-1	---	342	E	8.08E0	4.04E0	5.0	10.0
(4) Noble Gas	Air Dose (beta-mrad)	3.04E-1	---	342	E	3.04E0	1.52E0	10.0	20.0
(5) Noble Gas	Total Body	7.40E-2	All	700	E	---	---	---	---
(6) Noble Gas	Skin	1.42E-1	All	700	E	---	---	---	---
(7) Iodine & Particulates	Thyroid	1.83E-1	Infant	700	E	2.44E0	1.22E0	7.5	15.0

SUMMARY OF MAXIMUM POPULATION DOSES FOR UNIT 1 FROM
July 1, 1991 through December 31, 1991

Effluent	Applicable Organ	Estimated Population Dose (person-rem)
(8) Liquid	Total Body	6.43E0
(9) Liquid	Thyroid	1.08E+1
(10) Gaseous	Total Body	4.18E-2
(11) Gaseous	Thyroid	5.06E-1

TABLE 2

UNIT 1
Annual 1991 Dose Report

SUMMARY OF MAXIMUM INDIVIDUAL DOSES FOR UNIT 1 FROM
January 1, 1991 through December 31, 1991

Effluent	Applicable Organ	Estimated Dose (mrem)	Age Group	Location		% of Applicable Limit		Technical Specification Limits (mrem)	
				Dist (m)	Dir (toward)	Quarterly	Annual	Quarterly	Annual
(1) Liquid	Total Body	2.40E-1	Adult	Receptor 1		---	8.00E 0	1.5	3.0
(2) Liquid	Liver	3.38E-1	Teen	Receptor 1		---	3.38E 0	5.0	10.0
(3) Noble Gas	Air Dose (gamma-mrad)	5.66E-1	---	171	NW	---	5.69E 0	5.0	10.0
(4) Noble Gas	Air Dose (beta-mrad)	4.19E-1	---	171	NW	---	2.10E 0	10.0	20.0
(5) Noble Gas	Total Body	8.85E-2	All	700	E	---	---	---	---
(6) Noble Gas	Skin	1.70E-1	All	700	E	---	---	---	---
(7) Iodine & Particulates	Thyroid	1.96E-1	Infant	700	E	---	1.31E 0	7.5	15.0

SUMMARY OF MAXIMUM POPULATION DOSES FOR UNIT 1 FROM
January 1, 1991 through December 31, 1991

Effluent	Applicable Organ	Estimated Population Dose (person-rem)
(8) Liquid	Total Body	7.97E 0
(9) Liquid	Thyroid	1.23E+1
(10) Gaseous	Total Body	1.53E-1
(11) Gaseous	Thyroid	6.67E-1

Annual summations will not equal the sum of each periodic report due to receptor location changes and interpolation results.

METEOROLOGICAL DATA
1991 JOINT FREQUENCY TABLES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD 91010100 TO 91123123
STABILITY CLASS A

SECTOR WINDS		WIND SPEED						TOTAL
TO	FROM	1-3	4-7	8-12	13-18	19-24	>24	
N	S	2	12	4	0	0	0	18
NNE	SSW	5	32	43	6	0	0	86
NE	SW	11	41	20	1	0	0	73
ENE	WSW	17	25	14	4	0	0	60
E	W	25	27	32	11	2	1	98
ESE	WNW	27	56	47	12	1	0	143
SE	NW	32	79	74	38	9	0	232
SSE	NNW	33	89	55	22	11	2	212
S	N	10	21	17	5	0	0	53
SSW	NNE	1	5	0	0	0	0	6
SW	NE	0	3	1	0	0	0	4
WSW	ENE	3	2	4	0	0	0	9
W	E	0	5	9	1	0	0	15
WNW	ESE	2	13	18	2	0	0	35
NW	SE	1	7	9	2	0	0	19
NNW	SSE	2	5	4	0	0	0	11
TOTAL		171	422	351	104	23	3	1074

METEOROLOGICAL DATA
1991 JOINT FREQUENCY TABLES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD 91010100 TO 91123123
STABILITY CLASS B

SECTOR WINDS		WIND SPEED						TOTAL
TO	FROM	1-3	4-7	8-12	13-18	19-24	>24	
N	S	4	8	7	0	0	0	19
NNE	SSW	3	25	17	2	0	0	47
NE	SW	6	13	7	2	0	0	28
ENE	WSW	7	7	4	0	0	0	18
E	W	4	3	11	12	3	0	33
ESE	WNW	6	4	19	19	6	0	54
SE	NW	8	8	35	30	5	0	86
SSE	NNW	9	14	18	20	6	0	67
S	N	7	10	5	6	0	0	28
SSW	NNE	0	2	1	0	0	0	3
SW	NE	5	4	1	0	0	0	10
WSW	ENE	0	7	2	0	0	0	9
W	E	3	10	9	0	0	0	22
WNW	ESE	2	8	10	1	0	0	21
NW	SE	1	6	9	1	0	0	17
NNW	SSE	2	5	0	1	0	0	8
TOTAL		67	134	155	94	20	0	470

METEOROLOGICAL DATA
1991 JOINT FREQUENCY TABLES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD 91010100 TO 91123123
STABILITY CLASS C

SECTOR TO	WINDS FROM	WIND SPEED						TOTAL
		1-3	4-7	8-12	13-18	19-24	>24	
N	S	2	4	5	1	0	0	12
NNE	SSW	3	11	11	1	0	0	26
NE	SW	2	10	4	0	0	0	16
ENE	WSW	5	2	3	0	0	0	10
E	W	3	6	6	10	5	0	30
ESE	WNW	2	8	16	18	9	2	55
SE	NW	4	6	23	25	5	0	63
SSE	NNW	8	5	17	7	3	0	40
S	N	4	4	7	0	0	0	15
SSW	NNE	0	2	1	0	0	0	3
SW	NE	2	2	0	0	0	0	4
WSW	ENE	1	7	3	0	0	0	11
W	E	3	16	6	1	0	0	26
WNW	ESE	4	7	15	1	0	0	27
NW	SE	1	8	5	0	0	0	14
NNW	SSE	1	3	0	0	0	0	4
TOTAL		45	101	122	64	22	2	356

METEOROLOGICAL DATA
1991 JOINT FREQUENCY TABLES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD 01010100 TO 91123123
STABILITY CLASS D

SECTOR TO	WINDS FROM	WIND SPEED						TOTAL
		1-3	4-7	8-12	13-18	19-24	>24	
N	S	20	91	39	0	0	0	150
NNE	SSW	31	120	60	3	0	0	214
NE	SW	29	64	18	2	0	0	113
ENE	WSW	23	52	16	5	0	0	96
E	W	26	67	109	50	17	2	271
ESE	WNW	25	64	161	83	26	3	362
SE	NW	29	79	167	95	18	2	390
SSE	NNW	23	80	72	29	7	0	211
S	N	28	72	26	7	0	0	133
SSW	NNE	33	53	9	0	0	0	95
SW	NE	30	65	8	0	0	0	103
WSW	ENE	27	72	24	0	0	0	123
W	E	28	110	63	7	0	0	208
WNW	ESE	39	66	81	5	0	0	191
NW	SE	31	56	52	4	0	0	143
NNW	SSE	23	77	36	2	0	0	138
TOTAL		445	1188	941	292	68	7	2941

METEOROLOGICAL DATA
1991 JOINT FREQUENCY TABLES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD 91010100 TO 91123123
STABILITY CLASS E

SECTOR WINDS		WIND SPEED						TOTAL
		1-3	4-7	8-12	13-18	19-24	>24	
N	S	28	75	6	0	0	0	109
NNE	SSW	49	110	37	9	0	0	205
NE	SW	64	104	33	3	0	0	204
ENE	WSW	63	87	13	2	1	0	166
E	W	64	68	24	6	1	0	163
ESE	WNW	57	54	25	8	0	0	144
SE	NW	56	54	50	10	0	0	170
SSE	NNW	52	98	23	7	3	0	183
S	N	33	102	7	1	0	0	143
SSW	NNE	22	57	2	0	0	0	81
SW	NE	28	36	2	0	0	0	66
WSW	ENE	33	32	2	0	0	0	67
W	E	37	42	10	0	0	0	89
WNW	ESE	53	40	9	4	0	0	106
NW	SE	52	32	1	0	0	0	85
NNW	SSE	47	46	0	0	0	0	93
TOTAL		718	1037	244	50	5	0	2074

METEOROLOGICAL DATA
1991 JOINT FREQUENCY TABLES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD 91010100 TO 91123123
STABILITY CLASS F

		WIND SPEED						TOTAL
SECTOR TO	WINDS FROM	1-3	4-7	8-12	13-18	19-24	>24	
N	S	45	11	0	0	0	0	56
NNE	SSW	50	21	1	0	0	0	72
NE	SW	46	12	1	1	0	0	60
ENE	WSW	46	29	0	0	0	0	75
E	W	53	18	3	0	0	0	74
ESE	WNW	52	18	2	0	0	0	72
SE	NW	44	28	3	0	0	0	75
SSE	NNW	41	44	2	0	0	0	87
S	N	32	23	1	0	0	0	56
SSW	NNE	29	5	0	0	0	0	34
SW	NE	9	6	0	0	0	0	15
WSW	ENE	28	8	0	0	0	0	36
W	E	31	17	1	0	0	0	49
WNW	ESE	31	11	3	0	0	0	45
NW	SE	34	9	0	0	0	0	43
NNW	SSE	40	7	0	0	0	0	47
TOTAL		611	267	17	1	0	0	896

METEOROLOGICAL DATA
1991 JOINT FREQUENCY TABLES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD 91010100 TO 91123123
STABILITY CLASS G

SECTOR TO	WINDS FROM	WIND SPEED						TOTAL
		1-3	4-7	8-12	13-18	19-24	>24	
N	S	19	5	0	0	0	0	24
NNE	SSW	22	18	1	0	0	0	41
NE	SW	31	14	0	0	0	0	45
ENE	WSW	23	10	1	0	0	0	34
E	W	36	13	1	0	0	0	50
ESE	WNW	11	2	0	0	0	0	13
SE	NW	10	7	3	0	0	1	21
SSE	NW	13	18	0	0	0	0	31
S	N	9	11	1	0	0	0	21
SSW	NNE	15	1	0	0	0	0	16
SW	NE	11	1	0	0	0	0	12
WSW	ENE	17	8	0	0	0	0	25
W	E	24	9	0	0	0	0	33
WNW	ESE	26	7	0	0	0	0	33
NW	SE	28	7	0	0	0	0	35
NNW	SSE	16	1	0	0	0	0	17
TOTAL		311	132	7	0	0	1	451

METEOROLOGICAL DATA
1991 JOINT FREQUENCY TABLES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD 91010100 TO 91123123
STABILITY CLASS ALL

SECTOR WINDS		WIND SPEED						
TO	FROM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	S	120	206	61	1	0	0	388
NNE	SSW	163	337	170	21	0	0	691
NE	SW	189	258	83	9	0	0	539
ENE	WSW	184	212	51	11	1	0	459
E	W	211	202	186	89	28	3	719
ESE	WNW	180	206	270	140	42	5	843
SE	NW	183	261	355	198	37	3	1037
SSE	NNW	179	348	187	85	30	2	831
S	N	123	243	64	19	0	0	449
SSW	NNE	100	125	13	0	0	0	238
SW	NE	85	117	12	0	0	0	214
WSW	ENE	109	136	35	0	0	0	280
W	E	126	209	98	9	0	0	442
WNW	ESE	157	152	136	13	0	0	458
NW	SE	148	125	76	7	0	0	356
NNW	SSE	131	144	40	3	0	0	318
TOTAL		2388	3281	1837	605	138	13	8262

HOURS OF MISSING/INVALID DATA : 498

ATTACHMENT 1

SUMMARY OF CHANGE TO OP 1104-281 REV 16

1. An addition was made to the six (6) process control sections and acceptance criteria to identify a uniform method for application of a sample identification numbers for test samples.

This change affects:

Section 6	Step 6.1.3	Page 10
Section 7	Step 7.1.3	Page 14
Section 8	Step 8.1.3	Page 17
Section 9	Step 9.1.4	Page 19
Section 10	Step 10.1.4	Page 22
Section 11	Note after Step 11.1.6	Page 25
Section 12	Step 12.2.2	Page 26

2. Additional guidance was added to each process control section to refer personnel to the applicable section should a verification test fail. In addition, a reminder was added to emphasize the need to perform three (3) additional and successful test solidifications before proceeding with the procedure.

This change affects:

Section 6	Step 6.2.22	Page 12
Section 7	Step 7.2.22	Page 16
Section 8	Step 8.2.14	Page 18
Section 9	Step 9.2.19	Page 21
Section 10	Step 10.2.22	Page 24
Section 11	Step 11.2.2	Page 25

3. An additional step was added within the acceptance criteria section to refer to SEG - Westinghouse procedures for guidance concerning test solidification failures when using these procedures in lieu of OP 1104-281.

This change affects:

Section 12	Step 12.3.2	Page 27
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4. Additional guidance was added to test solidification work/calculation sheets to have personnel document a test solidification failure, any reasons for a failure and final check to ensure three (3) successful tests were performed before proceeding with the procedure. These changes tie the narrative part of the procedure to the work sheets requiring personnel to make a conscious decision concerning test acceptability prior to proceeding to the full scale solidification.

This change affects:

Attachment 1	Page E1-3, E1-4
Attachment 3	Page E3-3, E3-4
Attachment 5	Page E5-2
Attachment 7	Page E7-2
Attachment 9	Page E9-2
Attachment 11	Page E11-1, E11-2

These changes to the procedure are highlighted by the "Change Bars" located in the right hand margin.

All the changes incorporated are Administrative and do not affect the process, nor change analytical or operational methods which have been previously reviewed.