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Southern California Edison Company

SAN ONOFRE NUCLEAR GENERATING STATION
P.O. BOX 128
SAN CLEMENTE, CALIFORNIA 92672

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REGION V IAE

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July 2, 1984

U. S. Nuclear Regulatory Commission
Office of Inspection and Enforcement
Region V
1450 Maria Lane, Suite 210
Walnut Creek, California 94596-5358

Attention: Ray Fish, Team Leader
Emergency Preparedness Facility Appraisal

Dear Mr. Fish:

Subject: Verification and Validation of the EARS Program for San Onofre Nuclear Generation Station

A formal verification and validation program for the Nuclear Data EARAUT and EARMAN codes has been initiated by SONGS. The meterological portion of the code will be evaluated by Station Computer Engineering. The test sequence for this evaluation is included as Attachment No. 1. The dose calculation portion of the code has been evaluated by Health Physics Engineering. The parameters evaluated and the test sequence for this evaluation areincluded as Attachment No. 2.

A final copy of this verification will be filed in CDM. If you have any further questions regarding this matter, please contact me at (714) 492-7700, extension 59-108.

Sincerely,

LINDA BRAY
Health Physics Engineer

Enclosures

ATTACHMENT 1

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PRELIMINARY

INPUT AND OUTPUT DATA REQUIREMENTS
SONGS VERIFICATION PROJECT

Table 1 - Verification of Index Code Development

Procedure for Data Input

The meteorological data presented in this table will be placed in the system through either modification to the historical 15-minute Primary Tower data file (~~MSHR01~~) or through the operator input via a computer terminal. MSHOR01

Output Data Required

The output for this verification test should be a listing of the input meteorological data (File MSHR01) and the index developed for each meteorological category.

Table 2 - Verification of Meteorological Field Selection

Procedure for Data Input

The meteorological data input for Table 1 will be used for the verification task.

Output Data Required

Plots of the component wind fields or a printout of the u- and v-components of the wind and stability fields will be required.

Table 3 - Verification of Data Editing and Hierarchy Replacement

Procedure for Data Input

Shear Tests, Absolute Values, Temporal Changes, Invalidation, and Hierarchy Replacement test values will be placed in the system through modifications to the historical 1-minute data files for both the Primary (MICR1) and Backup (MICR2) Systems.

Modifications for each type of test and parameter will be performed separately in the 1-minute historical data file so that the effect on the subsequent 15-minute data can be identified. For the Hierarchy Replacement test, the replacement values will be made unique enough, when compared to the other possible replacement values, to enable overt demonstration of the replacement hierarchy of the system. No hierarchy replacements nor editing of the data occur until the data are used in an average calculation.

Output Data Required

The modified 1-minute data files for the Primary and Backup Systems (~~MICR1 and MICR2~~) and the associated processed 15-minute data files for the two systems (MSHR01 and MSHR02).

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PRELIMINARY

Table 4 - Verification of Mixing Height Field Development

Procedure for Input Data

The 15-minute (~~MSHR01~~ METSEN) data file for the Primary System will be modified to reflect the differential temperatures, date, and time presented in this table. A separate run of the dispersion and transport algorithm will be made for each entry.

Output Data Requirement

The output data must contain information that will enable the determination of the unmodified mixing heights, terrain adjusted mixing heights, stability and terrain modified mixing heights, and CIBL modified stability dependent terrain adjusted mixing heights at three to five specific receptor points. It is anticipated that the output file EAPNT will provide some of this information. Other intermediate data may be required.

Table 5 - Verification of Stability Field Adjustment

Procedure for Input Data

The input data presented in this table will be run separately and the required output generated for each entry. The meteorological data will be entered through modification to the 15-minute Primary System meteorological field (~~MSHR01~~ METSEN).

Output Data Required

The unadjusted stability field identified by the various indices and the modified stability field should be listed to enable comparison with hand calculations.

Table 6 - Verification of Wind Speed Adjustments

Procedure for Input Data

The input data presented in this table will be run separately and the required output generated for each entry. The meteorological data will be entered through modification to the 15-minute Primary System meteorological file (MSHR01).

Output Data Required

The unadjusted wind fields and the adjusted wind fields, identified by the various indices, should be listed.

PRELIMINARY

Table 7 - Verification of Dispersion and Transport Calculations

Procedure for Data Input

METSEN

The historical 15-minute Primary System data file will be modified to input the separate 15-minute observations of Set # 1 Input Data and the temporal data sequences of the other input data sets.

Output Data Required

Debug info.

The intermediate output of building wake, stability, mixing height, horizontal and vertical disperson coefficients, wind direction, travel distance, width of plume, concentration and deposition must be developed for each meteorological entry (i.e., 15-minute meteorological entry) and each segment of a release. Values of total concentration and deposition should also be provided at 5 to 10 receptor points for each time step or meteorological entry calculation. The ouput file EAPNT may provide some of this information.

PRELIMINARY

TABLE 1

VERIFICATION OF INDEX CODE DEVELOPMENT

Objective

Verify index development from meteorological input data. (Test approximately 10 percent of the 364 nonuniform meteorological fields, plus several of the uniform meteorological fields.)

Method

Compare the indices developed by the computer, from the meteorological input data, to the hand calculated indices shown below.

Input Data

Date	Julian Date	Time	ΔT (°C)	WS (mph)	WD (deg)	Index
09/01/83	244	1730	-0.45	4.0	191.5	101109
10/01/84	275	0700	-0.51	4.1	213.4	101209
11/01/85	305	0730	-0.57	12.1	124.0	101406
12/01/86	335	0800	-0.44	3.0	101.5	102105
12/31/87	365	1600	-0.15	2.0	214.0	102110
12/31/88	366*	2330	-0.14	1.0	11.5	103101
01/01/89	1	0815	+0.46	0.8	236.0	103110
02/01/90	32	0800	+1.21	8.0	56.0	103202
02/28/91	59	1700	+0.45	13.0	79.0	103404
09/01/92	245	0715	-0.56	8.1	349.0	111316
10/01/93	274	0730	-0.50	14.0	281.5	111413
11/02/94	306	0815	-0.30	0.9	169.0	112108
12/02/95	336	0845	+1.20	1.5	259.0	113112
01/02/97	2	0900	+0.75	2.5	304.0	113114
02/02/98	33	0845	+2.00	5.0	326.5	113215
02/29/96	60*	1615	+4.00	12.0	281.0	113312
03/01/99	60	0715	-0.48	3.5	393.0	201101
04/01/80	92	0645	-0.54	3.7	101.0	201104
05/01/81	121	0615	-0.70	3.3	220.0	201110
06/01/82	152	0600	-0.85	6.0	439.0	201204
07/01/83	182	0600	-1.00	10.0	359.9	201316
08/01/84	214	0615	-0.35	2.8	146.5	202107
03/02/85	61	0230	-0.40	2.4	360.0	202116
04/01/86	91	1730	-0.20	7.0	416.5	202203
05/02/87	122	1800	-0.25	7.5	506.0	202206
06/01/88	153	1815	+6.00	1.9	394.0	203102
07/02/89	183	1815	+1.50	6.5	11.0	203216
08/01/90	213	1800	+0.50	16.0	416.0	203402

* Leap Year

May need debug start. to get index code.

PRELIMINARY

TABLE 1 (Continued)

Date	Julian Date	Time	ΔT (°C)	WS (mph)	WD (deg)	Index
08/31/91	243	1700	-0.90	1.4	236.5	211111
08/31/92	244*	1400	-0.80	5.5	461.0	211204
03/03/93	62	0800	-0.75	4.5	371.0	211216
04/02/94	92	1645	-1.02	11.0	191.0	211308
05/03/95	123	1715	-0.65	20.0	540.0	211408
06/02/96	154	1730	-0.17	4.3	34.0	212202
07/03/97	184	1730	-0.34	9.0	303.5	212313
08/02/98	214	1715	-0.24	30.0	295.0	212413
03/04/99	63	1230	0.00	1.1	258.5	213111
11/01/85	305	2200	-0.30	10.0	300.0	102313
12/01/86	335	1100	+0.50	6.0	110.0	113205
06/01/82	152	0300	-1.00	15.0	45.0	201402
07/01/83	182	1500	-0.30	2.0	360.0	212116

* Leap Year

PRELIMINARY

TABLE 2

VERIFICATION OF METEOROLOGICAL FIELD SELECTION

Objective

Verify selection of proper meteorological field from a given index.

Method

Compare the meteorological fields selected by the computer to those that Dames & Moore developed for the indicated indices. (Output fields should be either plots (preferable) or tabular printouts of the u- and v-components of the wind fields, and the stability fields.)

Input Data

The index codes developed in Table 1 will be the input data for this verification task. In addition, an invalid index code (such as 313111) will be input.

PRELIMINARY

TABLE 3

VERIFICATION OF DATA EDITING AND HIERARCHY REPLACEMENT

Objective

Verify that proper meteorological data are used in the transport and dispersion analysis.

Method

The following editing checks are planned:

1-Minute Values

- Shear tests between levels
- Absolute values
- Temporal changes
- Invalidation
- Conversion from centivolts to engineering units
- Averaging process

15-Minute Values

- Invalidation
- Hierarchy replacement

1. Verification of the conversion from centivolt to engineering units and the averaging process will be performed during our second quarter calibration onsite. Known voltages will be transmitted to each channel and hand calculations of the conversion to engineering units will be compared to computer output values.

2. Verification of the other items above will be made by modifying the historical 1-minute and/or 15-minute data files using the system editor and the operator override capability. (A person familiar with the system operation and non-routine capabilities will be required.)

PRELIMINARY

Input Data

The following modifications to the historical data file are planned:

Type of Test	Averaging Period	Data Modifications
Shear Test Between Levels	1-minute	40m WS-10m WS > 30 mph 40m WD-10m WD > 140°
Absolute Values	1-minute	WD > 540° WS > 75 mph ΔT < -3.0°C and ΔT > 3.0°C Ta < -30.1°C and Ta > 50°C Julian Date > 366
Temporal Changes	1-minute	Change in WS > 25 mph Change in ΔT > 1.2°C Change in Ta > 6.0°C Change in Td > 6.0°C Rainfall > 0.20 inch/min.
Invalidation	1-min/15-min	7 out of 15 1-min values invalid 8 out of 15 1-min values invalid
Hierarchy Replacement*	15-minute	Wind Speed Replacement Wind Direction Replacement Stability Replacement

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* Hierarchy of replacement meteorological values is as follows:

WS & WD: (1) 10m primary tower,
(2) 10m backup tower, and
(3) 40m primary tower

Stability: (1) 10-40m ΔT-primary system,
(2) 10-40m ΔT-secondary system,
(3) 20-120 ft ΔT,
(4) 10m σ_θ-primary tower,
(5) 10m σ_θ-backup tower, and
(6) 40m σ_θ-primary tower (manually determined).

PRELIMINARY

TABLE 4

VERIFICATION OF MIXING HEIGHT FIELD DEVELOPMENT

Objectives

1. Verify mixing height field development for all four seasons (day and night), all possible stability adjustments, and all CIBL development criteria.

2. Verify the CIBL development criterion that land-water temperature difference be ≥ 1°C for both the January-March and April-December periods.

Method

Compare the mixing height fields selected by the computer with the following independently determined values:

- Unmodified mixing heights
- Terrain adjusted mixing heights
- Mixing heights over water (should be zero)
- Stability modification and terrain adjusted mixing heights
- CIBL modified stability dependent terrain adjusted mixing heights

Input Data

1. Season/Stability Tests

Date	Julian Date	Time	ΔT(°C)	Description of Test
01/31/90	31	0900	-0.75	Winter/"A"
12/30/87	364	1000	-0.53	Winter/"B"
12/03/95	337	2200	-0.30	Winter/"D" (night)
01/03/97	3	0300	0.00	Winter/"E"
03/31/86	90	1100	-0.70	Spring/"A"
04/30/81	120	1200	-0.48	Spring/"C"
05/31/81	151	2300	-0.25	Spring/"D" (night)
05/04/82	124	0100	+1.00	Spring/"F"
06/04/82	155	1300	-0.65	Summer/"A"
06/30/83	181	1600	-0.40	Summer/"D" (day)
07/04/83	185	2100	-0.35	Summer/"D" (night)
08/03/90	215	0200	+1.50	Summer/"G"
09/03/83	246	1400	-0.60	Fall/"A"
09/30/93	273	1500	-0.55	Fall/"B"
10/03/91	276	2000	-0.20	Fall/"D" (night)
11/03/94	307	0400	+0.40	Fall/"E"

(Other meteorological parameters do not affect the mixing height calculations.)

PRELIMINARY

2. CIBL Development Tests

Date	Julian Date	Time	ΔT(°C)	WS (mph)	WD (deg)	T_{air}(°C)	T_{water}(°C)	Description of Test
01/01/85	1	1200	-0.3	3.0	200	18.0	14.9	All conditions satisfied.
02/02/90	32	[2300]	-0.3	3.0	200	16.5	14.9	Hours not satisfied.
03/01/99	60	1200	-0.3	3.0	[330]	17.0	15.5	WD not satisfied.
04/10/86	100	1200	-0.3	[1.0]	200	18.5	17.0	WS not satisfied.
05/30/82	150	0800	[+0.9]	3.0	200	20.0	18.8	ΔT not satisfied.
07/19/90	200	1200	-0.3	3.0	200	[19.5]	[19.5]	Temp. difference not satisfied.
09/07/91	250	1200	[-1.2]	3.0	200	19.8	18.7	ΔT is autoconvective.

3. Land-Water Temperature Difference Tests

02/01/90	32	1200	-0.3	3.0	200	15.5	14.9	Jan-Mar/No CIBL
03/01/99	60	1200	-0.3	3.0	200	21.0	15.5	Jan-Mar/CIBL
04/10/86	100	1200	-0.3	3.0	200	17.8	17.0	Apr-Dec/No CIBL
05/30/82	150	1200	-1.2	3.0	200	20.0	18.8	Apr-Dec/Autoconvective

PRELIMINARY

TABLE 5

VERIFICATION OF STABILITY FIELD ADJUSTMENT

Objective

Verify the stability field adjustment for the three stability regions (ocean, coastal, and inland) for each of the seven stability classes.

Method

Compare the computer generated stability fields from the input data below to the hand calculated values in the ocean, coastal, and inland regions. (The printout of the unadjusted stability field for each index below must be obtained to determine the appropriate modification.)

Input Data

Julian Date	Time	ΔT(°C)	WS (mph)	WD (deg)	T_{air}(°C)	Index	Record No.
32	1200	-0.60	6.0	56	10.0	111202	124
32	1200	-0.60	2.0	355	10.0	111116	999
211	1400	-1.20	2.0	230	28.0	211110	296
32	1200	-0.55	6.0	355	10.0	111216	999
215	1200	-0.55	2.0	355	24.0	211116	313
215	2000	-0.55	2.0	355	24.0	201116	213
215	2000	-0.47	15.0	56	24.0	201402	999
32	1200	-0.47	6.0	56	10.0	111202	124
32	1200	-0.47	15.0	56	10.0	111402	136
181	1200	-0.30	10.0	240	24.0	212311	346
150	2200	-0.30	15.0	130	24.0	202406	70
215	1200	-0.30	2.0	70	24.0	212103	999
32	2200	-0.30	2.0	70	10.0	102103	47
32	1600	0.00	2.0	355	10.0	113116	999
215	2200	0.00	2.0	355	24.0	203116	285
32	2200	0.00	6.0	56	10.0	103202	91
32	2200	+1.00	15.0	292	10.0	103413	999
215	2200	+1.00	2.0	355	24.0	203116	285
121	1600	+1.50	2.0	160	25.0	213107	356
32	2200	+1.50	6.0	56	10.0	103202	91
32	1200	+1.50	15.0	56	10.0	113402	999
32	2200	+1.50	0.6	56	10.0	103102	91

PRELIMINARY

TABLE 6

VERIFICATION OF WIND SPEED ADJUSTMENT

Objective

Verify the proper scaling of the wind speeds in the nonuniform wind fields based on wind speed values measured at SONGS (wind speed should not be scaled below 0.75 mph.)

Method

Compare the computer generated wind speed values from the input data given below to the wind field prior to adjustment (requires a printout of the unadjusted wind field for each test).

Input Data

Meteorological input data given for indices 21110, 211116, 212311, 202406, 103202, 213107, and 91 (both) in Table 5.

PRELIMINARY

TABLE 7

VERIFICATION OF DISPERSION AND TRANSPORT CALCULATIONS

Objective

Verify the operation and calculation of plume dispersion and transport including verification of individual components as well as the integrated system. (The components to be tested include building wake, stability and mixing height, vertical and horizontal plume dispersion coefficients, wind direction, travel distance and width of plume segment, and concentrations and deposition at the site boundary and various receptor points.)

Methods

1. Use single 15-minute values of meteorological input data to test particular components or operations.

2. Use sequential uniform configurations of identical meteorological data to test temporal operations of the model.

3. Use sequential nonuniform test configurations of identical meteorological data to test temporal operations with nonuniform fields.

4. Use sequential test configurations with varying input data to test full operation of the system.

Input Data

1. Individual 15-minute Values for Component Test

Index	Julian Date	Time	ΔT (°C)	WS (mph)	WD (deg)	T_a-T_w (°C)	Reason
213311	181	1000	+0.10	10.0	245	2	Stable Uniform Field/CIBL
213111	181	1000	-0.40	10.0	245	2	Unstable Uniform Field/CIBL
213311	181	1000	+0.10	10.0	245	0	Stable Uniform Field/No CIBL
213301	181	1000	+0.10	10.0	360	0	Direction Change; Stable Uniform Field/No CIBL

The above individual 15-minute runs will be made separately including decay and deposition, and without decay and deposition.

2. Uniform Field/CIBL (Repeat data 3 times)

Index	Julian Date	Time	ΔT (°C)	WS (mph)	WD (deg)	T_a-T_w (°C)
213311	181	1000	+0.10	10.0	245	2

PRELIMINARY

3. Uniform Field/No CIBL (Repeat data 4 times)

Index	Julian Date	Time	ΔT (°C)	WS (mph)	WD (deg)	T_a-T_w (°C)
212110	181	1000	-0.30	[3.0]	225	0

4. Uniform Field/Varying Stability

Index	Julian Date	Time	ΔT (°C)	WS (mph)	WD (deg)	T_a-T_w (°C)
112402	31	1000	-0.30	13.0	045	0
113402	31	1000	+0.10	13.0	045	0
112402	31	1000	-0.30	13.0	045	0
113402	31	1000	+0.10	13.0	045	0

5. Uniform Field/Varying Wind Direction

Index	Julian Date	Time	ΔT (°C)	WS (mph)	WD (deg)	T_a-T_w (°C)
112302	31	1000	-0.30	10.0	045	0
112310	31	1000	-0.30	10.0	225	0
112302	31	1000	-0.30	10.0	045	0
112310	31	1000	-0.30	10.0	225	0

6. Uniform Field/Varying Wind Speed

Index	Julian Date	Time	ΔT (°C)	WS (mph)	WD (deg)	T_a-T_w (°C)
112110	31	1000	-0.30	1.0	225	0
112310	31	1000	-0.30	10.0	225	0
112110	31	1000	-0.30	1.0	225	0
112310	31	1000	-0.30	10.0	225	0

7. Nonuniform Field/Deletion of Plume Segments (Repeat data 6 times)

Index	Julian Date	Time	ΔT (°C)	WS (mph)	WD (deg)	T_a-T_w (°C)
213412	181	1000	+0.10	13.0	270	0

PRELIMINARY

TABLE 7 (Continued)

8. Varying Field Type (Nonuniform/Uniform)

Index	Julian Date	Time	ΔT (°C)	WS (mph)	WD (deg)	T_a-T_w (°C)
102301	31	2000	-0.30	10.0	020	0
102309	31	2000	-0.30	10.0	200	0
102301	31	2000	-0.30	10.0	020	0
102301	31	2000	-0.30	10.0	200	0

9. Varying Nonuniform Field

Index	Julian Date	Time	ΔT (°C)	WS (mph)	WD (deg)	T_a-T_w (°C)
113108	31	1000	+0.10	1.0	180	0
113112	31	1000	+0.10	1.0	270	0
113101	31	1000	+0.10	1.0	025	0
113106	31	1000	+0.10	1.0	135	0

ATTACHMENT 2

EARS Dose Calculation Verification Project

(1) Verification of Release Rate Effects

Procedure for Input

Released rates of 1, 2 and 10 Ci/sec of gross noble gas will be input to the computer as indicated in Runs #1, 2 and 3 of Table I.

Output Data Required

The output of the computer must agree with the hand calculated values of the whole body dose rate at two points on the centerline of the plume and two points off axis to the plume.

(2) Verification of Windspeed Effects

Procedure for Input

Wind speeds of 2, 5 and 10 mps will be input to the computer as indicated in Runs #1, 4 and 5 of Table I.

Output Data Required

The output of the computer must agree with the hand calculated values of the whole body dose rate at two points on the centerline of the volume and two points off axis to the plume.

(3) Verification of Stability Class Effects

Procedure for Input

Stability classes of A, C and F will be input to the computer as indicated in Runs #1, 6 and 7 on Table I.

Output Data Required

The output of the computer must agree with the hand calculated values of the whole body dose rate at two points on the centerline of the plume and two points off axis to the plume.

(4) Verification of Isotope Mix Effects

Procedure for Input

1 Ci/sec of gross noble gas and iodine will input to the computer as indicated in Runs #1, 8, 10 and 11.

Output Data Required

The output of the computer must agree with the hand calculated values for whole body and thyroid dose rate at two points along the centerline of the plume and two points off axis of the plume.

(5) Verification of Isotope Specific Effects

Procedure for Input

1 Ci/sec of Cs-137, Xe-133 and I-131 will be input to the computer as indicated on Runs #9, 10 and 11 of Table I.

Output Data Required

The output of the computer must agree with hand calculated values for whole body and thyroid dose at two points along the centerline of the plume and two points off axis to the plume.

(6) Verification of Dose Type Calculations

Procedure for Input

1 Ci/sec of Cs-137 will be input to the computer as indicated on Runs #9 and 12 of Table I.

Output Data Required

The output of the computer must agree with the hand calculated values for whole body and lung dose rates at two points along the centerline of the plume and two points off axis to the plume.

(7) Verification of Initial Effective Age Effects

Procedure for Input

1 Ci/sec of gross noble gas with effective ages of 0, 2 and 8 hours will be input to the computer as indicated in Runs #1, 13 and 14 on Table I.

Output Data Required

The output of the computer must agree with the hand calculated values for the whole body dose rate at two points along the centerline of the plume and two points off axis to the plume.

(8) Verification of Plume Duration Effects

Procedure for Input

1 Ci/sec of gross noble gas with update durations of 15, 60 and 480 min will be input to the computer as indicated on Runs #1, 15 and 16 of Table I.

Output Data Required

The output of the computer must agree with the hand calculated values for the whole body dose rate at two points along the centerline of the plume and two points off axis to the plume.

(9) Verification of Downwind Distance Calculations

Procedure for Input

1 Ci/sec of gross noble gas with a plume duration of 480 min will be input to the computer as indicated in Run #16 on Table I.

Output Data Required

The output of the computer must agree with the hand calculated values for the whole body dose rate at distances down wind at EAB, 1 mile and 5 miles.

(10) Verification of Wet Deposition

Procedure for Input

1 Ci/sec of gross iodine will be input to the computer with precipitation of 0, 0.1 and 0.5 mm during the update period as indicated by Runs #8, 17 and 18 on Table I.

Output Data Required

The output of the computer must agree with the hand calculated thyroid dose rates at two points along the centerline of the plume and two points off axis to the plume.

(11) Verification of Dry Deposition

Procedure for Input

1 Ci/sec of Cs-137 and I-131 will be input to the computer as indicated by Runs #9 and 11.

Output Data Required

The output of the computer must agree with the hand calculated whole body and thyroid dose rates at two points along the centerline of the plume and two points off axis to the plume.

(12) Verification of Mixing Height Calculation

Procedure for Input

1 Ci/sec of gross noble gas with mixing layers of 1627, 101 and 1000 m will be input to the computer as indicated by Runs #1, 19 and 20.

Output Data Required

The output of the computer must agree to the hand calculated values for the whole body dose rate at two points along the centerline of the plume and two points off axis to the plume.

TABLE I

RUN #	Ci/Sec Q	Wind Speed μ	Mixing Height / Stability Class	Isotope	Type of Dose	Initial Eff. Age	Plume Duration (Min)	Distance Downwind	Wet Dep	Wind Direction	Final Completed On
1	1	2 mps	1627m / A	Gross Noble Gas	Whole Body	0	15 min	EAB	0	45°	5-1-84
2	2	"	"	"	"	"	"	"	0	45°	5-7-84
3	10	"	"	"	"	"	"	"	0	45°	5-7-84
4	1	5 mps	"	"	"	"	"	"	0	45°	5-8-84
5	1	10 mps	"	"	"	"	"	"	0	45°	5-10-84
6	1	2	1627 / C	"	"	"	"	"	0	45°	5-21-84
7	1	2	1627 / F	"	"	"	"	"	0	45°	6-8-84
8	1	2	1627 / A	Gross Iodine	Thyroid	"	"	"	0	45°	6-12-84
9	1	2	"	Cs-137	Whole Body	"	"	"	0	45°	6-28-84
10	1	2	"	Xe-133	"	"	"	"	0	45°	6-18-84
11	1	2	"	I-131	Thyroid	"	"	"	0	45°	6-25-84
12	1	2	"	Cs-137	Lung	"	"	"	0	45°	6-28-84
13	1	2	"	Gross Noble Gas	Whole Body	2	"	"	0	45°	5-10-84
14	1	2	"	"	"	8	"	"	0	45°	5-10-84
15	1	2	"	"	"	0	60 min	"	0	45°	5-10-84
16	1	2	"	"	"	0	480 min	"	0	45°	5-14-84
	1	2						1 mile	0	45°	5-1-84
	1	2						5 mile	0	45°	6-15-84
17	1	2	"	Gross Iodine	Thyroid	0	15 min	EAB	0.1	45°	6-13-84
18	1	2	"	"	"	0	15 min	EAB	0.5	45°	6-14-84
19	1	2	101 / A	Gross Noble Gas	Whole Body	0	480		0	45°	6-18-84
20	1	2	1000 / A	"	"	0	480		0	45°	6-21-84