CALCULATION TITLE PAGE

Total Number of Pages: 17

MP-2 Fuel Handling Accident in the Spent Fuel Pool : 60 Day Decay, No Filtration

TITLE

M2SFP60D-01252R2	1	N/A
CALCULATION #	**REVISION No.**	**SYSTEM NAME**
N/A	N/A	N/A
VENDOR CALCULATION NUMBER	**Structure**	**System Number**

NUCLEAR INDICATOR:	Calc. Supports DCR/MMOD?	Calc. Supports Ind. Analysis?	N/A
☒CAT1 ☐RWQA ☐SBOQA	☐YES ☒NO	☐YES ☒NO	**Component**
☐FPQA ☐ATWSQA ☐NON-QA			

↓	↓
N/A	N/A
DCR/MMOD No.	**Reference**

INCORPORATES:

CCN NO:	AGAINST REV.
N/A	N/A

Executive Summary

This calculation represents a reanalysis and complete rewrite of the MP2 FHA in the spent fuel pool with 60 days decay and EBFS not in operation to the EAB and LPZ. The changes in this calculation include: including the dose to the control room in the calculation, using conservative data so the calculation now also applies to containment, new atmospheric dispersion (X/Q's) factors, new MP-2 specific source term, the power level was increased by 2% for instrument uncertainity based on the guidance in Regulatory Guide 1.49 and the peaking factor is now 1.83. The results of the calculation are EAB thyroid: 6.059E-01 rem, EAB whole body: 8.960E-04 rem, LPZ thyroid: 7.949E-02 rem, LPZ whole body: 1.175E-04 rem, control room thyroid: 9.01 rem; control room whole body: 7.23E-04 rem and control room beta skin: 7.00E-01 rem. All calculated doses are with SRP 15.7.4 criteria off-site and GDC 19 criteria for the control room

Approvals (Print & Sign Name)		
Preparer::James L. Wheeler		Date: 9/27/98
Interdiscipline Reviewer:N/A	Discipline:	Date:
Interdiscipline Reviewer:N/A	Discipline:	Date:
Independent Reviewer:Stuart Torf		Date: 9/28/98
Supervisor: William Eakin		Date: 9/28/98

Installation Verification

☒ Calculation accurately reflects plant configuration, OR

☐ N/A does not affect plant configuration)

Preparer/Designer Engineer:James L. Wheeler Date: 9/28/98

C #4

SUBJECT: Millstone Unit 2 Radiological Consequences of a Fuel Handling Accident: 60 Days Decay, No Filtration	BY	DWM	DATE	Aug 14, 1995
	CHCKD		DATE	
	CALC#	M2SFP60D-01252-R2	REV	0
	SHEET	1	OF	6

Title Page

Calculation # : M2SFP60D-01252-R2 **Rev #:** 0

A/E Calc #/ other _____ _____

TITLE: Millstone Unit 2 Radiological Consequences of a Fuel Handling Accident: 60 Days Decay, No Filtration

Responsible discipline: Radiological Assessment Branch

QA (y/n): Yes

Pages: 6

Total # of Alphanumeric Revision pages: —

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Total # of Appendix Pages: 61

Total # of Document Pages: 67

Prepared by: David Marzilli (signed) **Date** Aug 14, 1995
David W. Marzilli (DWM) (printed)

Reviewed by: Donald W. Miller (signed) **Date** 08/14/95
Donald W. Miller (printed)

Approved by: Raymond A. Crandall (signed) **Date** 8/15/95
Raymond A. Crandall (printed)

PMMS Code Structure/System/Component	Quality Software	Rev#/Level
	TACT	III

Method of Review: Full Review (plus non QA calc. in Comments section. Reviewer's hand calc. and preparer's calc. match exactly)

Date CTP Entered:

PassPort DATABASE INPUTs

CH #4

Calculation Number: M2SFP60D (prefix) 01252 (sequence no.) R2 (suffix) Revision: 1

Vendor Calculation Number/Other: N/A Revision: N/A

CCN # N/A QA ☒ Yes ☐ No Calc Voided: ☐ Yes ☒ No

Superseded By: N/A Supersedes Calc: N/A

Discipline (Up to 10) Z

Unit	Project Reference (EWA)	Component Id	Computer Code	Rev. No./ Level No.
2	N/A	N/A	TACTIII	83.0
			CRADLE	2/1

PMMS CODES*

Structure	System	Component	Reference Calculation	Rev No.
N/A	N/A	N/A	NUC-181	0
			070771300.WM(B)-03	0
			M2LOCA98-02635R2	0
			07077.13-WM(B)-02	0

*The codes required must be alpha codes designed for structure, system and component.

Reference Drawing	Sheet	Rev. No.
25203-26028	5	20

Comments:

SUBJECT	MP-2 Fuel Handling	BY	JLW	DATE	9/8/98
	Accident in the Spent	CHKED		DATE	
	Fuel Pool: 60 Days Decay	CALC #	M2SFP60D	01252R2	
	No Filtration, Rev. 1	SHEET	3		

Table of Contents

Title Page	1
Rev. 0 Title Page	1A
Passport Database	2
Table of Contents	3
I. Purpose/Objective:	4
II. Summary of Results:	4
III. References:	4-5
IV. Assumptions:	6
V. Method:	6-7
VI. Analysis	
A. Release Activity	7-8
B. Control Room	8
C. Computer Code Input Data Sets	8-11
D. Results of Computer Runs	12-15
Appendix A - Reviewer's Comments	A-1

Total Pages: 17

SUBJECT	MP-2 Fuel Handling	BY	JLW	DATE	9/8/98
	Accident in the Spent	CHKED		DATE	
	Fuel Pool: 60 Days Decay	CALC #	M2SFP60D	01252R2	
	No Filtration, Rev. 1	SHEET	4		

I. Purpose/Objective:

1. The purpose of this calculation is to reanalyze the radiological consequences of a Fuel Handling Accident (FHA) in the Spent Fuel Pool (SFP) at Millstone Unit 2 with 60 days decay and without EBFS in operation using revised assumptions.
2. The calculation will also analyze the radiological consequences of a Fuel Handling Accident (FHA) in containment at Millstone Unit 2 with 60 days decay and without EBFS in operation.

II. Summary of Results

The results in Table II-1 for the EAB and LPZ show that the thyroid and whole body doses calculated are all less than the Standard Review Plan 15.7.4 limits of 75 rem and 6 rem, respectively (Ref. 1). The results also show that the thyroid, whole body and beta skin dose to the MP-2 control room are less than the limits specified in GDC 19.

Table II-1

FHA DOSE (rem)

	Thyroid	Whole Body	Beta Skin
EAB	6.059E-01	8.960E-04	N/A
LPZ	7.949E-02	1.175E-04	N/A
Control Room	9.01E+00	7.23E-04	7.00E-01

III. References

1) Standard Review Plan 15.7.4, "Radiological Consequences of Fuel Handling Accidents", Rev. 1, July 1981.

2) MP2 Facility Operating License, Docket No 50-336, May 5, 1983

3) Regulatory Guide 1.25, Assumptions Used for Evaluating the Potential Radiological Consequences of a Fuel Handling Accident in the Fuel Handling and Storage Facility for Boiling and Pressurized Water Reactors, Rev. 0, March 1972.

4) TACT III, Atmospheric Transport Code System, Oak Ridge National Laboratory, CCC-447, version 83.0.

5) Report of Committee II on Permissible Dose for Internal Radiation, ICRP Publication 2, Permagon Press, New York, 1959.

6) Annals of the ICRP, Limits for Intakes of Radionuclides by Workers, ICRP30 Supplement to Part 1, Volume 3, No. 1-4, Permagon Press, New York, First Edition, 1980.

7) Millstone Nuclear Power Station Unit 2 Final Safety Analysis Report.

8) DiNunno, J.J. et. al., Calculation of Distance Factors for Power and Test Reactor Sites, TID-14844, U. S. Atomic Energy Commission, March 23, 1962.

9) Millstone Nuclear Power Station Unit 2 Technical Specifications

10) "MP-2 Design Basis Loss of Coolant Accident - Radiation Source Term", DES Calculation NUC-181, Rev. 0, June 1998.

11) Technical Evaluation M2-EV-98-0114, "Design Input for EQ Dose Calculations", Rev. 0, May 1998.

12) Siemens Document No. EMF-93-216(P), Millstone Unit 2 Mechanical Design Report for Reload Batch R (MIB-4)

13) "Normalized Concentrations (X/Q) at the EAB and LPZ for Gaseous Releases from the Unit 1 Stack and the Unit 2 Containment, Stack, PORV's/ADV's and MSLB", SWEC Calculation 070771300.WM(B)-03, Rev. 0, July 1998

14) P&ID 25203-26028, Sheet 5 of 5

15) Code of Federal Regulations, 10CFR Part 100 - Reactor Site Criteria.

16) M2LOCA98-02635R2, "EAB and LPZ Doses from a Millstone Unit 2 LOCA", Rev. 0, July 1998

17) "Assessment of the Use of Extended Burnup Fuel in Light Water Power Reactors", NUREG/CR-5009, 1988

18) ERC 25203-ER-98-0050, Rev. 2, "Control Room Filtration System Design Basis Parameters for Inputs to Revise Millstone Unit 2 Control Room Post-Accident Radiological Habitability Analyses", June, 1998.

19) CRADLE - Control Room Accident Dose Level Evaluations, QA Category 1 Calculation #XX-XXX-37 RA, Rev. 2, Donald Miller Nov. 22, 1982.

20) Bechtel Calc. 3D00-5, Containment Heat Sinks, dated 6/04/74

21) Normalized X/Qs at the Unit 2 & 3 Control Room and TSC for Releases from Unit 2, Calculation No. 07077.13-WM(B)-02, Rev. 0, July, 1998

IV. Assumptions

The assumptions used in this calculation are listed in Table IV-1.

Table IV-1

FHA Assumptions

ASSUMPTIONS	BASIS
1) Power Level = 2754 MW	Ref. 2
2) Core Inventory	Ref. 10
3) Core Release Fractions: 12% iodines 10% noble gas 30% Kr-85	Ref. 17 and conservative assumption for iodines
4) Iodine Chemical Form: 75% elemental 25% organic	Ref. 3
5) Offsite Breathing Rate (m^3/sec) : >24 hrs = 3.47E-4	Ref. 3
6) Decontamination Factor: iodines: 100 noble gasses: 1	Ref 3
7) Release Point: Ground	Conservative assumption
8) Minimum time after shutdown for fuel transfer: 60 days	Ref. 9
9) Peaking Factor: 1.83	Ref. 12
10) Assemblies Damaged: Conservative - 1	Conservative Assumption
11) X/Q (sec/m^3): Ground: EAB (0-2) hr = 3.66E-4 LPZ (0-4) hr = 4.80E-5	Ref. 13
Control Room (0-8) hr = 5.46E-3 (8-24) hr = 3.45E-3 (24-96) hr = 1.27E-3 (96-720) hr = 3.98E-4	Ref. 21
12) Dose Conversion Factors	Ref. 6
13) All activity must be released within 2 hours	Ref. 3
14) Control Room Intake Flowrate: 800 cfm	Ref. 18
15) Control Room Volume: 35,650 ft3	Ref. 18

V. Method:

This reanalysis of the MP2 FHA dose calculation uses the assumptions as listed herein. The reason for this reanalysis is due to the following assumption changes:

1) The peaking factor is now 1.83.
2) A new MP-2 specific source term was calculated.
3) New atmospheric dispersion factors (X/Q's) were calculated.
4) The power level was increased by 2% for instrument uncertainty based on the guidance in Regulatory Guide 1.49.
5) This calculation also analyzes doses to the control room assuming it does not isolate.
6) This calculation also applies to a FHA in containment with no filtration and 60 days decay.

The TACT III (version 83.0) (Ref. 4) computer code was used in this analysis. TACT III (ver. 83) was validated per NEO 2.24/QS-3 and was last benchmarked on July, 1998. TACT III "simulates the movement of radioactivity released from a

reactor core as it migrates through user-defined regions (nodes) of the containment, is immobilized by filters and sprays, and leaks to the outside environment... Outputs are shown for the end of each time interval and include the level of radioactivity in each node of the containment and in the environment, broken down as iodines, noble gases, and solids...; and the radiation dose to reference individuals at the exclusion radius, the boundary of the low population zone, and in the control room.", (Ref. 4).

Although reference 17 states that 10% of the iodines are available for release (except I-131 which is 12%), 12% will be used for all iodines for simplicity.

The thyroid dose conversion factors (DCF)s currently used in the TACT III code date back to Reg. Guide 1.109, Rev. 1, (Ref. 4 & 5). ICRP 30 adult thyroid DCF's will be used in this analysis because they are more up-to-date and realistic. Table VI-5 lists both the TACT III and ICRP 30 thyroid dose conversion factors and TACT-to-ICRP30 conversion ratios for each iodine isotope. In Table VI-7 the TACT III thyroid dose for each isotope is converted to ICRP 30 dose using the ratios as listed in Table VI-5.

The CRADLE (version 2) (Ref. 19) computer code was used for the control room exposure calculations in this analysis. CRADLE was validated per NEO 2.24/QS-3 and was last benchmarked on July 1998. CRADLE calculates the activity which enters the control room after an accident. The effects of filtration, buildup, decay and plateout are taken into account in the transport of activity from the core into containment to the environment and eventually to the control room. From the activity in the control room, CRADLE calculates the resulting thyroid, whole body and beta doses to the control room operators.

The thyroid dose conversion factors (DCF)s currently used in the CRADLE code date back to Reg. Guide 1.109, Rev. 1, (Ref. 5). ICRP 30 adult thyroid DCF's will be used in this analysis because they are more up-to-date and realistic. Table VI-5 lists both the Reg. Guide 1.109 and ICRP 30 thyroid dose conversion factors and Reg. Guide 1.109-to-ICRP30 conversion ratios for each iodine isotope. In Table VI-8 the CRADLE thyroid dose for each isotope is converted to ICRP 30 dose using the ratios as listed in Table VI-5.

VI. Analysis

A. Release Activity

Rather than use the inventories in TACT III based on TID 14844, the source core activity was taken from Reference 10. The equation for calculating the core release fraction is:

$$Fc = (1/N) * P * (1/DF) * Fg$$

where:

Fc = isotopic release fraction of core, by path
N = number of fuel assemblies in core, 217
P = peaking factor, 1.83
DF = decontamination factor, 100 for iodines, 1 for noble gasses

Fg = fraction of fuel in the gap, 12% iodines, 10% noble gasses, additional 20% Kr-85

Therefore:

Fc(iodines) = 1.01E-05
Fc(noble gas) = 8.43E-04
Fc(Kr-85 add) = 1.69E-03

Table VI-1 lists full core activity according to reference 10 multiplied by the above release fractions. These release fractions were also used in CRADLE.

Table VI-1

Instantaneous Release Activity

Radionuclide	Inventory	Release Fraction	Release Inventory
I-129	4.137E+00	1.01E-05	4.178E-05
I-130	5.101E+06	1.01E-05	5.152E+01
I-131	7.719E+07	1.01E-05	7.796E+02
I-132	1.105E+08	1.01E-05	1.116E+03
I-133	1.504E+08	1.01E-05	1.519E+03
I-134	1.666E+08	1.01E-05	1.683E+03
I-135	1.407E+08	1.01E-05	1.421E+03
Kr-83m	1.080E+07	8.43E-04	9.104E+03
Kr-85	1.194E+06	8.43E-04	1.007E+03
Kr-85m	2.451E+07	8.43E-04	2.066E+04
Kr-87	4.860E+07	8.43E-04	4.097E+04
Kr-88	6.865E+07	8.43E-04	5.787E+04
Kr-89	8.593E+07	8.43E-04	7.244E+04
Xe-131m	8.615E+05	8.43E-04	7.262E+02
Xe-133	1.569E+08	8.43E-04	1.323E+05
Xe-133m	4.808E+06	8.43E-04	4.053E+03
Xe-135	5.658E+07	8.43E-04	4.770E+04
Xe-135m	3.104E+07	8.43E-04	2.617E+04
Xe-137	1.316E+08	8.43E-04	1.109E+05
Xe-138	1.316E+08	8.43E-04	1.109E+05
Kr-85 (20%)	1.194E+06	1.69E-03	2.018E+03

B. Control Room

The control room is either isolated by a SIAS signal or the control room inlet radiation monitor. In this calculation it will be assumed that the control room does not isolate and continues with a intake flow rate of 800 cfm for the duration of the accident. Due to control room emergency ventilation not starting up, there also is no cleanup in the control room.

C. Computer Code Input Data Sets

The input data set to the TACT III (version 83.0) and CRADLE computer codes are given in Tables VI-2 thru VI-4.

SUBJECT	MP-2 Fuel Handling	BY	JLW	DATE	9/8/98
	Accident in the Spent	CHKED		DATE	
	Fuel Pool: 60 Days Decay	CALC #	M2SFP60D	01252R2	
	No Filtration, Rev. 1	SHEET	9		

Table VI-2

TACTIII Input Dataset

```
****************************** Top of Data ********************************
MP2 FHA; 12% IODINES, 10% NOBLE GASSES, 30% KR-85
1  1 1 21 9  8 98 0 0
2754. 0.0     1.01E-5 2.53E-3 0.0      7.50E-1 2.50E-1 0.0
1  2 0  1.440E+03  1.442E+03
2  1 1  4.178E-05
2  1 2  7.796E+02
2  1 3  1.116E+03
2  1 4  1.519E+03
2  1 5  1.683E+03
2  1 6  1.421E+03
2  1 8  5.152E+01
2  1 9  9.104E+03
2  1 10 2.066E+04
2  1 11 3.025E+03
2  1 12 4.097E+04
2  1 13 5.787E+04
2  1 14 7.244E+04
2  1 15 7.262E+02
2  1 16 4.053E+03
2  1 17 1.323E+05
2  1 18 2.617E+04
2  1 19 4.770E+04
2  1 20 1.109E+05
2  1 21 1.109E+05
3  1 0  1.000E+03
10 2 1  1.000E+08  0.0
17 6 0  3.660E-04  4.800E-05  3.470E-04  0.0  0.0  0.000E+00
0/
***************************** Bottom of Data ******************************
```

SUBJECT	MP-2 Fuel Handling	BY	JLW	DATE	9/8/98
	Accident in the Spent	CHKED		DATE	
	Fuel Pool: 60 Days Decay	CALC #	M2SFP60D	01252R2	
	No Filtration, Rev. 1	SHEET	10		

Table VI-3

CRADLE Input Dataset (20% Kr-85)

```
****************************** Top of Data ********************************
 MP-2 CR FROM FHA (20% KR-85)                                             1
     2754.  3.565E+4        1.          0          5
       0.0    1.44E3   1.448E3   1.464E3   1.536E3   2.160E3
       0.0   1.69E-3
       0.0       0.0
       0.0       0.0
       0.0       0.0
       0.0       0.0
     800.0     800.0     800.0     800.0     800.0
       0.0       0.0       0.0       0.0       0.0
     800.0     800.0     800.0     800.0     800.0
       0.0       0.0       0.0
       0.0       0.0       0.0
       0.0       0.0       0.0
       0.0       0.0       0.0
       0.0       0.0       0.0
       0.0       0.0       0.0
       0.0   5.46E-3   3.45E-3   1.27E-3   3.98E-4
       0.0    1.0E+8    1.0E+8    1.0E+8       0.0
       0.0       0.0       0.0
       0.0       0.0       0.0
       0.0       0.0       0.0
       0.0       0.0       0.0
       0.0       0.0       0.0
       0.0       0.0       0.0
****************************** Bottom of Data *****************************
```

Table VI-4

CRADLE Input Dataset (10% Noble Gasses)

```
****************************** Top of Data ********************************
 MP-2 CR FROM FHA (12% I; 10% NG)                                          1
     2754.  3.565E+4        1.          0          5
       0.0    1.44E3   1.448E3    1.464E3    1.536E3    2.160E3
   1.01E-5   8.43E-4
       0.0        0.0
       0.0        0.0
       0.0        0.0
       0.0        0.0
     800.0      800.0      800.0      800.0      800.0
       0.0        0.0        0.0        0.0        0.0
     800.0      800.0      800.0      800.0      800.0
       0.0        0.0        0.0
       0.0        0.0        0.0
       0.0        0.0        0.0
       0.0        0.0        0.0
       0.0        0.0        0.0
       0.0        0.0        0.0
       0.0   5.46E-3    3.45E-3    1.27E-3    3.98E-4
       0.0    1.0E+8     1.0E+8     1.0E+8        0.0
       0.0        0.0        0.0
       0.0        0.0        0.0
       0.0        0.0        0.0
       0.0        0.0        0.0
       0.0        0.0        0.0
       0.0        0.0        0.0
****************************** Bottom of Data *****************************
```

C. Results of Computer Runs

TACT III thyroid results will be adjusted using the ICRP 30 thyroid dose conversion factors by utilizing the equation given below.

$$D_{Thy_i}^{ICRP30} = D_{Thy_i}^{TACT} * F_i * R_i$$

where,

$D_{Thy_i}^{ICRP30}$ = Thyroid dose for isotope i adjusted for ICRP 30 DCF's.

$D_{Thy_i}^{TACT}$ = Total Thyroid dose from TACT III for isotope i

F_i = Fraction of total iodine.

R_i = Ratio of ICRP 30 to TACT III and CRADLE dose conversion factors (see Table VI-5).

The TACT III input data sets in Table VI-2 were run on the Wethersfield IBM 3090 mainframe computer. The thyroid doses adjusted for ICRP 30 DCF's in each time interval are listed in Table VI-7 with corresponding data. The summary of both thyroid and whole body dose results appear in Table II-1.

TABLE VI-5

THYROID DOSE CONVERSION FACTORS
(rem/Ci - inhaled)

ISOTOPE	TACT III and CRADLE	ICRP 30 *	DCF RATIO (ICRP 30/TACTIII or CRADLE)
I-129	5.54E+6	5.920E+6	1.068
I-130	1.42E+5	7.400E+4	0.521
I-131	1.49E+6	1.073E+6	0.718
I-132	1.43E+4	6.290E+3	0.440
I-133	2.69E+5	1.813E+5	0.674
I-134	3.73E+3	1.073E+3	0.288
I-135	5.60E+4	3.145E+4	0.562

The results from CRADLE must be adjusted for thyroid dose as described above. The results also must be adjusted for the difference in the source term. Since CRADLE does not have an option to input a plant specific source term, another ratio must be calculated. The ratio will be the total source as calculated in reference 10 to the total source as listed in reference 19 (CRADLE). The doses per time step will be multiplied by this ratio and then summed. The ratios are listed and calculated in Table VI-6 below.

Table VI-6

	Ref. 12 (NUC-181) Full Core Activity	Ref. 24 (CRADLE) Full Core Activity	Ratio
I-131	7.72E+07	6.91E+07	1.1177
I-132	1.11E+08	1.05E+08	1.0544
I-133	1.50E+08	1.55E+08	0.9714
I-134	1.67E+08	1.81E+08	0.9201
I-135	1.41E+08	1.41E+08	1.0013
Kr-83M	1.08E+07	1.14E+07	0.9445
Kr-85	1.19E+06	1.13E+06	1.0569
Kr-85M	2.45E+07	3.57E+07	0.6862
Kr-87	4.86E+07	6.43E+07	0.7558
Kr-88	6.87E+07	8.81E+07	0.7790
Kr-89	8.59E+07	1.10E+08	0.7842
Xe-131M	8.62E+05	7.15E+05	1.2055
Xe-133M	4.81E+06	3.81E+06	1.2614
Xe-133	1.57E+08	1.55E+08	1.0134
Xe-135M	3.10E+07	4.29E+07	0.7239
Xe-135	5.66E+07	1.48E+08	0.3831
Xe-137	1.32E+08	1.41E+08	0.9364
Xe-138	1.32E+08	1.32E+08	1.0007

The CRADLE input data sets in Table V1-3 and VI-4 were run on the Wethersfield IBM 3090 mainframe computer. The thyroid doses adjusted for ICRP 30 DCF's in each time interval is listed in Table VI-8 with corresponding data. The thyroid, beta skin and whole body doses adjusted for the source term correction in each time interval, using the ratios developed in Table VI-6, are also listed in Table VI-8 with corresponding data. The summary of thyroid, beta skin and whole body dose results appear in Table II-1.

SUBJECT	MP-2 Fuel Handling Accident in the Spent Fuel Pool: 60 Days Decay No Filtration, Rev. 1	BY	JLW	DATE	9/8/98
		CHKED		DATE	
		CALC #	M2SFP60D	01252R2	
		SHEET	14		

TABLE VI-7

FHA; 60 Day Decay; No EBFS

DCF Ratio						
I-129	I-130	I-131	I-132	I-133	I-134	I-135
1.068	0.521	0.718	0.440	0.674	0.288	0.562

	TACT III Iodine Dose Fraction							*Combined Factor*
Release Type	I-129	I-130	I-131	I-132	I-133	I-134	I-135	
12% Iodine	3.49E-05	9.339E-36	1.000E+00	0.000E+00	1.192E-19	0.000E+00	4.611E-64	*7.1804E-01*

Combined Factor(t) = Summation of [DCF Ratio(i) x Iodine Dose Fraction(i)] over i for time interval (t), where i=iodine isotope.

		Filtered Release Thyroid Doses (Rem)			
		TACT III		*ICRP 30*	
Release Type		EAB	LPZ	*EAB*	*LPZ*
12% Iodine		8.438E-01	1.107E-01	*6.059E-01*	*7.949E-02*
				6.059E-01	*7.949E-02*

ICRP 30 EAB(t). or LPZ(t) = TACT III EAB(t). or LPZ(t), x Combined Factor(t) for time interval (t).

TABLE VI-8

Control Room Dose Adjustments

CRADLE Thyroid Correction

	Source Term Correction	1440 - 1448 hrs	1448 - 1464 hrs	Integrated Dose rem	R.G. 1.109 to ICRP 30 DCF Corr.	Corrected Dose (rem)
I-131 ELEM	1.1177	1.02E+01	2.09E-04	1.02E+01	7.18E-01	8.20E+00
I-131 ORG.	1.1177	4.49E-01	9.16E-06	4.49E-01	7.18E-01	3.61E-01
I-131 PART.	1.1177	5.62E-01	1.15E-05	5.62E-01	7.18E-01	4.51E-01
					Total:	9.01E+00

CRADLE Whole Body Correction

	Source Term Correction	1440 - 1448 hrs	1448 - 1464 hrs	Integrated Dose rem	Corrected Dose (rem)
I-131 ELEM	1.1177	1.93E-03	3.93E-08	1.93E-03	2.15E-03
I-131 ORG.	1.1177	8.47E-05	1.73E-09	8.47E-05	9.47E-05
I-131 PART.	1.1177	1.06E-04	2.16E-09	1.06E-04	1.18E-04
10% KR-85	1.0569	2.83E-03	5.94E-08	2.83E-03	2.99E-03
XE-131M	1.2055	5.17E-04	1.06E-08	5.17E-04	6.23E-04
XE-133	1.0134	3.05E-03	6.12E-08	3.05E-03	3.09E-03
20% Kr-85	1.0569	5.67E-03	1.19E-07	5.67E-03	6.00E-03
				1.42E-02	1.51E-02
				6.80E-04	7.23E-04

CRADLE Beta Correction

	Source Term Correction	1440 - 1448 hrs	1448 - 1464 hrs	Integrated Dose rem	Corrected Dose (rem)
I-131 ELEM	1.1177	8.69E-04	1.77E-08	8.69E-04	9.71E-04
I-131 ORG.	1.1177	3.82E-05	7.79E-10	3.82E-05	4.27E-05
I-131 PART.	1.1177	4.77E-05	9.74E-10	4.77E-05	5.33E-05
10% KR-85	1.0569	2.19E-01	4.59E-06	2.19E-01	2.31E-01
XE-131M	1.2055	1.55E-03	3.20E-08	1.55E-03	1.87E-03
XE-133	1.0134	2.60E-03	5.23E-08	2.60E-03	2.64E-03
20% Kr-85	1.0569	4.38E-01	9.20E-06	4.38E-01	4.63E-01
					7.00E-01

APPENDIX A

Calculation Review Comment and Resolution Form

(Sheet 1 of 1)

Calculation Number: M2SFP60D-01252R2 Revision: 1 Calculation Tiitle: MP-2 FUEL HANDLING ACCIDENT IN THE SPENT FUEL POOL: 60 DAY DECAY; NO FILTRATION

Calc. Originator: James L. Wheeler Reviewer (PRINT): **Stuart Torf**

This form is intended to document significant comments and their resolutions. Typographical errors and other editorial recommendations may be marked up in the calculation text and presented to the originator

Review Type ☞ ☐**Interdiscipline** ☒**Independent**

Reviewer (SIGN) Date: **9/28/98**

(signature signifies all comments have been resolved to your satisfaction)

Item	Page/Section	Comments	Response
1	1/TITLE	**In the executive summary, change beta to beta skin**	**Done**
2	2/Passport	**Change CRADLE to level 1**	**Done**
3	4/Table II-1	**Change beta to beta skin**	**Done**