MathCad Worksheet	TAC: MB7863,MB7864
S.F. LaVie, *NRR/DSSA/SPSB*	Catawba FHA for MOX LTA

INITIALIZATIONS

$Ci := 3.7 \cdot 10^{10} \cdot sec^{-1}$ $rem := 100 \cdot \frac{erg}{gm}$ $Bq := 1.0 \cdot sec^{-1}$ $MWt := 1.0 \cdot 10^{6} \cdot watt$

$ORIGIN := 1$ $uCi := 1.0 \cdot 10^{-6} \cdot Ci$ $mrem := 0.001 \cdot rem$ $Sv := 100 \cdot rem$

$kr85 := 3$ $I131 := 13$

$j := 1..12$ $i := 13..17$ $k := 1..17$

Read in nuclide database NUCLIDE.DAT.>>>>> $M := READPRN(nuclide)$

Re-assign arrays and assign units $\lambda := M^{<2>} \cdot sec^{-1}$

INPUT DATA

Fuel assembly activity, Ci, From Staff S/T report Table 7

$$A_{core} := \begin{bmatrix} 4.2840 \cdot 10^{4} \\ 7.8550 \cdot 10^{4} \\ 4.0430 \cdot 10^{3} \\ 1.4910 \cdot 10^{5} \\ 2.0010 \cdot 10^{5} \\ 7.5110 \cdot 10^{3} \\ 3.2540 \cdot 10^{4} \\ 9.8000 \cdot 10^{5} \\ 2.3070 \cdot 10^{5} \\ 5.3860 \cdot 10^{5} \\ 0.0 \\ 7.6430 \cdot 10^{5} \\ 5.1950 \cdot 10^{5} \\ 7.4150 \cdot 10^{5} \\ 9.7630 \cdot 10^{5} \\ 1.0420 \cdot 10^{6} \\ 9.2860 \cdot 10^{5} \end{bmatrix} \cdot Ci$$

Kr83m
Kr85m
Kr85
Kr87
Kr88
Xe131m
Xe133m
Xe133
Xe135m
Xe135
Xe137
Xe138
I131
I132
I133
I134
I135

Radial peaking factor: $k_p := 1.65$

Decay Time $T_{decay} := 72 \cdot hr$

Assign gap fractions:

$F_{g_k} := 0.075$ noble gases and iodines

$F_{g_{I131}} := 0.12$ Increased 50% as done by licensee

$F_{g_{kr85}} := 0.15$

Assign pool DF:

$DF_j := 1.0$

$DF_i := \frac{1}{200}$

CALCULATION

Activity available for release:

$$A_{rel_k} := A_{core_k} \cdot k_p \cdot DF_k \cdot F_{g_k} \cdot e^{-\lambda_k \cdot T_{decay}}$$

$$A_{rel} = \begin{bmatrix} 7.603 \cdot 10^{-9} \\ 0.141 \\ 1 \cdot 10^{3} \\ 1.667 \cdot 10^{-13} \\ 5.782 \cdot 10^{-4} \\ 780.465 \\ 1.557 \cdot 10^{3} \\ 8.158 \cdot 10^{4} \\ 0 \\ 275.025 \\ 0 \\ 0 \\ 397.096 \\ 1.73 \cdot 10^{-7} \\ 54.836 \\ 0 \\ 0.302 \end{bmatrix} \cdot Ci \begin{matrix} Kr83m \\ Kr85m \\ Kr85 \\ Kr87 \\ Kr88 \\ Xe131m \\ Xe133m \\ Xe133 \\ Xe135m \\ Xe135 \\ Xe137 \\ Xe138 \\ I131 \\ I132 \\ I133 \\ I134 \\ I135 \end{matrix}$$

RG1.183 (RG1.25) stipulates that the activity is released over a two hour period. While it is typical to model an offsite release as a puff release of the total release inventory. However, for a control room assessment, the release must be expressed in terms of a rate. We'll assume that 99% is released in two hours.

$A_o := 1.0$

$A_f := 0.01$

$t := 2 \cdot hr$

$$A_f = A_o \cdot e^{-\lambda \cdot t}$$

solve for λ

$$\lambda := \frac{-\ln\left(\frac{A_f}{A_o}\right)}{t}$$

$$\lambda = 5.526 \cdot 10^{3} \cdot \frac{\%}{day}$$

RNEditor v1.0

File Name:
C:\Documents and Settings\Normal\My Documents\A_NRC\MOX\CatawbaMOX_FHA.RFT
C:\Documents and Settings\Normal\My Documents\A_NRC\MOX\CatawbaMOX_FHA.NIF

Description
Catawba FHA with MOX assembly 50% higher gao fractions

RELEASE FRACTION

Duration, hr	1.0000E-04	0.0000E+00	0.0000E+00	0.0000E+00
Noble Gases:	1.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
Iodine:	1.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
Cesium:	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
Tellurium:	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
Strontium:	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
Barium:	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
Ruthenium:	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
Cerium:	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
Lanthanium:	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
Non-Radioactive Aerosols (kg):				
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

ACTIVITY, Ci (Stored in NIF File as Ci/MWt)

Co-58	0.0000E+00	Co-60	0.0000E+00	Kr-83m	0.0000E+00	Kr-85	1.0001E+03
Kr-85m	1.4101E-01	Kr-87	0.0000E+00	Kr-88	0.0000E+00	Rb-86	0.0000E+00
Sr-89	0.0000E+00	Sr-90	0.0000E+00	Sr-91	0.0000E+00	Sr-92	0.0000E+00
Y-90	0.0000E+00	Y-91	0.0000E+00	Y-92	0.0000E+00	Y-93	0.0000E+00
Zr-95	0.0000E+00	Zr-97	0.0000E+00	Nb-95	0.0000E+00	Mo-99	0.0000E+00
Tc-99m	0.0000E+00	Ru-103	0.0000E+00	Ru-105	0.0000E+00	Ru-106	0.0000E+00
Rh-105	0.0000E+00	Sb-127	0.0000E+00	Sb-129	0.0000E+00	Te-127	0.0000E+00
Te-127m	0.0000E+00	Te-129	0.0000E+00	Te-129m	0.0000E+00	Te-131m	0.0000E+00
Te-132	0.0000E+00	I-131	3.9704E+02	I-132	0.0000E+00	I-133	5.4849E+01
I-134	0.0000E+00	I-135	3.0201E-01	Xe-131m	7.8044E+02	Xe-133	8.1591E+04
Xe-133m	1.5571E+03	Xe-135	2.7503E+02	Xe-135m	0.0000E+00	Xe-138	0.0000E+00
Cs-134	0.0000E+00	Cs-136	0.0000E+00	Cs-137	0.0000E+00	Ba-139	0.0000E+00
Ba-140	0.0000E+00	La-140	0.0000E+00	La-141	0.0000E+00	La-142	0.0000E+00
Ce-141	0.0000E+00	Ce-143	0.0000E+00	Ce-144	0.0000E+00	Pr-143	0.0000E+00
Nd-147	0.0000E+00	Np-239	0.0000E+00	Pu-241	0.0000E+00	Cm-242	0.0000E+00

```
 ##########################################################################
    RADTRAD Version 3.03 (Spring 2001) run on 12/27/2003  at  0:01:13
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                      File information
 ##########################################################################

 Plant file           = C:\Documents and Settings\Normal\My
Documents\A_NRC\MOX\catawbaFHA_mOX.psf
 Inventory file       = C:\Documents and Settings\Normal\My
Documents\A_NRC\MOX\CatawbaMOX_FHA.NIF
 Release file         = C:\Documents and Settings\Normal\My
Documents\A_NRC\MOX\CatawbaMOX_FHA.RFT
 Dose Conversion file = c:\program files\radtrad3.03\defaults\dba_fg11&12.inp




     #####    ####   #####    #  #     #  #####   #    #  #####
     #    #  #       #        #  ##    #  #    #  #    #    #
     #    #  #       #        #  # #   #  #    #  #    #    #
     #####    ####   ####     #  #  #  #  #####   #    #    #
     #            #  #        #  #   # #  #       #    #    #
     #            #  #        #  #    ##  #       #    #    #
     #         ####   #        #  #     #  #        ####     #


 Radtrad 3.03 4/15/2001

 Nuclide Inventory File:
 C:\Documents and Settings\Normal\My Documents\A_NRC\MOX\CatawbaMOX_FHA.NIF
 Plant Power Level:
  3.4110E+03
 Compartments:
   3
 Compartment 1:
 FHB/CNMT
   3
  1.0000E+00
   0
   0
   0
   0
   0
 Compartment 2:
 Environm
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Compartment 3:
 Control Room
   1
  1.1790E+05
   0
   0
```

```
  1
  0
  0
Pathways:
  4
Pathway 1:
FHB/CNMT to Environm
  1
  2
  4
Pathway 2:
Environm to Control Room-unfilt
  2
  3
  2
Pathway 3:
Environm to Control Room Filt
  2
  3
  2
Pathway 4:
Control Room to Environm
  3
  2
  2
End of Plant Model File
Scenario Description Name:

Plant Model Filename:

Source Term:
  1
  1   1.0000E+00
c:\program files\radtrad3.03\defaults\dba_fg11&12.inp
C:\Documents and Settings\Normal\My Documents\A_NRC\MOX\CatawbaMOX_FHA.RFT
  0.0000E+00
  0
  0.0000E+00   5.7000E-01   4.3000E-01   1.0000E+00
Overlying Pool:
  0
  0.0000E+00
  0
  0
  0
  0
Compartments:
  3
Compartment 1:
  0
  1
  0
  0
  0
  0
  0
  0
  0
Compartment 2:
  0
  1
  0
```

```
  0
  0
  0
  0
  0
  0
Compartment 3:
  0
  1
  0
  0
  0
  0
  1
  1.5000E+03
  3
  0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   9.9000E+01   9.9000E+01   9.5000E+01
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
Pathways:
  4
Pathway 1:
  0
  0
  0
  0
  0
  0
  0
  0
  0
  0
  1
  2
  0.0000E+00   5.5260E+03
  2.0000E+00   0.0000E+00
  0
Pathway 2:
  0
  0
  0
  0
  0
  1
  3
  0.0000E+00   2.1000E+03   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   1.0000E+02   0.0000E+00   0.0000E+00   0.0000E+00
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 3:
  0
  0
  0
  0
```

```
  0
  1
  3
  0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  5.0000E-01   2.0000E+03   9.9000E+01   9.9000E+01   9.5000E+01
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Pathway 4:
  0
  0
  0
  0
  0
  1
  3
  0.0000E+00   2.1000E+03   1.0000E+02   1.0000E+02   1.0000E+02
  5.0000E-01   2.1000E+03   1.0000E+02   1.0000E+02   1.0000E+02
  7.2000E+02   0.0000E+00   0.0000E+00   0.0000E+00   0.0000E+00
  0
  0
  0
  0
  0
  0
Dose Locations:
  3
Location 1:
EAB
  2
  1
  2
  0.0000E+00   4.7800E-04
  2.0000E+00   0.0000E+00
  1
  4
  0.0000E+00   3.4700E-04
  8.0000E+00   1.7500E-04
  2.4000E+01   2.3200E-04
  7.2000E+02   0.0000E+00
  0
Location 2:
LPZ
  2
  1
  2
  0.0000E+00   6.8500E-05
  2.0000E+00   0.0000E+00
  1
  4
  0.0000E+00   3.4700E-04
  8.0000E+00   1.7500E-04
  2.4000E+01   2.3200E-04
  7.2000E+02   0.0000E+00
  0
Location 3:
Control Room
```

```
  3
  0
  1
  2
  0.0000E+00   3.4700E-04
  7.2000E+02   0.0000E+00
  1
  4
  0.0000E+00   1.0000E+00
  2.4000E+01   6.0000E-01
  9.6000E+01   4.0000E-01
  7.2000E+02   0.0000E+00
Effective Volume Location:
  1
  2
  0.0000E+00   1.0400E-03
  2.0000E+00   0.0000E+00
Simulation Parameters:
  1
  0.0000E+00   0.0000E+00
Output Filename:
C:\Documents and Settings\Normal\My Documents\A_NRC\MOX\catawbaFHA_mOX.o9
  1
  1
  1
  0
  0
End of Scenario File


##############################################################################
   RADTRAD Version 3.03 (Spring 2001) run on 12/27/2003  at  0:01:13
##############################################################################

##############################################################################
                    Plant Description
##############################################################################

Number of Nuclides =  60

Inventory Power =   1.0000E+00 MWth
Plant Power Level =   3.4110E+03 MWth

Number of compartments    =   3

Compartment information

Compartment number  1  (Source term fraction =   1.0000E+00
)
Name: FHB/CNMT
Compartment volume =   1.0000E+00 (Cubic feet)
Compartment type is Normal
Pathways into and out of compartment  1
   Exit Pathway Number    1: FHB/CNMT to Environm

Compartment number  2
Name: Environm
Compartment type is Environment
Pathways into and out of compartment  2
   Inlet Pathway Number   1: FHB/CNMT to Environm
   Inlet Pathway Number   4: Control Room to Environm
```

```
   Exit Pathway Number    2: Environm to Control Room-unfilt
   Exit Pathway Number    3: Environm to Control Room Filt

Compartment number  3
Name: Control Room
Compartment volume =   1.1790E+05 (Cubic feet)
Compartment type is Control Room
Removal devices within compartment:
     Filter(s)
Pathways into and out of compartment  3
   Inlet Pathway Number   2: Environm to Control Room-unfilt
   Inlet Pathway Number   3: Environm to Control Room Filt
   Exit Pathway Number    4: Control Room to Environm

Total number of pathways =   4

##########################################################################
   RADTRAD Version 3.03 (Spring 2001) run on 12/27/2003  at  0:01:13
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##########################################################################
                    Scenario Description
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Radioactive Decay is enabled

Release Fractions and Timings
                GAP       EARLY IN-VESSEL  LATE RELEASE    RELEASE MASS
             0.000100 hr    0.0000 hrs      0.0000 hrs          (gm)
NOBLES       1.0000E+00     0.0000E+00      0.0000E+00        2.985E+00
IODINE       1.0000E+00     0.0000E+00      0.0000E+00        3.251E-03
CESIUM       0.0000E+00     0.0000E+00      0.0000E+00        0.000E+00
TELLURIUM    0.0000E+00     0.0000E+00      0.0000E+00        0.000E+00
STRONTIUM    0.0000E+00     0.0000E+00      0.0000E+00        0.000E+00
BARIUM       0.0000E+00     0.0000E+00      0.0000E+00        0.000E+00
RUTHENIUM    0.0000E+00     0.0000E+00      0.0000E+00        0.000E+00
CERIUM       0.0000E+00     0.0000E+00      0.0000E+00        0.000E+00
LANTHANUM    0.0000E+00     0.0000E+00      0.0000E+00        0.000E+00

Inventory Power =      3411. MWt

Nuclide  Group  Specific     half     Whole Body   Inhaled     Inhaled
 Name          Inventory     life        DCF       Thyroid    Effective
                (Ci/MWt)     (s)     (Sv-m3/Bq-s)  (Sv/Bq)     (Sv/Bq)
 Kr-85     1   2.932E-01  3.383E+08   1.190E-16   0.000E+00   0.000E+00
 Kr-85m    1   4.134E-05  1.613E+04   7.480E-15   0.000E+00   0.000E+00
 I-131     2   1.164E-01  6.947E+05   1.820E-14   2.920E-07   8.890E-09
 I-133     2   1.608E-02  7.488E+04   2.940E-14   4.860E-08   1.580E-09
 I-135     2   8.854E-05  2.380E+04   8.294E-14   8.460E-09   3.320E-10
 Xe-131m   1   2.288E-01  1.023E+06   7.890E-16   0.000E+00   0.000E+00
 Xe-133    1   2.392E+01  4.532E+05   1.560E-15   0.000E+00   0.000E+00
 Xe-133m   1   4.565E-01  1.892E+05   2.160E-15   0.000E+00   0.000E+00
 Xe-135    1   8.063E-02  3.272E+04   1.190E-14   0.000E+00   0.000E+00

Iodine fractions
     Aerosol     =   0.0000E+00
     Elemental   =   5.7000E-01
     Organic     =   4.3000E-01

COMPARTMENT DATA
```

Compartment number 1: FHB/CNMT

Compartment number 2: Environm

Compartment number 3: Control Room

Compartment Filter Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	1.5000E+03	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	1.5000E+03	9.9000E+01	9.9000E+01	9.5000E+01
7.2000E+02	1.5000E+03	0.0000E+00	0.0000E+00	0.0000E+00

PATHWAY DATA

Pathway number 1: FHB/CNMT to Environm

Convection Data

Time (hr)	Flow Rate (% / day)
0.0000E+00	5.5260E+03
2.0000E+00	0.0000E+00

Pathway number 2: Environm to Control Room-unfilt

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	2.1000E+03	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	1.0000E+02	0.0000E+00	0.0000E+00	0.0000E+00
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 3: Environm to Control Room Filt

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5.0000E-01	2.0000E+03	9.9000E+01	9.9000E+01	9.5000E+01
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Pathway number 4: Control Room to Environm

Pathway Filter: Removal Data

Time (hr)	Flow Rate (cfm)	Filter Efficiencies (%) Aerosol	Elemental	Organic
0.0000E+00	2.1000E+03	1.0000E+02	1.0000E+02	1.0000E+02
5.0000E-01	2.1000E+03	1.0000E+02	1.0000E+02	1.0000E+02
7.2000E+02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

LOCATION DATA

Location EAB is in compartment 2

Location X/Q Data

Time (hr)	X/Q (s * m^-3)
0.0000E+00	4.7800E-04
2.0000E+00	0.0000E+00

Location Breathing Rate Data

Time (hr)	Breathing Rate (m^3 * sec^-1)
0.0000E+00	3.4700E-04
8.0000E+00	1.7500E-04
2.4000E+01	2.3200E-04
7.2000E+02	0.0000E+00

Location LPZ is in compartment 2

Location X/Q Data

Time (hr)	X/Q (s * m^-3)
0.0000E+00	6.8500E-05
2.0000E+00	0.0000E+00

Location Breathing Rate Data

Time (hr)	Breathing Rate (m^3 * sec^-1)
0.0000E+00	3.4700E-04
8.0000E+00	1.7500E-04
2.4000E+01	2.3200E-04
7.2000E+02	0.0000E+00

Location Control Room is in compartment 3

Location X/Q Data

Time (hr)	X/Q (s * m^-3)
0.0000E+00	1.0400E-03
2.0000E+00	0.0000E+00

Location Breathing Rate Data

Time (hr)	Breathing Rate (m^3 * sec^-1)
0.0000E+00	3.4700E-04
7.2000E+02	0.0000E+00

Location Occupancy Factor Data

Time (hr)	Occupancy Factor
0.0000E+00	1.0000E+00
2.4000E+01	6.0000E-01
9.6000E+01	4.0000E-01
7.2000E+02	0.0000E+00

USER SPECIFIED TIME STEP DATA - SUPPLEMENTAL TIME STEPS

Time	Time step
0.0000E+00	0.0000E+00

```
##########################################################################
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```

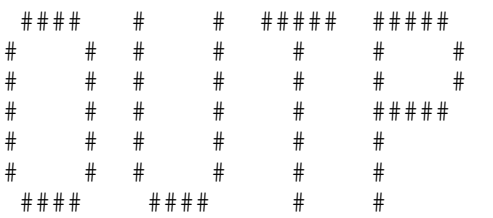

```
##########################################################################
                                Dose Output
##########################################################################

EAB Doses:

Time (h) =   0.0001    Whole Body   Thyroid       TEDE
Delta dose (rem)        2.9219E-05  8.3790E-03  2.8471E-04
Accumulated dose (rem)  2.9219E-05  8.3790E-03  2.8471E-04

LPZ Doses:

Time (h) =   0.0001    Whole Body   Thyroid       TEDE
Delta dose (rem)        4.1873E-06  1.2008E-03  4.0801E-05
Accumulated dose (rem)  4.1873E-06  1.2008E-03  4.0801E-05

Control Room Doses:

Time (h) =   0.0001    Whole Body   Thyroid       TEDE
Delta dose (rem)        1.4995E-10  9.7412E-07  2.9853E-08
Accumulated dose (rem)  1.4995E-10  9.7412E-07  2.9853E-08

EAB Doses:

Time (h) =   0.5000    Whole Body   Thyroid       TEDE
Delta dose (rem)        1.7332E-01  4.9725E+01  1.6895E+00
Accumulated dose (rem)  1.7334E-01  4.9734E+01  1.6898E+00

LPZ Doses:

Time (h) =   0.5000    Whole Body   Thyroid       TEDE
Delta dose (rem)        2.4837E-02  7.1259E+00  2.4212E-01
Accumulated dose (rem)  2.4841E-02  7.1271E+00  2.4216E-01

Control Room Doses:

Time (h) =   0.5000    Whole Body   Thyroid       TEDE
Delta dose (rem)        4.3393E-03  2.8213E+01  8.6460E-01
Accumulated dose (rem)  4.3393E-03  2.8213E+01  8.6460E-01

EAB Doses:

Time (h) =   2.0000    Whole Body   Thyroid       TEDE
```

Delta dose (rem)	7.7257E-02	2.2214E+01	7.5457E-01
Accumulated dose (rem)	2.5060E-01	7.1948E+01	2.4444E+00

LPZ Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.1071E-02	3.1834E+00	1.0813E-01
Accumulated dose (rem)	3.5913E-02	1.0310E+01	3.5029E-01

Control Room Doses:

Time (h) = 2.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	1.4227E-02	4.5631E+01	1.4056E+00
Accumulated dose (rem)	1.8567E-02	7.3845E+01	2.2702E+00

EAB Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	2.5060E-01	7.1948E+01	2.4444E+00

LPZ Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	3.5913E-02	1.0310E+01	3.5029E-01

Control Room Doses:

Time (h) = 8.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	4.5428E-03	3.4359E+00	1.0930E-01
Accumulated dose (rem)	2.3109E-02	7.7280E+01	2.3795E+00

EAB Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	2.5060E-01	7.1948E+01	2.4444E+00

LPZ Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	3.5913E-02	1.0310E+01	3.5029E-01

Control Room Doses:

Time (h) = 24.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	7.1319E-06	6.4484E-05	9.0975E-06
Accumulated dose (rem)	2.3117E-02	7.7281E+01	2.3795E+00

EAB Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00
Accumulated dose (rem)	2.5060E-01	7.1948E+01	2.4444E+00

LPZ Doses:

Time (h) = 96.0000	Whole Body	Thyroid	TEDE
Delta dose (rem)	0.0000E+00	0.0000E+00	0.0000E+00

Accumulated dose (rem) 3.5913E-02 1.0310E+01 3.5029E-01

Control Room Doses:

Time (h) = 96.0000   Whole Body   Thyroid   TEDE
Delta dose (rem)   3.1978E-13 3.6281E-17 3.1978E-13
Accumulated dose (rem) 2.3117E-02 7.7281E+01 2.3795E+00

EAB Doses:

Time (h) = 720.0000   Whole Body   Thyroid   TEDE
Delta dose (rem)   0.0000E+00 0.0000E+00 0.0000E+00
Accumulated dose (rem) 2.5060E-01 7.1948E+01 2.4444E+00

LPZ Doses:

Time (h) = 720.0000   Whole Body   Thyroid   TEDE
Delta dose (rem)   0.0000E+00 0.0000E+00 0.0000E+00
Accumulated dose (rem) 3.5913E-02 1.0310E+01 3.5029E-01

Control Room Doses:

Time (h) = 720.0000   Whole Body   Thyroid   TEDE
Delta dose (rem)   5.4194E-47 9.8268E-74 5.4194E-47
Accumulated dose (rem) 2.3117E-02 7.7281E+01 2.3795E+00

##
I-131 Summary
##

Time (hr)	FHB/CNMT I-131 (Curies)	Environm I-131 (Curies)	Control Room I-131 (Curies)
0.000	3.9699E+02	4.5706E-02	4.7109E-05
0.401	1.5762E+02	2.3900E+02	1.9383E-01
0.500	1.2535E+02	2.7122E+02	2.0569E-01
0.800	6.2758E+01	3.3370E+02	1.2287E-01
1.100	3.1420E+01	3.6498E+02	7.3062E-02
1.400	1.5731E+01	3.8064E+02	4.3279E-02
1.700	7.8758E+00	3.8849E+02	2.5557E-02
2.000	3.9431E+00	3.9241E+02	1.5052E-02
2.300	3.9389E+00	3.9241E+02	8.7346E-03
2.600	3.9346E+00	3.9241E+02	5.0686E-03
2.900	3.9304E+00	3.9241E+02	2.9414E-03
3.200	3.9261E+00	3.9241E+02	1.7069E-03
3.500	3.9219E+00	3.9241E+02	9.9058E-04
3.800	3.9177E+00	3.9241E+02	5.7488E-04
4.100	3.9135E+00	3.9241E+02	3.3363E-04
4.400	3.9093E+00	3.9241E+02	1.9363E-04
4.700	3.9051E+00	3.9241E+02	1.1238E-04
5.000	3.9008E+00	3.9241E+02	6.5224E-05
5.300	3.8966E+00	3.9241E+02	3.7856E-05
5.600	3.8924E+00	3.9241E+02	2.1972E-05
5.900	3.8883E+00	3.9241E+02	1.2753E-05
6.200	3.8841E+00	3.9241E+02	7.4026E-06
6.500	3.8799E+00	3.9241E+02	4.2968E-06
6.800	3.8757E+00	3.9241E+02	2.4942E-06
7.100	3.8715E+00	3.9241E+02	1.4478E-06
7.400	3.8674E+00	3.9241E+02	8.4044E-07
7.700	3.8632E+00	3.9241E+02	4.8787E-07

8.000	3.8590E+00	3.9241E+02	2.8322E-07
8.300	3.8549E+00	3.9241E+02	1.6441E-07
8.600	3.8507E+00	3.9241E+02	9.5449E-08
8.900	3.8466E+00	3.9241E+02	5.5413E-08
9.200	3.8424E+00	3.9241E+02	3.2171E-08
9.500	3.8383E+00	3.9241E+02	1.8677E-08
9.800	3.8342E+00	3.9241E+02	1.0844E-08
10.100	3.8300E+00	3.9241E+02	6.2959E-09
10.400	3.8259E+00	3.9241E+02	3.6555E-09
24.000	3.6435E+00	3.9241E+02	7.3849E-20
96.000	2.8132E+00	3.9241E+02	3.0299E-76
720.000	2.9908E-01	3.9241E+02	0.0000E+00

##

Cumulative Dose Summary

##

	EAB		LPZ		Control Room	
Time (hr)	Thyroid (rem)	TEDE (rem)	Thyroid (rem)	TEDE (rem)	Thyroid (rem)	TEDE (rem)
0.000	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.401	4.3827E+01	1.4891E+00	6.2807E+00	2.1340E-01	2.0007E+01	6.1311E-01
0.500	4.9734E+01	1.6898E+00	7.1271E+00	2.4216E-01	2.8213E+01	8.6460E-01
0.800	6.1188E+01	2.0789E+00	8.7686E+00	2.9792E-01	4.8208E+01	1.4782E+00
1.100	6.6922E+01	2.2737E+00	9.5903E+00	3.2583E-01	6.0124E+01	1.8450E+00
1.400	6.9792E+01	2.3712E+00	1.0002E+01	3.3980E-01	6.7196E+01	2.0635E+00
1.700	7.1228E+01	2.4200E+00	1.0207E+01	3.4679E-01	7.1378E+01	2.1933E+00
2.000	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.3845E+01	2.2702E+00
2.300	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.5287E+01	2.3154E+00
2.600	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.6124E+01	2.3418E+00
2.900	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.6609E+01	2.3573E+00
3.200	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.6891E+01	2.3663E+00
3.500	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7055E+01	2.3717E+00
3.800	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7149E+01	2.3748E+00
4.100	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7204E+01	2.3767E+00
4.400	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7236E+01	2.3778E+00
4.700	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7255E+01	2.3784E+00
5.000	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7266E+01	2.3788E+00
5.300	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7272E+01	2.3791E+00
5.600	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7276E+01	2.3792E+00
5.900	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7278E+01	2.3793E+00
6.200	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7279E+01	2.3794E+00
6.500	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7280E+01	2.3794E+00
6.800	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7280E+01	2.3794E+00
7.100	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7280E+01	2.3794E+00
7.400	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7280E+01	2.3794E+00
7.700	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7280E+01	2.3794E+00
8.000	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7280E+01	2.3795E+00
8.300	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7280E+01	2.3795E+00
8.600	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7281E+01	2.3795E+00
8.900	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7281E+01	2.3795E+00
9.200	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7281E+01	2.3795E+00
9.500	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7281E+01	2.3795E+00
9.800	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7281E+01	2.3795E+00
10.100	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7281E+01	2.3795E+00
10.400	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7281E+01	2.3795E+00
24.000	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7281E+01	2.3795E+00
96.000	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7281E+01	2.3795E+00
720.000	7.1948E+01	2.4444E+00	1.0310E+01	3.5029E-01	7.7281E+01	2.3795E+00

##

Worst Two-Hour Doses

##

EAB

Time (hr)	Whole Body (rem)	Thyroid (rem)	TEDE (rem)
0.0	2.5060E-01	7.1948E+01	2.4444E+00

Licensee obtained 2.3 at EAB, 0.34 at LPZ, and 2.1 in Control Room