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Title/Desc:

UNIT RADIOLOGICAL DOSES FOR FUEL RETRIEVAL
PRELIMINARY SAFETY EVALUATION

Pages: 59

2. To: (Receiving Organization) LATA	3. From: (Originating Organization) Consequence Analysis 8M400	4. Related EDT No.: N/A
5. Proj./Prog./Dept./Div.: SNF/Fuel Retrieval Sub Project	6. Cog. Engr.: C.H. Huang	7. Purchase Order No.: N/A
8. Originator Remarks: The attached SD provides the unit radiological dose calculations for Fuel Retrieval Preliminary Safety Evaluation Feed.		9. Equip./Component No.: N/A
		10. System/Bldg./Facility: K WEST BASIN
11. Receiver Remarks:		12. Major Assm. Dwg. No.: N/A
		13. Permit/Permit Application No.: N/A
		14. Required Response Date: 3/1/96

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(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Approval Designator	Reason for Transmittal	Originator Disposition	Receiver Disposition
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16. KEY									
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17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)									
(G)	(H)	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN
Reason	Disp.								
1		Cog.Eng. C.H. Huang	<i>[Signature]</i>	4/13/96	A3-34				
1		Cog. Mgr. D.S. Leach	<i>[Signature]</i>	4/14/96	A3-34				
		QA							
		Safety							
		Env.							
1		Peer rev. John C. Van Keuren	<i>[Signature]</i>	4/17/96	A3-34				

18. <i>[Signature]</i> C.H. Huang 4/13/96	19. <i>[Signature]</i> John P. Joyce 4-22-96	20. <i>[Signature]</i> D.S. Leach 4/14/96	21. DOE APPROVAL (if required) Ctrl. No. [N/A] Approved ☐ Approved w/comments ☐ Disapproved w/comments
Signature of EDT Originator	Authorized Representative Date for Receiving Organization	Cognizant Manager Date	

UNIT RADIOLOGICAL DOSES FOR FUEL RETRIEVAL PRELIMINARY SAFETY EVALUATION

C. H. HUANG

Westinghouse Hanford, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-87RL10930

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Key Words: Dose Calculations, Atmospheric Dispersion, K Basins,
Preliminary Safety Evaluation, Calculation Note.

Abstract: This document provides the atmospheric dispersion and the
unit dose calculations for K West liquid, a fuel element, and gaseous
release from a fuel canister.

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C. H. Huang 4-23-95
Release Approval Date

Release Stamp

Approved for Public Release

UNIT RADIOLOGICAL DOSES FOR FUEL RETRIEVAL
PRELIMINARY SAFETY EVALUATIONC. H. HUANG
March 21, 1996

INTRODUCTION

The objective for this document is to present the chronic X/Qs and unit dose calculations for Fuel Retrieval Preliminary Safety Evaluation (PSE). The release location is at the K West Basins in the 100 Area.

SOURCE TERM

The source terms are specified by the customer (see Tables 1, 2, and 3; and Appendix A).

The source terms (isotopes) for one liter of K West liquid, a portion of a spent fuel element, and gaseous releases from a fuel canister were provided by the customer as shown in Tables 1, 2, and 3, respectively. For dose calculations, the source terms in the tables are expressed as the specific activity in unit of Ci for each isotope.

Table 1. The isotopes of one liter of K West liquid with the quantities expressed in activity (Ci).

Isotope	Activity Ci/Liter
Sr-90	1.7 E-06
Cs-137	3.7 E-06
Pu-239	1.9 E-08

Table 2. The isotopes of a portion of a fuel element with the quantities expressed in activity (C_i).

Isotope	Activity C_i /element
Sr-90	9.6 E+00
Cs-137	1.2 E+03
Pu-238	2.1 E-01
Pu-239	1.9 E-01
Pu-240	1.6 E-01
Pu-241	1.1 E+01
Pu-242	1.3 E-04
Am-241	4.4 E-01

Table 3. Gaseous release from a fuel canister with the quantities of isotopes.

Isotope	Activity C_i /canister
H-3	6.2 E-04
Kr-85	1.1 E-02

METHODOLOGIES AND ASSUMPTIONS

The chronic ground level release dispersion factors (X/Q) were calculated using the GXQ (Hey, 1994) for each sector at the onsite location at a distance of 100 m and for 16 sectors at the offsite locations around the site boundary. The unit X/Q was used for the chronic dose release calculations. The X/Q refers to the concentration of airborne contamination. It is the ratio of contaminant concentration at a specific receptor location to contaminant release rate. The receptor of concern is normally defined as a human having a standard breathing rate and metabolism. The product of X/Q and breathing rate is a nondimensional quantity representing the fraction of contaminant inhaled to contaminant released. Inhalation is the most likely pathway to human exposure.

The GENII code was used to calculate the unit doses. The plutoniums in all cases are assumed to be in the oxide form, as all accident scenarios will have the Pu oxidized. Thus, the PNL solubility will be used in the GENII

calculations. The unit X/Q, PNL solubilities, and chronic release at the ground level were used as input data in the GENII code for the unit dose calculations.

RECEPTOR DESCRIPTIONS

- Onsite: Chronic ground level release dispersion factors (X/Q) were generated using the GXQ dosimetry code for the onsite receptor location at a distance of 100 m and the nearest occupied facility for various cases. These results are summarized in Table 5.

- Land and Far River (Site Boundary): Receptor at the site boundary in the worst direction. Where the site is bounded by the Columbia River, the site boundary is taken to be at the far bank of the river at the east direction. Atmosphere dispersion factors (X/Q) were generated for 16 sectors location around the site boundary. The result is given in Table 5.

- Far River Only: Receptor at the site boundary in the worst direction. The site boundary is taken to be at the far bank of the river at the north and east directions. Atmosphere dispersion factors (X/Q) were generated for 16 sectors location around the site boundary. The result is given in Table 5.

- Near River: Receptor at the site boundary in the worst direction. The site boundary is taken to be at the nearer bank of the river at the north and the east directions. Atmosphere dispersion factors (X/Q) were generated for 16 sectors location around the site boundary. The result is given in Table 5.

Receptor Locations

The receptor locations are specified by the customer (see Appendix A). The receptor locations at the onsite facility and the offsite boundary for chronic ground level releases from K West Basins in the 100 Area are shown in Tables 4.a and 4.b.

Table 4.a Various Receptor Locations.

Case	Receptor Location
1	Land and Far River (all 16 directions)
2	Far River Only (all 16 directions)
3	Near River Only (all 16 directions)
4	41 km SE
5	Onsite (100 m)
6	4,000 m ESE
7	3,200 m NE
8	4,000 m WSW

Table 4.b Receptor Location at Each Sector for Land and Far River, Far River Only, and Near River Only.

NO.	Sector	Land and Far River (km)	Far River Only (km)	Near River Only (km)
1	S	25.15	25.15	25.15
2	SSW	25.54	25.54	25.54
3	SW	17.31	17.31	17.31
4	WSW	15.66	15.66	1.06
5	W	12.04	1.69	0.71
6	WNW	10.07	1.13	0.52
7	NW	8.65	1.03	0.48
8	NNW	8.81	1.03	0.48
9	N	10.91	1.14	0.53
10	NNE	15.19	1.70	0.73
11	NE	19.88	7.49	2.25
12	ENE	20.38	11.83	11.33
13	E	20.57	12.30	11.78
14	ESE	21.70	15.65	15.05
15	SE	32.08	32.08	30.94
16	SSE	30.99	30.99	30.99

CODE DOCUMENTATION

- o GENII version 1.485 (12/3/90)
- o GENII Default Parameter Values (28-Mar-90 RAP)
- o Radionuclide Master Library (7/23/93 PDR)
- o External Dose Factor Library (8-May-90-RAP)
- o Internal Dose Increments, PNL Solubilities,
(7/23/93 PDR)

GENII code was used in the chronic dose release calculations.

Assumption: Unit X/Q is assumed in the chronic ground level release calculations.

The output files for the GXQ code is given in Appendix B.

GENII input and output files are attached in Appendix C.

RESULTS

Calculations of Dispersion Factors (X/Q)

The values of X/Qs calculated from the chronic ground level releases for using the sources terms from Tables 1, 2, and 3 are given in Table 5 for various onsite and offsite receptor locations at the worst meteorological direction.

Table 5. Chronic X/Qs at Various Receptor Locations.

Case	Receptor Location	Distance or Worst Direction	X/Q (s/m^3)
1	Land and Far River	12.04 km W	1.23 E-7
2	Far River Only	1.13 km WNW	2.89 E-6
3	Near River Only	520 m WNW	1.14 E-5
4	41 km SE	41 km SE	1.48 E-8
5	Onsite (100 m)	100 m E	5.12 E-4
6	4,000 m ESE	4.0 km ESE	5.17 E-7
7	3,200 m NE	3.2 km NE	4.58 E-7
8	4,000 m WSW	4.0 km WSW	3.16 E-7

UNIT DOSE CALCULATIONS

The GENII code was used to calculate doses for the mixture of isotopes. The unit X/Q and the source terms as shown in Tables 1, 2, and 3 were used as input data into the GENII code for dose calculations. The calculated doses are shown in Table 6 for KW liquid, fuel element and gaseous release from a fuel canister. The radiological doses in the tables are expressed in the unit of rem.

Table 6. Radiological Dose per Unit Release for Fuel Retrieval PSE (PNL Solubility; X/Q = One Unit).

Case	Mixture Type	Inhalation Dose EDE* (rem)
1	One Liter of KW Liquid	1.7 E-3
2	A Portion of A Fuel Element	1.2 E+5
3	Gaseous Release from Fuel Canister	1.5 E-5

* EDE: Effective Dose Equivalent.

Note that the care must be taken in the use of the unit X/Q doses for the onsite chronic exposure. The chronic inhalation dose calculated for the onsite receptor must be adjusted by multiplying by an occupancy factor. The occupancy factor must be used in conjunction with the chronic breathing rate for onsite receptor dose calculations for a period of greater than one week. The occupancy factor for the onsite receptor is 0.286, i.e., the ratio of the volume of air breathed at work ($2,400 \text{ m}^3$) to the total volume of air breathed during the year ($8,400 \text{ m}^3$).

REFERENCES

- Hey, B. E., 1994, *GXQ Program Users' Guide*, WHC-SD-GN-SWD-30002, Westinghouse Hanford Company, Richland, Washington.
- Napier, B. A., et al., 1988, *GENII - The Hanford Environmental Radiation Dosimetry Software System*, PNL-6584, Pacific Northwest Laboratory, Richland, Washington.

APPENDIX A

SOURCE TERMS PROVIDED BY THE CUSTOMER

[11] From: ^Los Alamos Tech Assoc Inc at -DOE_HANFORD_1 3/12/96 3:09PM (709
byte

s: 14 ln)

To: Chin-Hua (Chester) Huang at -BCS78

cc: John C Van Keuren at -BCS78, Steven H Peck at -WHC79,

^Los Alamos Tech Assoc Inc at -DOE_HANFORD_1

Subject: Modification to GENII Calculations

----- Message Contents

Chester,

Per our telephone discussion today, I had reversed the Ci
for the Kr-85 and H-3. The correct value should be:

Kr-85 10.9 mCi

H-3 0.62 mCi

Please run the unit dose for the canister gas (case 3) as
above.

Thanks,

John Joyce

946-2914

[9] From: ^Los Alamos Tech Assoc Inc at -DOE_HANFORD_1 3/15/96 6:04AM (731
bytes

: 11 ln)

To: Chin-Hua (Chester) Huang at -BCS78

cc: John C Van Keuren at -BCS78, Steven H Peck at -WHC79,

^Los Alamos Tech Assoc Inc at -DOE_HANFORD_1

Subject: Revised GXQ Release Location

----- Message Contents

Chester,

This confirms our telephone discussion of March 13, 1996 in
which I indicated that the Chi/Qs for the eight items should
be performed from KW instead of KE. Please perform the
Chi/Qs for the chronic releases from KW. Everything else
remains the same.

Thanks,

John Joyce

946-2914

Memo To: Julie Reddick
Steve Peck

From: John Joyce

Subject: Unit Radiological Doses For Fuel Retrieval PSE

For the Fuel Retrieval Sub-Project PSE, we need GENII dose calculations for the following:

1) One liter of KE liquid with the following quantities of isotopes:

1.7 E-06 Ci of ^{90}Sr
3.7 E-06 Ci of ^{137}Cs
1.9 E-08 Ci of ^{239}Pu

2) A portion of a fuel element with the following quantities of isotopes:

9.6 E+00 Ci of ^{90}Sr
1.2 E+03 Ci of ^{137}Cs
2.1 E-01 Ci of ^{238}Pu
1.9 E-01 Ci of ^{239}Pu
1.6 E-01 Ci of ^{240}Pu
1.1 E+01 Ci of ^{241}Pu
1.3 E-04 Ci of ^{242}Pu
4.4 E-01 Ci of ^{241}Am

3) Gaseous release from fuel canister with the following quantities of isotopes:

1.1 E-02 Ci of ^3H (as tritiated water vapor)
6.2 E-04 Ci of ^{85}Kr

The plutoniums in all cases can be assumed to be in the oxide form, as all scenarios will have the Pu oxidized. The daughter ^{90}Y can be added to the ^{90}Sr quantities.

The GENII calculations should be done with a Chi/Q of 1.0 s/m³. Various Chi/Qs from previous GXQ calculations for K Basins will be used to calculate actual radiological doses.

Draft doses need to be made available by March 11, 1996 with final doses (including HEDOP approval) required by March 20.

Any questions should be directed to me at 946-2914.

February 24, 1996

Julie,

This Memo supersedes the one I gave you yesterday, as I believe we need to add the onsite receptors for the chronic releases. For the fuel retrieval effort, we will probably need chronic release information due to the de-lidding operation. We need to ask for GXQ calculations from KE in the 100 Area for ground level chronic releases. The following receptor locations are needed to determine those with the highest chronic Chi/Q:

1. Land and Far River (all 16 sectors)
2. Far River Only (all 16 sectors)
3. Near River Only (all 16 sectors)
4. 41 km SE (same as what DOE/RL-95-49 uses for 100 Area)
5. 100 meter circle (all 16 sectors)
6. 4,000 m ESE (fire station)
7. 3,200 m NE (N Reactor)
8. 4,000 m WSW (B & C Reactor)

Thanks,

John Joyce

APPENDIX B

GXQ OUTPUT FILES

GXQ Version 4.0
December 19, 1994

General Purpose Atmospheric Dispersion Code
Produced by Westinghouse Hanford Company

Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1.
Validation documented in WHC-SD-GN-SWD-30003 Rev. 1.
Code Custodian is: Brit E. Key

Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352
(509) 376-2921

Run Date = 03/14/96
Run Time = 09:35:33.90

INPUT ECHO:

KW FUEL RETRIEVAL

c GXQ Version 4.0 Input File

c mode
1

c

c MODE CHOICE:

c mode = 1 then X/Q based on Hanford site specific meteorology
c mode = 2 then X/Q based on atmospheric stability class and wind speed
c mode = 3 then X/Q plot file is created

c

c LOGICAL CHOICES:

c ifox inorm icdf ichk isite ipop
F F F F F F

c ifox = t then joint frequency used to compute frequency to exceed X/Q
c = f then joint frequency used to compute annual average X/Q
c inorm = t then joint frequency data is normalized (as in GEN11)
c = f then joint frequency data is un-normalized
c icdf = t then cumulative distribution file created (CDF.OUT)
c = f then no cumulative distribution file created
c ichk = t then X/Q parameter print option turned on
c = f then no parameter print
c isite = t then X/Q based on joint frequency data for all 16 sectors
c = f then X/Q based on joint frequency data of individual sectors
c ipop = t then X/Q is population weighted
c = f then no population weighting

c

c X/Q AND WIND SPEED ADJUSTMENT MODELS:

c ipuff idep isrc iwind
0 0 0 0

c DIFFUSION COEFFICIENT ADJUSTMENT MODELS:

c iwake ipm iflow ientr
0 3 0 0

c EFFECTIVE RELEASE HEIGHT ADJUSTMENT MODELS:

c (irise igrnd)iwash igrav
0 0 0 0

c ipuff = 1 then X/Q calculated using puff model
c = 0 then X/Q calculated using default continuous plume model
c idep = 1 then plume depletion model turned on (Chamberlain model)
c isrc = 1 then X/Q multiplied by scalar
c = 2 then X/Q adjusted by wind speed function
c iwind = 1 then wind speed corrected for plume height
c iwake = 1 then NRC RG 1.145 building wake model turned on
c = 2 then MACCS virtual distance building wake model turned on
c ipm = 1 then NRC RG 1.145 plume meander model turned on
c = 2 then 5th Power Law plume meander model turned on
c = 3 then sector average model turned on
c iflow = 1 then sigmas adjusted for volume flow rate
c ientr = 1 then method of Pasquill used to account for entrainment
c irise = 1 then MACCS buoyant plume rise model turned on
c = 2 then ISC2 momentum/buoyancy plume rise model turned on
c igrnd = 1 then Mills buoyant plume rise modification for ground effects

c iwash = 1 then stack downwash model turned on
 c igrav = 1 then gravitational settling model turned on
 c = 0 unless specified otherwise, 0 turns model off

PARAMETER INPUT:

release height hs(m)	reference anemometer height ha(m)	mixing height hm(m)	frequency to exceed Cx(%)
0.00000E+00	1.00000E+01	1.00000E+03	5.00000E+00

initial plume width WB(m)	initial plume height Hb(m)	release duration trd(hr)	deposition velocity vd(m/s)	gravitational settling velocity vg(m/s)
0.00000E+00	0.00000E+00	1.00000E+00	1.00000E-03	1.00000E-03

ambient temperature Tamb(C)	initial plume temperature T0(C)	initial plume flow rate V0(m3/s)	release diameter d(m)	convective heat release rate(1) qh(w)
2.00000E+01	2.00000E+01	1.00000E+00	1.00000E+00	0.00000E+00

(1) If zero then buoyant flux based on plume/ambient temperature difference.

X/Q scaling factor c(?)	Wind Speed Exponent a(?)
1.00000E+00	7.80000E-01

RECEPTOR DEPENDENT DATA (no line limit)

FOR MODE make RECEPTOR DEPENDENT DATA
 c 1 (site specific) sector distance receptor-height
 c 2 (by class & wind speed) class windspeed distance offset receptor-height
 c 3 (create plot file) class windspeed xmax ymax jmax xqmin power

RECEPTOR PARAMETER DESCRIPTION

c sector = 0, 1, 2... (all, S, SSW, etc.)
 c distance = receptor distance (m)
 c receptor height = height of receptor (m)
 c class = 1, 2, 3, 4, 5, 6, 7 (P-G stability class A, B, C, D, E, F, G)
 c windspeed = anemometer wind speed (m/s)
 c offset = offset from plume centerline (m)
 c xmax = maximum distance to plot or calculate to (m)
 c imax = distance intervals
 c ymax = maximum offset to plot (m)
 c jmax = offset intervals
 c xqmin = minimum scaled X/Q to calculate
 c power = exponent in power function step size

MODE:

Site specific X/Q calculated.

LOGICAL CHOICES:

Joint frequency used to calculate annual average X/Q.
 No normalization of joint frequency.
 X/Q calculated for single sector.

MODELS SELECTED:

Sector average model selected.
 Default Gaussian plume model selected.

WARNING/ERROR MESSAGES:

JOINT FREQUENCY DATA:

100 N AREA - 10 M - Pasquill A - G (1983 - 1991 Average)
 Created 8/26/92 KR

KW FUEL RETRIEVAL

SECTOR	DISTANCE (m)	RECEPT HEIGHT (m)	SECT. FREQ. (%)	TOTAL POPULATION X/Q (s/m3)	AVERAGE INDIVIDUAL X/Q (s/m3)	ATM. STAB. CLASS	WIND SPEED (m/s)
S	25150	0	6.18	1	2.69E-08	2.69E-08	
SSW	25540	0	5.01	1	1.71E-08	1.71E-08	
SW	17310	0	3.91	1	3.13E-08	3.13E-08	
WSW	15660	0	3.88	1	4.48E-08	4.48E-08	
W	12040	0	7.54	1	1.23E-07	1.23E-07	
WNW	10070	0	5.46	1	9.83E-08	9.83E-08	
NW	8650	0	4.92	1	9.93E-08	9.93E-08	
NNW	8810	0	3.41	1	6.75E-08	6.75E-08	
N	10910	0	3.89	1	6.31E-08	6.31E-08	
NNE	15190	0	3.54	1	3.23E-08	3.23E-08	
NE	19880	0	5.96	1	3.28E-08	3.28E-08	
ENE	20380	0	9.19	1	5.12E-08	5.12E-08	
E	20570	0	16.14	1	8.30E-08	8.30E-08	
ESE	21700	0	10.16	1	4.69E-08	4.69E-08	
SE	32080	0	6.17	1	2.05E-08	2.05E-08	
SSE	30990	0	4.44	1	1.83E-08	1.83E-08	
S	25150	0	6.18	1	2.69E-08	2.69E-08	
SSW	25540	0	5.01	1	1.71E-08	1.71E-08	
SW	17310	0	3.91	1	3.13E-08	3.13E-08	
WSW	15660	0	3.88	1	4.48E-08	4.48E-08	
W	1690	0	7.54	1	2.31E-06	2.31E-06	
WNW	1130	0	5.46	1	2.89E-06	2.89E-06	
NW	1030	0	4.92	1	2.78E-06	2.78E-06	
NNW	1030	0	3.41	1	1.95E-06	1.95E-06	
N	1140	0	3.89	1	2.07E-06	2.07E-06	
NNE	1700	0	3.54	1	8.52E-07	8.52E-07	
NE	7490	0	5.96	1	1.30E-07	1.30E-07	
ENE	11830	0	9.19	1	1.09E-07	1.09E-07	
E	12300	0	16.14	1	1.69E-07	1.69E-07	
ESE	15650	0	10.16	1	7.34E-08	7.34E-08	
SE	32080	0	6.17	1	2.05E-08	2.05E-08	
SSE	30990	0	4.44	1	1.83E-08	1.83E-08	
S	25150	0	6.18	1	2.69E-08	2.69E-08	
SSW	25540	0	5.01	1	1.71E-08	1.71E-08	
SW	17310	0	3.91	1	3.13E-08	3.13E-08	
WSW	1060	0	3.88	1	2.66E-06	2.66E-06	
W	710	0	7.54	1	1.03E-05	1.03E-05	
WNW	520	0	5.46	1	1.14E-05	1.14E-05	
NW	480	0	4.92	1	1.07E-05	1.07E-05	
NNW	480	0	3.41	1	7.52E-06	7.52E-06	
N	530	0	3.89	1	7.99E-06	7.99E-06	
NNE	730	0	3.54	1	3.66E-06	3.66E-06	
NE	2250	0	5.96	1	7.91E-07	7.91E-07	
ENE	11330	0	9.19	1	1.15E-07	1.15E-07	
E	11780	0	16.14	1	1.79E-07	1.79E-07	
ESE	15050	0	10.16	1	7.75E-08	7.75E-08	
SE	30940	0	6.17	1	2.16E-08	2.16E-08	
SSE	30990	0	4.44	1	1.83E-08	1.83E-08	
SE	41000	0	6.17	1	1.48E-08	1.48E-08	
S	100	0	6.18	1	2.29E-04	2.29E-04	
SSW	100	0	5.01	1	1.48E-04	1.48E-04	
SW	100	0	3.91	1	1.56E-04	1.56E-04	
WSW	100	0	3.88	1	1.89E-04	1.89E-04	
W	100	0	7.54	1	3.63E-04	3.63E-04	
WNW	100	0	5.46	1	2.33E-04	2.33E-04	
NW	100	0	4.92	1	1.91E-04	1.91E-04	
NNW	100	0	3.41	1	1.34E-04	1.34E-04	
N	100	0	3.89	1	1.70E-04	1.70E-04	
NNE	100	0	3.54	1	1.37E-04	1.37E-04	
NE	100	0	5.96	1	2.00E-04	2.00E-04	
ENE	100	0	9.19	1	3.13E-04	3.13E-04	
E	100	0	16.14	1	5.12E-04	5.12E-04	
ESE	100	0	10.16	1	3.15E-04	3.15E-04	
SE	100	0	6.17	1	2.36E-04	2.36E-04	
SSE	100	0	4.44	1	2.01E-04	2.01E-04	
ESE	4000	0	10.16	1	5.17E-07	5.17E-07	
NE	3200	0	5.96	1	4.58E-07	4.58E-07	
WSW	4000	0	3.88	1	3.16E-07	3.16E-07	

APPENDIX C

GENII INPUT AND OUTPUT FILES

Program GENII Input File ##### 8 Jul 88

Title: KW CHRONIC UNIT DOSES RELESAE--case 1.

\GENII\KEI.in

-- K WEST LIQUID

OPTIONS===== Default =====
 F Near-field scenario? (Far-field) NEAR-FIELD: narrowly-focused
 F Population dose? (Individual) release, single site
 F Acute release? (Chronic) FAR-FIELD: wide-scale release,
 Maximum Individual data set used multiple sites
 Complete

TRANSPORT OPTIONS===== Section EXPOSURE PATHWAY OPTIONS===== Section
 T Air Transport 1 F Finite plume, external 5
 F Surface Water Transport 2 T Infinite plume, external 5
 F Biotic Transport (near-field) 3,4 F Ground, external 5
 F Waste Form Degradation (near) 3,4 F Recreation, external 5
 T Inhalation uptake 5,6

REPORT OPTIONS=====
 T Report AEDE only F Drinking water ingestion 7,8
 T Report by radionuclide F Aquatic foods ingestion 7,8
 T Report by exposure pathway F Terrestrial foods ingestion 7,9
 F Debug report on screen F Animal product ingestion 7,10
 F Inadvertent soil ingestion

INVENTORY #####

4 Inventory input activity units: (1-pCi 2-uCi 3-mCi 4-Ci 5-Bq)

0 Surface soil source units (1- m2 2- m3 3- kg)

Equilibrium question goes here

Use when	---Release Terms---			-----Basic Concentrations-----				
	transport selected			near-field scenario, optionally				
Release	Air	Surface	Buried	Air	Surface	Deep	Ground	Surface
Radio-		Water	Waste		Soil	Soil	Water	Water
nuclide	/yr	/yr	/m3	/m3	/unit	/m3	/L	/L
SR90	1.7E-6							
Y 90	1.7E-6							
CS137	3.7E-6							
PU239	1.9E-8							

Use when	---Derived Concentrations---			
	measured values are known			
Release	Terres.	Animal	Drink	Aquatic
Radio-	Plant	Product	Water	Food
nuclide	/kg	/kg	/L	/kg

TIME #####

1 Intake ends after (yr)

50 Dose calc. ends after (yr)

1 Release ends after (yr)

0 No. of years of air deposition prior to the intake period

0 No. of years of irrigation water deposition prior to the intake period

FAR-FIELD SCENARIOS (IF POPULATION DOSE) #####

0 Definition option: 1-Use population grid in file POP.IN
0 2-Use total entered on this line

NEAR-FIELD SCENARIOS #####

Prior to the beginning of the intake period: (yr)
0 When was the inventory disposed? (Package degradation starts)
0 When was LOIC? (Biotic transport starts)
0 Fraction of roots in upper soil (top 15 cm)
0 Fraction of roots in deep soil
0 Manual redistribution: deep soil/surface soil dilution factor
0 Source area for external dose modification factor (m2)

TRANSPORT #####

====AIR TRANSPORT=====SECTION 1=====

0	0-Calculcate PM	0	Release type (0-3)
1	Option: 1-Use chi/Q or PM value	F	Stack release (T/F)
	2-Select MI dist & dir	0	Stack height (m)
	3-Specify MI dist & dir	0	Stack flow (m3/sec)
1.	Chi/Q or PM value	0	Stack radius (m)
0	MI sector index (1=S)	0	Effluent temp. (C)
0	MI distance from release point (m)	0	Building x-section (m2)
T	Use jf data, (T/F) else chi/Q grid	0	Building height (m)

====SURFACE WATER TRANSPORT=====SECTION 2=====

0 Mixing ratio model: 0-use value, 1-river, 2-lake
0 Mixing ratio, dimensionless
0 Average river flow rate for: MIXFLG=0 (m3/s), MIXFLG=1,2 (m/s),
0 Transit time to irrigation withdrawal location (hr)
If mixing ratio model > 0:
0 Rate of effluent discharge to receiving water body (m3/s)
0 Longshore distance from release point to usage location (m)
0 Offshore distance to the water intake (m)
0 Average water depth in surface water body (m)
0 Average river width (m), MIXFLG=1 only
0 Depth of effluent discharge point to surface water (m), lake only

====WASTE FORM AVAILABILITY=====SECTION 3=====

0 Waste form/package half life, (yr)
0 Waste thickness, (m)
0 Depth of soil overburden, m

====BIOTIC TRANSPORT OF BURIED SOURCE=====SECTION 4=====

T Consider during inventory decay/buildup period (T/F)?
T Consider during intake period (T/F)? | 1-Arid non agricultural
0 Pre-Intake site condition..... | 2-Humid non agricultural
| 3-Agricultural

EXPOSURE #####

====EXTERNAL EXPOSURE=====SECTION 5=====

0	Exposure time:		Residential irrigation:
	Plume (hr)	T	Consider: (T/F)

```

0      Soil contamination (hr)      | 0      Source: 1-ground water
0      Swimming (hr)                |        2-surface water
0      Boating (hr)                 | 0      Application rate (in/yr)
0      Shoreline activities (hr)    | 0      Duration (mo/yr)
0      Shoreline type: (1-river, 2-lake, 3-ocean, 4-tidal basin)
0      Transit time for release to reach aquatic recreation (hr)
1.0    Average fraction of time submersed in acute cloud (hr/person hr)

```

=====INHALATION=====SECTION 6=====

```

8766.0 Hours of exposure to contamination per year
0      0-No resus- 1-Use Mass Loading      2-Use Anspaugh model
0      pension      Mass loading factor (g/m3)  Top soil available (cm)

```

=====INGESTION POPULATION=====SECTION 7=====

```

0      Atmospheric production definition (select option):
0      0-Use food-weighted chi/Q,(food-sec/m3), enter value on this line
      1-Use population-weighted chi/Q
      2-Use uniform production
      3-Use chi/Q and production grids (PRODUCTION will be overridden)
0      Population ingesting aquatic foods, 0 defaults to total (person)
0      Population ingesting drinking water, 0 defaults to total (person)
F      Consider dose from food exported out of region (default=F)

```

Note below: S* or Source: 0-none, 1-ground water, 2-surface water
3-Derived concentration entered above

===== AQUATIC FOODS / DRINKING WATER INGESTION=====SECTION 8=====

F Salt water? (default is fresh)

USE ? T/F	FOOD TYPE	TRAN- SIT hr	PROD- UCTION kg/yr	-CONSUMPTION- HOLDUP da	RATE kg/yr	DRINKING WATER	
F	FISH	0.00	0.0E+00	0.00	0.0	0	Source(see above)
F	MOLLUS	0.00	0.0E+00	0.00	0.0	T	Treatment? T/F
F	CRUSTA	0.00	0.0E+00	0.00	0.0	0	Hldup/transit(da)
F	PLANTS	0.00	0.0E+00	0.00	0.0	0	Consumpton(L/yr)

=====TERRESTRIAL FOOD INGESTION=====SECTION 9=====

USE ? T/F	FOOD TYPE	GROW TIME da	--IRRIGATION-- S RATE * in/yr		TIME mo/yr	YIELD kg/m2	PROD- UCTION kg/yr	--CONSUMPTION-- HOLDUP da	RATE kg/yr
F	LEAF V	0.00	0	0.0	0.0	0.0	0.0E+00	0.0	0.0
F	ROOT V	0.00	0	0.0	0.0	0.0	0.0E+00	0.0	0.0
F	FRUIT	0.00	0	0.0	0.0	0.0	0.0E+00	0.0	0.0
F	GRAIN	0.00	0	0.0	0.0	0.0	0.0E+00	0.0	0.0

=====ANIMAL PRODUCTION CONSUMPTION=====SECTION 10=====

USE ? FOOD	---HUMAN---		TOTAL CONSUMPTION RATE	PROD- HOLDUP	DRINK WATER CONTAM	DIET FRAC-	GROW TIME	---STORED FEED---		---IRRIGATION-- S RATE	TIME	STOR- YIELD	AGE
---------------	-------------	--	------------------------------	-----------------	--------------------------	---------------	--------------	-------------------	--	---------------------------	------	----------------	-----

T/F	TYPE	kg/yr	da	kg/yr	FRACT.	TION	da	*	in/yr	mo/yr	kg/m3	da
F	BEEF	0.0	0.0	0.00	0.00	0.00	0.0	0	0.0	0.00	0.00	0.0
F	POULTR	0.0	0.0	0.00	0.00	0.00	0.0	0	0.0	0.00	0.00	0.0
F	MILK	0.0	0.0	0.00	0.00	0.00	0.0	0	0.0	0.00	0.00	0.0
F	EGG	0.0	0.0	0.00	0.00	0.00	0.0	0	0.0	0.00	0.00	0.0
						-----FRESH FORAGE-----						
	BEEF					0.00	0.0	0	0.0	0.00	0.00	0.0
	MILK					0.00	0.0	0	0.0	0.00	0.00	0.0

#####

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: KW CHRONIC UNIT DOSES RELESAE--case 1.

Executed on: 03/08/96 at 13:19:59

Page A.

1

 This is a far-field (wide-scale release, multiple site) scenario.
 Release is chronic
 Individual dose

THE FOLLOWING TRANSPORT MODES ARE CONSIDERED
 Air

THE FOLLOWING EXPOSURE PATHS ARE CONSIDERED:
 Infinite plume, external
 Inhalation uptake

THE FOLLOWING TIMES ARE USED:
 Intake ends after (yr): 1.0
 Dose calculations ends after (yr): 50.0
 Release ends after (yr): 1.0

===== FILENAMES AND TITLES OF FILES/LIBRARIES USED
 =====

Input file name: \GENII\KEON1.in

GENII Default Parameter Values (28-Mar-90 RAP)

Radionuclide Library - Times<100 years (23-July-93 PDR)

External Dose Factors for GENII in person Sv/yr per Bq/n (8-May-90 R

PNL Solubilities, Yearly Dose Increments (23-Jul-93 PDR)

=====

-----Release Terms-----			
Release	Surface		Buried
Radio-	Air	Water	Source
nuclide	Ci/yr	Ci/yr	Ci/m3

SR90	1.7E-06	0.0E+00	0.0E+00
Y 90	1.7E-06	0.0E+00	0.0E+00
CS137	3.7E-06	0.0E+00	0.0E+00

PU239 1.9E-08 0.0E+00 0.0E+00

===== AIR TRANSPORT

=====

1.0E+00 Input chi/Q value (s/m3)

===== EXTERNAL EXPOSURE

=====

0.0E+00 Hours of exposure to plume

===== INHALATION

=====

8.8E+03 Hours of inhalation exposure per year

Resuspension not considered

=====

=

Input prepared by: _____

Date: _____

Input checked by: _____

Date: _____

=====

=

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: KW CHRONIC UNIT DOSES RELESAE--case 1.

Executed on: 03/08/96 at 13:20:06

Page C.

1

Release period:	1.0
Uptake/exposure period:	1.0
Dose commitment period:	50.0
Dose units:	Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	2.5E-04	2.5E-01	6.2E-05
Breast	3.0E-05	1.5E-01	4.5E-06
R Marrow	1.8E-03	1.2E-01	2.1E-04
Lung	5.9E-03	1.2E-01	7.0E-04
Thyroid	3.0E-05	3.0E-02	9.0E-07
Bone Sur	1.7E-02	3.0E-02	5.1E-04
Liver	2.8E-03	6.0E-02	1.7E-04
LL Int.	6.2E-05	6.0E-02	3.7E-06
UL Int.	4.4E-05	6.0E-02	2.6E-06
S Int.	3.6E-05	6.0E-02	2.2E-06
Stomach	3.4E-05	6.0E-02	2.0E-06
Internal Effective Dose Equivalent			1.7E-03
External Dose			0.0E+00
Annual Effective Dose Equivalent			1.7E-03

Controlling Organ:	Bone Sur
Controlling Pathway:	Inh
Controlling Radionuclide:	PU239

Total Inhalation EDE:	1.7E-03
Total Ingestion EDE:	0.0E+00

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: KW CHRONIC UNIT DOSES RELESAE--case 1.

Executed on: 03/08/96 at 13:20:06

Page C.

2

 Release period: 1.0
 Uptake/exposure period: 1.0
 Dose commitment period: 50.0
 Dose units: Rem

Dose Commitment Year

1 2 3 ...

Internal : |

Intake : |

Year: 3 | 0.0E+00 ...

| +

2 | 0.0E+00 0.0E+00 ...

| + +

1 | 1.9E-04 + 1.2E-04 + 9.0E-05 + ... = 1.7E-03

Internal

Effective

Dose

Equivalent

|| || ||

Internal

Cumulative

Annual 1.9E-04 + 1.2E-04 + 9.0E-05 + ... = 1.7E-03

Internal

Dose

Dose

+ + + +

External

WHC-SD-WM-CN-018, Rev.0

Annual	0.0E+00	0.0E+00	0.0E+00	...	0.0E+00
Dose					

Annual		Cumulative
Dose	$1.9E-04 + 1.2E-04 + 9.0E-05 + \dots = 1.7E-03$	Dose

Maximum
 1.9E-04 Annual
 Dose Occurred
 In Year 1

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: KW CHRONIC UNIT DOSES RELESAE--case 1.

Executed on: 03/08/96 at 13:20:06

Page C.

3

 Release period: 1.0
 Uptake/exposure period: 1.0
 Dose commitment period: 50.0
 Dose units: Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro
Testes							
Inhale	5.9E-03	3.4E-05	3.6E-05	4.4E-05	6.2E-05	1.7E-02	1.8E-03
2.5E-04							
Total	5.9E-03	3.4E-05	3.6E-05	4.4E-05	6.2E-05	1.7E-02	1.8E-03
2.5E-04							

Pathway	Ovaries	Muscle	Thyroid	Liver
Inhale	2.5E-04	3.0E-05	3.0E-05	2.8E-03
Total	2.5E-04	3.0E-05	3.0E-05	2.8E-03

External Dose by Exposure Pathway

Pathway	
Plume	0.0E+00
Total	0.0E+00

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: KW CHRONIC UNIT DOSES RELESAS--case 1.

Executed on: 03/08/96 at 13:20:06

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Release period:	1.0
Uptake/exposure period:	1.0
Dose commitment period:	50.0
Dose units:	Rem

Committed Dose Equivalent by Radionuclide

Radionuclide Testes	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro
-----	-----	-----	-----	-----	-----	-----	-----
SR 90	2.6E-06	7.0E-07	7.5E-07	1.7E-06	5.3E-06	1.1E-03	4.9E-04
6.5E-07							
Y 90	1.7E-05	7.5E-07	1.9E-06	9.0E-06	2.2E-05	2.7E-08	2.7E-08
9.2E-10							
CS 137	3.3E-05	3.2E-05	3.4E-05	3.3E-05	3.4E-05	3.0E-05	3.1E-05
3.3E-05							
PU 239	5.8E-03	2.1E-08	4.0E-08	1.9E-07	5.8E-07	1.6E-02	1.2E-03
2.2E-04							
-----	-----	-----	-----	-----	-----	-----	-----
Total	5.9E-03	3.4E-05	3.6E-05	4.4E-05	6.2E-05	1.7E-02	1.8E-03
2.5E-04							

Radionuclide	Ovaries	Muscle	Thyroid	Liver
-----	-----	-----	-----	-----
SR 90	6.5E-07	6.3E-07	6.5E-07	0.0E+00
Y 90	9.0E-10	8.9E-10	9.0E-10	2.7E-08
CS 137	3.0E-05	2.9E-05	2.9E-05	0.0E+00
PU 239	2.1E-04	7.5E-09	7.2E-09	2.8E-03
-----	-----	-----	-----	-----
Total	2.5E-04	3.0E-05	3.0E-05	2.8E-03

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: KW CHRONIC UNIT DOSES RELESAE--case 1.

Executed on: 03/08/96 at 13:20:06

Page C.

5

 Release period: 1.0
 Uptake/exposure period: 1.0
 Dose commitment period: 50.0
 Dose units: Rem

Radio-nuclide	Inhalation Effective Dose Equivalent	Ingestion Effective Dose Equivalent	External Dose	Internal Effective Dose Equivalent	Annual Effective Dose Equivalent
SR 90	9.4E-05	0.0E+00	0.0E+00	9.4E-05	9.4E-05
Y 90	4.0E-06	0.0E+00	0.0E+00	4.0E-06	4.0E-06
CS 137	3.0E-05	0.0E+00	0.0E+00	3.0E-05	3.0E-05
PU 239	1.5E-03	0.0E+00	0.0E+00	1.5E-03	1.5E-03

Program GENII Input File ##### 8 Jul 88 ####
 Title: KW CHRONIC UNIT DOSES RELESAE--case 2.

\GENII\KE2.in -- FUEL ELEMENT

OPTIONS===== Default =====
 F Near-field scenario? (Far-field) NEAR-FIELD: narrowly-focused
 F Population dose? (Individual) release, single site
 F Acute release? (Chronic) FAR-FIELD: wide-scale release,
 Maximum Individual data set used multiple sites
 Complete
 TRANSPORT OPTIONS===== Section EXPOSURE PATHWAY OPTIONS===== Section
 T Air Transport 1 F Finite plume, external 5
 F Surface Water Transport 2 T Infinite plume, external 5
 F Biotic Transport (near-field) 3,4 F Ground, external 5
 F Waste Form Degradation (near) 3,4 F Recreation, external 5
 T Inhalation uptake 5,6
 REPORT OPTIONS===== Section
 T Report AEDE only F Drinking water ingestion 7,8
 T Report by radionuclide F Aquatic foods ingestion 7,8
 T Report by exposure pathway F Terrestrial foods ingestion 7,9
 F Debug report on screen F Animal product ingestion 7,10
 F Inadvertent soil ingestion

INVENTORY #####

- 4 Inventory input activity units: (1-pCi 2-uCi 3-mCi 4-Ci 5-Bq)
 0 Surface soil source units (1- m2 2- m3 3- kg)
 Equilibrium question goes here

Use when	---Release Terms--- transport selected			---Basic Concentrations--- near-field scenario, optionally				
	Air	Surface Water	Buried Waste	Air	Surface Soil	Deep Soil	Ground Water	Surface Water
Radio-nuclide	/yr	/yr	/m3	/m3	/unit	/m3	/L	/L
SR90	9.6							
Y 90	9.6							
CS137	1.2E+3							
PU238	2.1E-1							
PU239	1.9E-1							
PU240	1.6E-1							
PU241	1.1E+1							
PU242	1.3E-4							
AM241	4.4E-1							

Use when	---Derived Concentrations--- measured values are known			
	Terres. Plant	Animal Product	Drink Water	Aquatic Food
Radio-nuclide	/kg	/kg	/L	/kg

TIME #####

1 Intake ends after (yr)
 50 Dose calc. ends after (yr)
 1 Release ends after (yr)
 0 No. of years of air deposition prior to the intake period
 0 No. of years of irrigation water deposition prior to the intake period

FAR-FIELD SCENARIOS (IF POPULATION DOSE) #####

0 Definition option: 1-Use population grid in file POP.IN
 0 2-Use total entered on this line

NEAR-FIELD SCENARIOS #####

Prior to the beginning of the intake period: (yr)
 0 When was the inventory disposed? (Package degradation starts)
 0 When was LOIC? (Biotic transport starts)
 0 Fraction of roots in upper soil (top 15 cm)
 0 Fraction of roots in deep soil
 0 Manual redistribution: deep soil/surface soil dilution factor
 0 Source area for external dose modification factor (m2)

TRANSPORT #####

====AIR TRANSPORT=====SECTION 1====
 0 Calculate PM | 0 Release type (0-3)
 1 Option: 1-Use chi/Q or PM value | F Stack release (T/F)
 2-Select MI dist & dir | 0 Stack height (m)
 3-Specify MI dist & dir | 0 Stack flow (m3/sec)
 1. Chi/Q or PM value | 0 Stack radius (m)
 0 MI sector index (1=S) | 0 Effluent temp. (C)
 0 MI distance from release point (m) | 0 Building x-section (m2)
 T Use jf data, (T/F) else chi/Q grid | 0 Building height (m)

====SURFACE WATER TRANSPORT=====SECTION 2====
 0 Mixing ratio model: 0-use value, 1-river, 2-lake
 0 Mixing ratio, dimensionless
 0 Average river flow rate for: MIXFLG=0 (m3/s), MIXFLG=1,2 (m/s),
 0 Transit time to irrigation withdrawal location (hr)
 If mixing ratio model > 0:
 0 Rate of effluent discharge to receiving water body (m3/s)
 0 Longshore distance from release point to usage location (m)
 0 Offshore distance to the water intake (m)
 0 Average water depth in surface water body (m)
 0 Average river width (m), MIXFLG=1 only
 0 Depth of effluent discharge point to surface water (m), lake only

====WASTE FORM AVAILABILITY=====SECTION 3====
 0 Waste form/package half life, (yr)
 0 Waste thickness, (m)
 0 Depth of soil overburden, m

====BIOTIC TRANSPORT OF BURIED SOURCE=====SECTION 4====
 T Consider during inventory decay/buildup period (T/F)?
 T Consider during intake period (T/F)? | 1-Arid non agricultural
 0 Pre-Intake site condition..... | 2-Humid non agricultural
 | 3-Agricultural

EXPOSURE #####

```

=====EXTERNAL EXPOSURE=====SECTION 5=====
Exposure time:                Residential irrigation:
0   Plume (hr)                 T   Consider: (T/F)
0   Soil contamination (hr)    0   Source: 1-ground water
0   Swimming (hr)              0   2-surface water
0   Boating (hr)               0   Application rate (in/yr)
0   Shoreline activities (hr)  0   Duration (mo/yr)
0   Shoreline type: (1-river, 2-lake, 3-ocean, 4-tidal basin)
0   Transit time for release to reach aquatic recreation (hr)
1.0 Average fraction of time submersed in acute cloud (hr/person hr)
  
```

```

=====INHALATION=====SECTION 6=====
8766.0 Hours of exposure to contamination per year
0   0-No resus- 1-Use Mass Loading      2-Use Anspaugh model
0   pension      Mass loading factor (g/m3)  Top soil available (cm)
  
```

```

=====INGESTION POPULATION=====SECTION 7=====
0   Atmospheric production definition (select option):
0   0-Use food-weighted chi/Q,(food-sec/m3), enter value on this line
    1-Use population-weighted chi/Q
    2-Use uniform production
    3-Use chi/Q and production grids (PRODUCTION will be overridden)
0   Population ingesting aquatic foods, 0 defaults to total (person)
0   Population ingesting drinking water, 0 defaults to total (person)
F   Consider dose from food exported out of region (default=F)
  
```

Note below: S* or Source: 0-none, 1-ground water, 2-surface water
3-Derived concentration entered above

===== AQUATIC FOODS / DRINKING WATER INGESTION=====SECTION 8=====

F Salt water? (default is fresh)

USE ? T/F	FOOD TYPE	TRAN- SIT hr	PROD- UCTION kg/yr	-CONSUMPTION- HOLDUP da	RATE kg/yr	DRINKING WATER	
F	FISH	0.00	0.0E+00	0.00	0.0	0	Source(see above)
F	MOLLUS	0.00	0.0E+00	0.00	0.0	T	Treatment? T/F
F	CRUSTA	0.00	0.0E+00	0.00	0.0	0	Hidup/transit(da)
F	PLANTS	0.00	0.0E+00	0.00	0.0	0	Consumpton(L/yr)

=====TERRESTRIAL FOOD INGESTION=====SECTION 9=====

USE ? T/F	FOOD TYPE	GROW TIME da	--IRRIGATION-- S RATE * in/yr		YIELD kg/m2	PROD- UCTION kg/yr	--CONSUMPTION-- HOLDUP da	RATE kg/yr
F	LEAF V	0.00	0	0.0	0.0	0.0E+00	0.0	0.0
F	ROOT V	0.00	0	0.0	0.0	0.0E+00	0.0	0.0
F	FRUIT	0.00	0	0.0	0.0	0.0E+00	0.0	0.0
F	GRAIN	0.00	0	0.0	0.0	0.0E+00	0.0	0.0

===ANIMAL PRODUCTION CONSUMPTION=====SECTION 10===

USE ?	FOOD T/F TYPE	---HUMAN---		TOTAL PROD- DUCTION kg/yr	DRINK WATER CONTAM FRACT.	DIET FRAC- TION	GROW TIME da	-----STORED FEED-----				STOR- AGE da
		CONSUMPTION RATE kg/yr	HOLDUP da					S RATE * in/yr	-IRRIGATION-- TIME mo/yr	YIELD kg/m3		
F	BEEF	0.0	0.0	0.00	0.00	0.00	0.0	0	0.0	0.00	0.00	0.0
F	POULTR	0.0	0.0	0.00	0.00	0.00	0.0	0	0.0	0.00	0.00	0.0
F	MILK	0.0	0.0	0.00	0.00	0.00	0.0	0	0.0	0.00	0.00	0.0
F	EGG	0.0	0.0	0.00	0.00	0.00	0.0	0	0.0	0.00	0.00	0.0
	BEEF					0.00	0.0	0	0.0	0.00	0.00	0.0
	MILK					0.00	0.0	0	0.0	0.00	0.00	0.0

#####

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: KW CHRONIC UNIT DOSES RELESAE--case 2.

Executed on: 03/08/96 at 13:46:51

Page A.

1

 This is a far-field (wide-scale release, multiple site) scenario.
 Release is chronic
 Individual dose

THE FOLLOWING TRANSPORT MODES ARE CONSIDERED
 Air

THE FOLLOWING EXPOSURE PATHS ARE CONSIDERED:
 Infinite plume, external
 Inhalation uptake

THE FOLLOWING TIMES ARE USED:
 Intake ends after (yr): 1.0
 Dose calculations ends after (yr): 50.0
 Release ends after (yr): 1.0

===== FILENAMES AND TITLES OF FILES/LIBRARIES USED
 =====

Input file name: \GENII\KE2.in

GENII Default Parameter Values (28-Mar-90 RAP)

Radionuclide Library - Times<100 years (23-July-93 PDR)

External Dose Factors for GENII in person Sv/yr per Bq/n (8-May-90 R)

PNL Solubilities, Yearly Dose Increments (23-Jul-93 PDR)

=====

Release Radio- nuclide	----Release Terms-----		
	Air	Surface Water	Buried Source
	Ci/yr	Ci/yr	Ci/m3
SR90	9.6E+00	0.0E+00	0.0E+00
Y 90	9.6E+00	0.0E+00	0.0E+00
CS137	1.2E+03	0.0E+00	0.0E+00
PU238	2.1E-01	0.0E+00	0.0E+00

PU239	1.9E-01	0.0E+00	0.0E+00
PU240	1.6E-01	0.0E+00	0.0E+00
PU241	1.1E+01	0.0E+00	0.0E+00
PU242	1.3E-04	0.0E+00	0.0E+00
AM241	4.4E-01	0.0E+00	0.0E+00

===== AIR TRANSPORT

=====

1.0E+00 Input chi/Q value (s/m3)

===== EXTERNAL EXPOSURE

=====

0.0E+00 Hours of exposure to plume

===== INHALATION

=====

8.8E+03 Hours of inhalation exposure per year
Resuspension not considered

=====

=

Input prepared by: _____

Date: _____

Input checked by: _____

Date: _____

=====

=

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: KW CHRONIC UNIT DOSES RELESAE--case 2.

Executed on: 03/08/96 at 13:47:09

Page C.

1

Release period: 1.0
Uptake/exposure period: 1.0
Dose commitment period: 50.0
Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	3.3E+04	2.5E-01	8.3E+03
Breast	9.4E+03	1.5E-01	1.4E+03
R Marrow	1.4E+05	1.2E-01	1.7E+04
Lung	2.3E+05	1.2E-01	2.7E+04
Thyroid	9.4E+03	3.0E-02	2.8E+02
Bone Sur	1.6E+06	3.0E-02	4.9E+04
Liver	2.9E+05	6.0E-02	1.7E+04
LL Int.	1.1E+04	6.0E-02	6.6E+02
S Int.	1.1E+04	6.0E-02	6.5E+02
UL Int.	1.1E+04	6.0E-02	6.4E+02
Stomach	1.0E+04	6.0E-02	6.2E+02
Internal Effective Dose Equivalent			1.2E+05
External Dose			0.0E+00
Annual Effective Dose Equivalent			1.2E+05

Controlling Organ: Bone Sur
Controlling Pathway: Inh
Controlling Radionuclide: AM241

Total Inhalation EDE: 1.2E+05
Total Ingestion EDE: 0.0E+00

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: KW CHRONIC UNIT DOSES RELESAE--case 2.

Executed on: 03/08/96 at 13:47:09

Page C.

 Release period: 1.0
 Uptake/exposure period: 1.0
 Dose commitment period: 50.0
 Dose units: Rem

Dose Commitment Year

1 2 3 ...

Internal : |

Intake : |

Year: 3 | 0.0E+00 ...

| +

2 | 0.0E+00 0.0E+00 ...

| + +

1 | 1.6E+04 + 5.9E+03 + 4.4E+03 + ... = 1.2E+05

Internal

Effective

Dose

Equivalent

|| || ||

Internal

Cumulative

Annual 1.6E+04 + 5.9E+03 + 4.4E+03 + ... = 1.2E+05

Internal

Dose

Dose

+ + + +

External

Annual 0.0E+00 0.0E+00 0.0E+00 ... 0.0E+00

Dose

|| || || ||

Annual

Cumulative

Dose 1.6E+04 + 5.9E+03 + 4.4E+03 + ... = 1.2E+05

Dose

Maximum

1.6E+04

Annual

Dose Occurred

In Year 1

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: KE CHRONIC UNIT DOSES RELESAR--case 1.

Executed on: 03/08/96 at 13:47:09

Page C.

3

 Release period: 1.0
 Uptake/exposure period: 1.0
 Dose commitment period: 50.0
 Dose units: Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro
Testes							
Inhale	2.3E+05	1.0E+04	1.1E+04	1.1E+04	1.1E+04	1.6E+06	1.4E+05
3.3E+04							
Total	2.3E+05	1.0E+04	1.1E+04	1.1E+04	1.1E+04	1.6E+06	1.4E+05
3.3E+04							

Pathway	Ovaries	Muscle	Thyroid	Liver
Inhale	3.2E+04	9.4E+03	9.4E+03	2.9E+05
Total	3.2E+04	9.4E+03	9.4E+03	2.9E+05

External Dose by Exposure Pathway

Pathway	
Plume	0.0E+00
Total	0.0E+00

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title: KW CHRONIC UNIT DOSES RELESAE--case 2.

Executed on: 03/08/96 at 13:47:09

Page C.

4

Release period:	1.0
Uptake/exposure period:	1.0
Dose commitment period:	50.0
Dose units:	Rem

Committed Dose Equivalent by Radionuclide

Radionuclide Testes	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro
-----	-----	-----	-----	-----	-----	-----	-----
SR 90	1.4E+01	3.9E+00	4.2E+00	9.6E+00	3.0E+01	6.3E+03	2.8E+03
3.7E+00							
Y 90	9.3E+01	4.2E+00	1.1E+01	5.1E+01	1.3E+02	1.5E-01	1.5E-01
5.2E-03							
CS 137	1.1E+04	1.0E+04	1.1E+04	1.1E+04	1.1E+04	9.6E+03	1.0E+04
1.0E+04							
PU 240	4.9E+04	1.8E-01	3.3E-01	1.6E+00	5.1E+00	1.3E+05	1.0E+04
1.8E+03							
PU 238	6.7E+04	2.3E-01	4.6E-01	2.3E+00	7.0E+00	1.5E+05	1.2E+04
2.1E+03							
PU 242	4.0E+01	1.4E-04	2.6E-04	1.3E-03	3.9E-03	9.9E+01	8.2E+00
1.4E+00							
PU 241	3.5E+04	3.3E-01	3.1E-01	9.0E-01	2.0E+00	2.0E+05	1.6E+04
2.9E+03							
U 237	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
0.0E+00							
AM 241	8.1E+03	1.6E+00	2.0E+00	5.8E+00	1.4E+01	9.7E+05	7.6E+04
1.4E+04							
PU 239	5.8E+04	2.1E-01	4.0E-01	1.9E+00	5.8E+00	1.6E+05	1.2E+04
2.2E+03							
-----	-----	-----	-----	-----	-----	-----	-----
Total	2.3E+05	1.0E+04	1.1E+04	1.1E+04	1.1E+04	1.6E+06	1.4E+05
3.3E+04							

Radionuclide	Ovaries	Muscle	Thyroid	Liver
-----	-----	-----	-----	-----
SR 90	3.7E+00	3.6E+00	3.7E+00	0.0E+00
Y 90	5.1E-03	5.0E-03	5.1E-03	1.5E-01
CS 137	9.7E+03	9.4E+03	9.4E+03	0.0E+00

PU 240	1.8E+03	7.0E-02	6.0E-02	2.4E+04
PU 238	2.1E+03	9.5E-02	8.2E-02	2.9E+04
PU 242	1.4E+00	5.8E-05	4.9E-05	1.9E+01
PU 241	2.8E+03	3.1E-01	1.3E-01	3.3E+04
U 237	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 241	1.3E+04	1.3E+00	7.5E-01	1.7E+05
PU 239	2.1E+03	7.5E-02	7.2E-02	2.8E+04
-----	-----	-----	-----	-----
Total	3.2E+04	9.4E+03	9.4E+03	2.9E+05

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: KW CHRONIC UNIT DOSES RELESAE--case 2.

Executed on: 03/08/96 at 13:47:09

Page C.

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Release period:	1.0
Uptake/exposure period:	1.0
Dose commitment period:	50.0
Dose units:	Rem

Radio-nuclide	Inhalation Effective Dose Equivalent	Ingestion Effective Dose Equivalent	External Dose	Internal Effective Dose Equivalent	Annual Effective Dose Equivalent
SR 90	5.3E+02	0.0E+00	0.0E+00	5.3E+02	5.3E+02
Y 90	2.3E+01	0.0E+00	0.0E+00	2.3E+01	2.3E+01
CS 137	9.6E+03	0.0E+00	0.0E+00	9.6E+03	9.6E+03
PU 240	1.3E+04	0.0E+00	0.0E+00	1.3E+04	1.3E+04
PU 238	1.6E+04	0.0E+00	0.0E+00	1.6E+04	1.6E+04
PU 242	1.0E+01	0.0E+00	0.0E+00	1.0E+01	1.0E+01
PU 241	1.5E+04	0.0E+00	0.0E+00	1.5E+04	1.5E+04
U 237	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
AM 241	5.3E+04	0.0E+00	0.0E+00	5.3E+04	5.3E+04
PU 239	1.5E+04	0.0E+00	0.0E+00	1.5E+04	1.5E+04

Program GENII Input File ##### 8 Jul 88

Title: KW CHRONIC UNIT DOSES RELEASAE--case 3.

\GENII\KE3.in -- FUEL CANISTER

OPTIONS===== Default =====

F Near-field scenario? (Far-field) NEAR-FIELD: narrowly-focused
F Population dose? (Individual) release, single site
F Acute release? (Chronic) FAR-FIELD: wide-scale release,
Maximum Individual data set used multiple sites

Complete Complete

TRANSPORT OPTIONS===== Section EXPOSURE PATHWAY OPTIONS===== Section

T Air Transport 1 F Finite plume, external 5
F Surface Water Transport 2 T Infinite plume, external 5
F Biotic Transport (near-field) 3,4 F Ground, external 5
F Waste Form Degradation (near) 3,4 F Recreation, external 5
T Inhalation uptake 5,6

REPORT OPTIONS===== F Drinking water ingestion 7,8

T Report AEDE only F Aquatic foods ingestion 7,8

T Report by radionuclide F Terrestrial foods ingestion 7,9

T Report by exposure pathway F Animal product ingestion 7,10

F Debug report on screen F Inadvertent soil ingestion

INVENTORY #####

4 Inventory input activity units: (1-pCi 2-uCi 3-mCi 4-Ci 5-Bq)

0 Surface soil source units (1- m2 2- m3 3- kg)

Equilibrium question goes here

-----Release Terms-----		-----Basic Concentrations-----				
Use when	transport selected		near-field scenario, optionally			
Release	Air	Surface	Buried	Air	Surface	Ground
Radio-		Water	Waste	Soil	Deep	Water
nuclide	/yr	/yr	/m3	/unit	/m3	/L
KR85	1.1E-2					
H 3	6.2E-4					

-----Derived Concentrations-----	
Use when	measured values are known
Release	Terres. Animal Drink
Radio-	Plant Product Water
nuclide	/kg /kg /L /kg

TIME #####

1 Intake ends after (yr)

50 Dose calc. ends after (yr)

1 Release ends after (yr)

0 No. of years of air deposition prior to the intake period

0 No. of years of irrigation water deposition prior to the intake period

FAR-FIELD SCENARIOS (IF POPULATION DOSE) #####

0 Definition option: 1-Use population grid in file POP.IN
0 2-Use total entered on this line

NEAR-FIELD SCENARIOS #####

Prior to the beginning of the intake period: (yr)
0 When was the inventory disposed? (Package degradation starts)
0 When was LOIC? (Biotic transport starts)
0 Fraction of roots in upper soil (top 15 cm)
0 Fraction of roots in deep soil
0 Manual redistribution: deep soil/surface soil dilution factor
0 Source area for external dose modification factor (m2)

TRANSPORT #####

====AIR TRANSPORT=====SECTION 1=====

0	Calculate PM	0	Release type (0-3)
1	Option: 1-Use chi/Q or PM value	F	Stack release (T/F)
	2-Select MI dist & dir	0	Stack height (m)
	3-Specify MI dist & dir	0	Stack flow (m3/sec)
1.	Chi/Q or PM value	0	Stack radius (m)
0	MI sector index (1=S)	0	Effluent temp. (C)
0	MI distance from release point (m)	0	Building x-section (m2)
T	Use jf data, (T/F) else chi/Q grid	0	Building height (m)

====SURFACE WATER TRANSPORT=====SECTION 2=====

0 Mixing ratio model: 0-use value, 1-river, 2-lake
0 Mixing ratio, dimensionless
0 Average river flow rate for: MIXFLG=0 (m3/s), MIXFLG=1,2 (m/s),
0 Transit time to irrigation withdrawal location (hr)
If mixing ratio model > 0:
0 Rate of effluent discharge to receiving water body (m3/s)
0 Longshore distance from release point to usage location (m)
0 Offshore distance to the water intake (m)
0 Average water depth in surface water body (m)
0 Average river width (m), MIXFLG=1 only
0 Depth of effluent discharge point to surface water (m), lake only

====WASTE FORM AVAILABILITY=====SECTION 3=====

0 Waste form/package half life, (yr)
0 Waste thickness, (m)
0 Depth of soil overburden, m

====BIOTIC TRANSPORT OF BURIED SOURCE=====SECTION 4=====

T Consider during inventory decay/buildup period (T/F)?
T Consider during intake period (T/F)? | 1-Arid non agricultural
0 Pre-Intake site condition..... | 2-Humid non agricultural
| 3-Agricultural

EXPOSURE #####

====EXTERNAL EXPOSURE=====SECTION 5=====

0	Exposure time:		Residential irrigation:
0	Plume (hr)	T	Consider: (T/F)
0	Soil contamination (hr)	0	Source: 1-ground water
0	Swimming (hr)		2-surface water

```

0      Boating (hr)      | 0      Application rate (in/yr)
0      Shoreline activities (hr) | 0      Duration (mo/yr)
0      Shoreline type: (1-river, 2-lake, 3-ocean, 4-tidal basin)
0      Transit time for release to reach aquatic recreation (hr)
1.0    Average fraction of time submersed in acute cloud (hr/person hr)

```

=====INHALATION=====SECTION 6=====

```

8766.0 Hours of exposure to contamination per year
0      0-No resus- 1-Use Mass Loading      2-Use Anspaugh model
0      pension      Mass loading factor (g/m3)      Top soil available (cm)

```

=====INGESTION POPULATION=====SECTION 7=====

```

0      Atmospheric production definition (select option):
0      0-Use food-weighted chi/Q,(food-sec/m3), enter value on this line
      1-Use population-weighted chi/Q
      2-Use uniform production
      3-Use chi/Q and production grids (PRODUCTION will be overridden)
0      Population ingesting aquatic foods, 0 defaults to total (person)
0      Population ingesting drinking water, 0 defaults to total (person)
F      Consider dose from food exported out of region (default=F)

```

Note below: S* or Source: 0-none, 1-ground water, 2-surface water
3-Derived concentration entered above

===== AQUATIC FOODS / DRINKING WATER INGESTION=====SECTION 8=====

F Salt water? (default is fresh)

USE ? T/F	FOOD TYPE	TRAN- SIT hr	PROD- UCTION kg/yr	-CONSUMPTION- HOLDUP da	RATE kg/yr	DRINKING WATER	
F	FISH	0.00	0.0E+00	0.00	0.0	0	Source(see above)
F	MOLLUS	0.00	0.0E+00	0.00	0.0	T	Treatment? T/F
F	CRUSTA	0.00	0.0E+00	0.00	0.0	0	Hldup/transit(da)
F	PLANTS	0.00	0.0E+00	0.00	0.0	0	Consumpton(L/yr)

=====TERRESTRIAL FOOD INGESTION=====SECTION 9=====

USE ? T/F	FOOD TYPE	GROW TIME da	--IRRIGATION-- S RATE * in/yr			YIELD kg/m2	PROD- UCTION kg/yr	--CONSUMPTION-- HOLDUP da	RATE kg/yr
F	LEAF V	0.00	0	0.0	0.0	0.0	0.0E+00	0.0	0.0
F	ROOT V	0.00	0	0.0	0.0	0.0	0.0E+00	0.0	0.0
F	FRUIT	0.00	0	0.0	0.0	0.0	0.0E+00	0.0	0.0
F	GRAIN	0.00	0	0.0	0.0	0.0	0.0E+00	0.0	0.0

=====ANIMAL PRODUCTION CONSUMPTION=====SECTION 10=====

USE ? T/F	FOOD TYPE	---HUMAN--- CONSUMPTION RATE	TOTAL HOLDUP da	PROD- UCTION kg/yr	DRINK WATER CONTAM FRACT.	DIET FRAC- TION	GROW TIME da	---STORED FEED--- --IRRIGATION-- S RATE * in/yr	TIME mo/yr	YIELD kg/m3	STOR- AGE da
		kg/yr	da	kg/yr	FRACT.		da	in/yr	mo/yr	kg/m3	da

F	BEEF	0.0	0.0	0.00	0.00	0.00	0.0	0	0.0	0.00	0.00	0.0
F	POULTR	0.0	0.0	0.00	0.00	0.00	0.0	0	0.0	0.00	0.00	0.0
F	MILK	0.0	0.0	0.00	0.00	0.00	0.0	0	0.0	0.00	0.00	0.0
F	EGG	0.0	0.0	0.00	0.00	0.00	0.0	0	0.0	0.00	0.00	0.0
									-----FRESH FORAGE-----			
	BEEF					0.00	0.0	0	0.0	0.00	0.00	0.0
	MILK					0.00	0.0	0	0.0	0.00	0.00	0.0

#####

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: KW CHRONIC UNIT DOSES RELESAE--case 3.

Executed on: 03/13/96 at 08:58:49

Page A.

1

 This is a far-field (wide-scale release, multiple site) scenario.
 Release is chronic
 Individual dose

THE FOLLOWING TRANSPORT MODES ARE CONSIDERED
 Air

THE FOLLOWING EXPOSURE PATHS ARE CONSIDERED:
 Infinite plume, external
 Inhalation uptake

THE FOLLOWING TIMES ARE USED:
 Intake ends after (yr): 1.0
 Dose calculations ends after (yr): 50.0
 Release ends after (yr): 1.0

===== FILENAMES AND TITLES OF FILES/LIBRARIES USED
 =====

Input file name: \GENII\KE3.in

GENII Default Parameter Values (28-Mar-90 RAP)

Radionuclide Library - Times<100 years (23-July-93 PDR)

External Dose Factors for GENII in person Sv/yr per Bq/n (8-May-90 R

PNL Solubilities, Yearly Dose Increments (23-Jul-93 PDR)

=====

-----Release Terms-----			
Release	Surface Buried		
Radio-	Air	Water	Source
nuclide	Ci/yr	Ci/yr	Ci/m3
KR85	1.1E-02	0.0E+00	0.0E+00
H 3	6.2E-04	0.0E+00	0.0E+00

===== AIR TRANSPORT

=====

1.0E+00 Input chi/Q value (s/m3)

===== EXTERNAL EXPOSURE

=====

0.0E+00 Hours of exposure to plume

===== INHALATION

=====

8.8E+03 Hours of inhalation exposure per year
Resuspension not considered

=====

=

Input prepared by: _____

Date: _____

Input checked by: _____

Date: _____

=====

=

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: KW CHRONIC UNIT DOSES RELESAE--case 3.

Executed on: 03/13/96 at 08:58:52

Page C.

1

 Release period: 1.0
 Uptake/exposure period: 1.0
 Dose commitment period: 50.0
 Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	1.6E-05	2.5E-01	3.9E-06
Breast	1.6E-05	1.5E-01	2.4E-06
R Marrow	1.9E-05	1.2E-01	2.3E-06
Lung	1.6E-05	1.2E-01	1.9E-06
Thyroid	1.6E-05	3.0E-02	4.7E-07
Bone Sur	1.9E-05	3.0E-02	5.8E-07
Stomach	1.6E-05	6.0E-02	9.4E-07
S Int.	1.6E-05	6.0E-02	9.4E-07
UL Int.	1.6E-05	6.0E-02	9.4E-07
LL Int.	1.6E-05	6.0E-02	9.4E-07
Internal Effective Dose Equivalent			1.5E-05
External Dose			0.0E+00
Annual Effective Dose Equivalent			1.5E-05

 Controlling Organ: R Marrow
 Controlling Pathway: Inh
 Controlling Radionuclide: H 3

 Total Inhalation EDE: 1.5E-05
 Total Ingestion EDE: 0.0E+00

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: KW CHRONIC UNIT DOSES RELESAE--case 3.

Executed on: 03/13/96 at 08:58:52

Page C.

2

 Release period: 1.0
 Uptake/exposure period: 1.0
 Dose commitment period: 50.0
 Dose units: Rem

Dose Commitment Year

1 2 3 ...

Internal : |

Intake : |

Year: 3 | 0.0E+00 ...

| +

2 | 0.0E+00 0.0E+00 ...

| + +

1 | 1.5E-05 + 0.0E+00 + 0.0E+00 + ... = 1.5E-05

Internal
 Effective
 Dose
 Equivalent

|| || ||

Internal

Cumulative

Annual 1.5E-05 + 0.0E+00 + 0.0E+00 + ... = 1.5E-05

Internal

Dose

Dose

+ + + +

External

Annual 0.0E+00 0.0E+00 0.0E+00 ... 0.0E+00

Dose

|| || || ||

Annual

Cumulative

Dose 1.5E-05 + 0.0E+00 + 0.0E+00 + ... = 1.5E-05

Dose

Maximum

1.5E-05

Annual

Dose Occurred

In Year 1

 GENII Dose Calculation Program
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Case title: KW CHRONIC UNIT DOSES RELESAE--case 3.

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 Release period: 1.0
 Uptake/exposure period: 1.0
 Dose commitment period: 50.0
 Dose units: Rem

Committed Dose Equivalent by Exposure Pathway

Pathway	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro
Testes							
Inhale	1.6E-05	1.6E-05	1.6E-05	1.6E-05	1.6E-05	1.9E-05	1.9E-05
1.6E-05							
Total	1.6E-05	1.6E-05	1.6E-05	1.6E-05	1.6E-05	1.9E-05	1.9E-05
1.6E-05							

Pathway	Ovaries	Muscle	Thyroid
Inhale	1.6E-05	1.6E-05	1.6E-05
Total	1.6E-05	1.6E-05	1.6E-05

External Dose by Exposure Pathway

Pathway	
Plume	0.0E+00
Total	0.0E+00

 GENII Dose Calculation Program
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Case title: KW CHRONIC UNIT DOSES RELESAE--case 3.

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 Release period: 1.0
 Uptake/exposure period: 1.0
 Dose commitment period: 50.0
 Dose units: Rem

Committed Dose Equivalent by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R	Marro
Testes								
H 3	1.6E-05	1.6E-05	1.6E-05	1.6E-05	1.6E-05	1.9E-05	1.9E-05	
1.6E-05								
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	
0.0E+00								
Total	1.6E-05	1.6E-05	1.6E-05	1.6E-05	1.6E-05	1.9E-05	1.9E-05	
1.6E-05								

Radionuclide	Ovaries	Muscle	Thyroid
H 3	1.6E-05	1.6E-05	1.6E-05
KR 85	0.0E+00	0.0E+00	0.0E+00
Total	1.6E-05	1.6E-05	1.6E-05

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title: KW CHRONIC UNIT DOSES RELESAE--case 3.

Executed on: 03/13/96 at 08:58:52

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 Release period: 1.0
 Uptake/exposure period: 1.0
 Dose commitment period: 50.0
 Dose units: Rem

Radio-nuclide	Inhalation Effective Dose Equivalent	Ingestion Effective Dose Equivalent	External Dose	Internal Effective Dose Equivalent	Annual Effective Dose Equivalent
H 3	1.5E-05	0.0E+00	0.0E+00	1.5E-05	1.5E-05
KR 85	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
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CHECKLIST FOR PEER REVIEW

Document Reviewed: C. H. Huang, " UNIT RADIOLOGICAL DOSE CALCULATIONS FOR FUEL RETRIEVAL PRELIMINARY SAFETY EVALUATION," March 21, 1996.

Scope of Review: Entire Document

Yes No NA

- ☒ ☐ ☐ * Previous reviews complete and cover analysis, up to scope of this review, with no gaps.
- ☒ ☐ ☐ Problem completely defined.
- ☒ ☐ ☒ Accident scenarios developed in a clear and logical manner.
- ☒ ☐ ☐ Necessary assumptions explicitly stated and supported.
- ☒ ☐ ☐ Computer codes and data files documented.
- ☒ ☐ ☐ Data used in calculations explicitly stated in document.
- ☒ ☐ ☐ Data checked for consistency with original source information as applicable.
- ☐ ☐ ☒ Mathematical derivations checked including dimensional consistency of results.
- ☒ ☐ ☐ Models appropriate and used within range of validity or use outside range of established validity justified.
- ☒ ☐ ☐ Hand calculations checked for errors. Spreadsheet results should be treated exactly the same as hand calculations.
- ☒ ☐ ☐ Software input correct and consistent with document reviewed.
- ☒ ☐ ☐ Software output consistent with input and with results reported in document reviewed.
- ☐ ☐ ☒ Limits/criteria/guidelines applied to analysis results are appropriate and referenced. Limits/criteria/guidelines checked against references.
- ☐ ☐ ☒ Safety margins consistent with good engineering practices.
- ☒ ☐ ☐ Conclusions consistent with analytical results and applicable limits.
- ☒ ☐ ☐ Results and conclusions address all points required in the problem statement.
- ☐ ☐ ☒ Format consistent with appropriate NRC Regulatory Guide or other standards
- ☐ ☒ * Review calculations, comments, and/or notes are attached.
- ☒ ☐ ☐ Document approved.

J.C. Van Kesteren J.C. Van Kesteren
Reviewer (Printed Name and Signature)

4/8/96
Date

HEDOP REVIEW CHECKLIST
for
Radiological and Nonradiological Release Calculations

Document Reviewed: C. H. Huang, " UNIT RADIOLOGICAL DOSE CALCULATIONS FOR FUEL RETRIEVAL PRELIMINARY SAFETY EVALUATION,"
March 21, 1996.

Submitted by: C. H. HUANG
Date Submitted: March 21, 1996

Scope of Review: Entire Document

YES NO* N/A

☒	☐	☐	1. A detailed technical review and approval of the environmental transport and dose calculation portion of the analysis has been performed and documented.
☐	☐	☒	2. Detailed technical review(s) and approval(s) of scenario and release determinations have been performed and documented.
☒	☐	☐	3. HEDOP-approved code(s) were used.
☐	☐	☒	4. Receptor locations were selected according to HEDOP recommendations.
☒	☐	☐	5. All applicable environmental pathways and code options were included and are appropriate for the calculations.
☒	☐	☐	6. Hanford site data were used.
☐	☐	☒	7. Model adjustments external to the computer program were justified and performed correctly.
☒	☐	☐	8. The analysis is consistent with HEDOP recommendations.
☐	☐	☒	9. Supporting notes, calculations, comments, comment resolutions, or other information is attached. (Use the "Page 1 of X" page numbering format and sign and date each added page.)
☒	☐		10. Approval is granted on behalf of the Hanford Environmental Dose Overview Panel.

* All "NO" responses must be explained and use of nonstandard methods justified.

D.A. Himes 4/12/96
HEDOP-Approved Reviewer (Printed Name and Signature) Date

COMMENTS (add additional signed and dated pages if necessary):

DISTRIBUTION SHEET

To	From	Page 1 of 1
John P. Joyce	C.H. Huang	Date 3/21/96
Project Title/Work Order		EDT No. 156465
UNIT RADIOLOGICAL DOSES FOR FUEL RETRIEVAL PRELIMINARY SAFETY EVALUATION		ECN No. N/A

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
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John P. Joyce	R2-88	X			
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J.C. Van Keuren	A3-34	X			
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<i>Richard E. Jones</i>	<i>A3-34</i>	<i>X</i>			
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