
Wyman-Gordon's Comments

on the

February 22, 1993

Nuclear Regulatory Commission Draft Dose Assessment

May 14, 1993

Prepared by
Bechtel Environmental, Inc.



WYMAN-GORDON'S COMMENTS ON THE FEBRUARY 22, 1993
NUCLEAR REGULATORY COMMISSION DRAFT DOSE ASSESSMENT

May 14, 1993

I. Introduction

Following are comments on the February 22, 1993 Nuclear Regulatory Commission ("NRC") draft dose assessment for magnesium-thorium alloy which is located at the Wyman-Gordon plant site in North Grafton, Massachusetts (the "Site"). These comments were prepared on behalf of Wyman-Gordon Company by Bechtel Environmental, Inc. ("Bechtel").

As described by the NRC, the dose assessment consists of a series of models automated by a computer code named RESRAD, which assumes a family-farm scenario. Pacific Northwest Laboratory ("PNL"), under contract to the NRC, carried out the modeling exercise using the RESRAD code and chose to use certain inputs which do not reflect actual site conditions. In many instances, PNL used input parameters which were either overly conservative or were specified as "default" values in the RESRAD code. Because the PNL modeling runs do not take into account crucial site-specific information, the results of the modeling yield a maximum dose which is several orders of magnitude higher than what would be expected if actual input parameters reflective of site conditions had been used.

Those inputs which significantly contributed to the maximum dose values in PNL's modeling results are: 1) the depth of the soil cover; 2) the surface erosion rate; and 3) the density of the cover material. Bechtel recalculated the dose using the RESRAD code, together with parameters for the three controlling inputs which are reflective of actual site conditions. The results of the Bechtel

RESRAD code modeling runs, completed for a 1000 year time span, indicate that the maximum dose would be 1.4 mrem/yr at year 391 for trench area 1 and the calculated doses for areas 2 and 3 would be approximately .3 mrem/yr and .5 mrem/yr respectively, also at year 391. We believe that the great variability in the modeling results strongly supports the conclusion that before any decision on remediation can be made actual site conditions must be taken into account.

II. Applicability of Family-Farm Scenario

It is inappropriate to apply the family-farm scenario to the Site which has been used continuously since 1945 (i.e., almost 50 years) as an industrial defense facility. The Site was initially owned and operated by the Air Force, then leased to Wyman-Gordon, and, in 1982, well after expiration of the last of the Atomic Energy Commission licenses for use of magnesium-thorium alloys, Wyman-Gordon purchased the Site subject to retention by the Air Force of liability for pre-existing environmental conditions.

The Site is presently occupied by an operating facility which is one of the largest manufacturers of forgings for the aerospace industry. There are no plans at hand to cease operations at this location. Moreover, the Site and adjacent properties are zoned for industrial/office and light industrial use and have not been used for residential or agricultural purposes for over 45 years.

Given the history of land use in the area and the fact that the Site has been used for heavy industry for almost half a century, it is unreasonable to assume that this Site would be desirable for use as a family farm.

Furthermore, oversight of industrial properties such as this under federal and state environmental regulatory programs virtually assures that sufficient information would be publicly available to prevent an unsuspecting family from purchasing the land, building a house on it, and

raising crops and livestock for family consumption. Consideration could also be given to recording a notice in the Registry of Deeds indicating precisely where on the Site the magnesium-thorium waste is buried.

III. Description of Pertinent Modeling Inputs

A. Depth of Soil Cover

The trenches in the PNL dose assessment were described as being 30 feet long, 3 feet wide and 2 feet deep, with no surface cover. However, there are 4 feet of surface cover on the trenches. As stated in the "Site Decommissioning Management Plan" (NRC 1992a), "The magnesium-thorium wastes are buried and covered by 4 feet of soil." The fact that there are 4 feet of soil covering the waste is further supported by: a) a series of as-built drawings (Wyman-Gordon 1961, 1970) on trench details (see Figure 1); b) a letter on "Information Regarding Mag-Thorium Low-Level Radioactive Wastes Buried at Wyman-Gordon Company, 244 Worcester Street, North Grafton, MA" (Wyman-Gordon 1991); and c) the "Summary of Data Investigation of the Magnesium-Thorium Disposal Area" (GZA 1991).

Specifically, the trench detail shown in Figure 1 indicates that each of the trenches is 6 feet deep with 2 feet of magnesium-thorium waste material at the bottom of the trench and 4 feet of surface cover on top of the waste.

As an input parameter to the RESRAD code, PNL used a soil cover depth of 0 feet in its primary dose assessment simulation and 2 feet in its sensitivity run to bound the doses. There is no basis in fact for either of those numbers. When Bechtel ran the RESRAD code, it used the actual soil cover depth of 4 feet. See Table 1 for a comparison of the variation in modeling input parameters used by PNL and Bechtel.

B. Surface Erosion Rate

The surface erosion rate used in the PNL dose assessment was the RESRAD code default of 1×10^{-3} m/yr. However, PNL should more appropriately have used the 6×10^{-5} m/yr surface erosion rate which the RESRAD manual (Gilbert 1989) (Knight 1983) calls out as a suitable rate of erosion for a site at which the family-farm scenario is unreasonable and where there is a 2% slope. Inasmuch as this Site has no apparent slope and erosion rates increase with increasing slope, even this input represents an overly conservative rate of erosion for the Site.

When Bechtel ran the RESRAD model, it used the arguably conservative surface erosion rate of 6×10^{-5} m/y in its primary dose assessment simulation and 6×10^{-4} m/y in its sensitivity run to bound the doses. According to the RESRAD manual, a surface erosion rate of 6×10^{-4} m/y is a suitable rate for row crop agriculture, i.e., the family-farm scenario (Gilbert 1989).

C. Density of Cover Material

The PNL dose assessment states that 1.78 g/cm^3 is the input parameter that should be used in the RESRAD code to represent local soil conditions. PNL explains that it obtained this value from the range given in A Manual of Geology for Civil Engineers (Pitts 1984). However, when PNL ran the model, it inexplicably used a cover density value of 1.6 g/cm^3 instead of 1.78 g/cm^3 .

When Bechtel ran the RESRAD code, it used 1.78 g/cm^3 as the input parameter for density of cover material. See Table 1.

D. Miscellaneous Inputs

Other input parameters which were used in the PNL dose assessment are not reflective of actual site conditions. For example, two such inputs are the estimated inventory of magnesium-

thorium alloy and the percentage of thorium in the alloy. The estimated inventory used in the PNL dose assessment was approximately 120 percent of the recorded value, or 50,000 pounds, instead of the recorded value of 42,000 pounds. The PNL dose assessment also assumed that the percentage of thorium in the alloy was always 3%. In actuality, the alloy contained between 2% and 3% thorium. When Bechtel ran the RESRAD code, it did not correct for these values.

IV. Results of Modeling Using the RESRAD Code

Using the PNL input parameters identified on Table 1 for PNL Dose Assessment #1, the RESRAD code calculated the maximum dose for trench area 1 to be 1322 mrem/yr at time zero, and the calculated doses for areas 2 and 3 are approximately 1027 mrem/yr and 1103 mrem/yr respectively, also at time zero. For all of the reasons stated previously, those calculated doses are not realistic nor do they represent anything close to the expected future site-specific conditions within a 1000 year time span.

Using appropriate site-specific input parameters (i.e., those identified on Table 1 for Bechtel Dose Assessment #1), the RESRAD code calculated the maximum dose for trench area 1 to be 1.4 mrem/yr, and the calculated dose for areas 2 and 3 are approximately .3 mrem/yr and .5 mrem/yr respectively, all at year 391. The code was completed for a 1000 year time span. Even when the RESRAD code is run using the more conservative family-farm scenario erosion rate specified on Table 1 (See Bechtel Dose Assessment #2 sensitivity run), the maximum doses for the three trench areas, as calculated by the model, are 22.5 mrem/yr for area 1 and for areas 2 and 3 are 6.1 mrem/yr and 8.7 mrem/yr, respectively. See Table 2 for a summary of the dose assessment modeling results which were derived using the RESRAD code.

Based on PNL's RESRAD code modeling runs, one would conclude that the direct radiation pathway is the main contributor to the dose, followed by the dust inhalation pathway. However, Bechtel's modeling runs clearly show that when one uses the RESRAD code with site-specific input parameters, both the direct radiation and inhalation pathways do not contribute significantly to the dose. Furthermore, there is no basis to believe that the ingestion of on-site well water would ever be a prominent radiation pathway. Groundwater monitoring of on-site and off-site wells since 1990 indicates that gross alpha and gross beta levels meet U.S. Environmental Protection Agency Primary Drinking Water Standards (NRC 1992a 1992b) (GZA 1992). Assays of sediment samples from the on-site wells indicate no thorium migration above background levels (NRC 1992a). Moreover, the magnesium-thorium alloys are in an insoluble form and, thus, would not be anticipated to leach into the groundwater or surface water.

See the Attachment annexed to these comments for copies of Bechtel's RESRAD code modeling runs 1 through 6 as identified on Table 2.

V. Conclusion

The great variability in the modeling results discussed in these comments strongly supports the conclusion that before any decision on remediation can be made, actual site conditions must be taken into account. When input parameters representative of site conditions are used with the RESRAD code, the maximum radiation dose from the magnesium-thorium materials at the Site occurs in year 391 and is less than 1.5 mrem/yr. Dose levels decline thereafter for the remainder of the 1000 year modeling time span. These estimates of potential future radiological exposure at the Site are well below the 170 mrem/yr maximum permissible exposure level espoused in the NRC's 1981 Branch Technical Position for "Disposal or Onsite Storage of Thorium or Uranium Wastes

from Past Operations" [46 Fed. Reg. 52061 (Oct. 23, 1981)].

Thus, the results of the PNL dose assessment cannot justifiably be used to support a need for remediation of the Site. In fact, there may be no technical basis to support inclusion of the Wyman-Gordon Site on the Site Decommissioning Management Plan list.

Table 1

SUMMARY OF PARAMETER DIFFERENCES BETWEEN
THE PNL AND BECHTEL DOSE ASSESSMENTS

Version of Dose Assessment	Dose Assessment Inputs		
	Cover Depth (feet)	Erosion Rate (m/yr)	Cover Density (g/cm ³)
PNL Dose Assessment #1	0	1×10^{-3}	1.6
PNL Dose Assessment #2 (sensitivity run)	2	1×10^{-3}	1.6
Bechtel Dose Assessment #1	4*	6×10^{-5} *	1.78*
Bechtel Dose Assessment #2 (sensitivity run)	4*	6×10^{-4}	1.78*

* Indicates site-specific value

Table 2

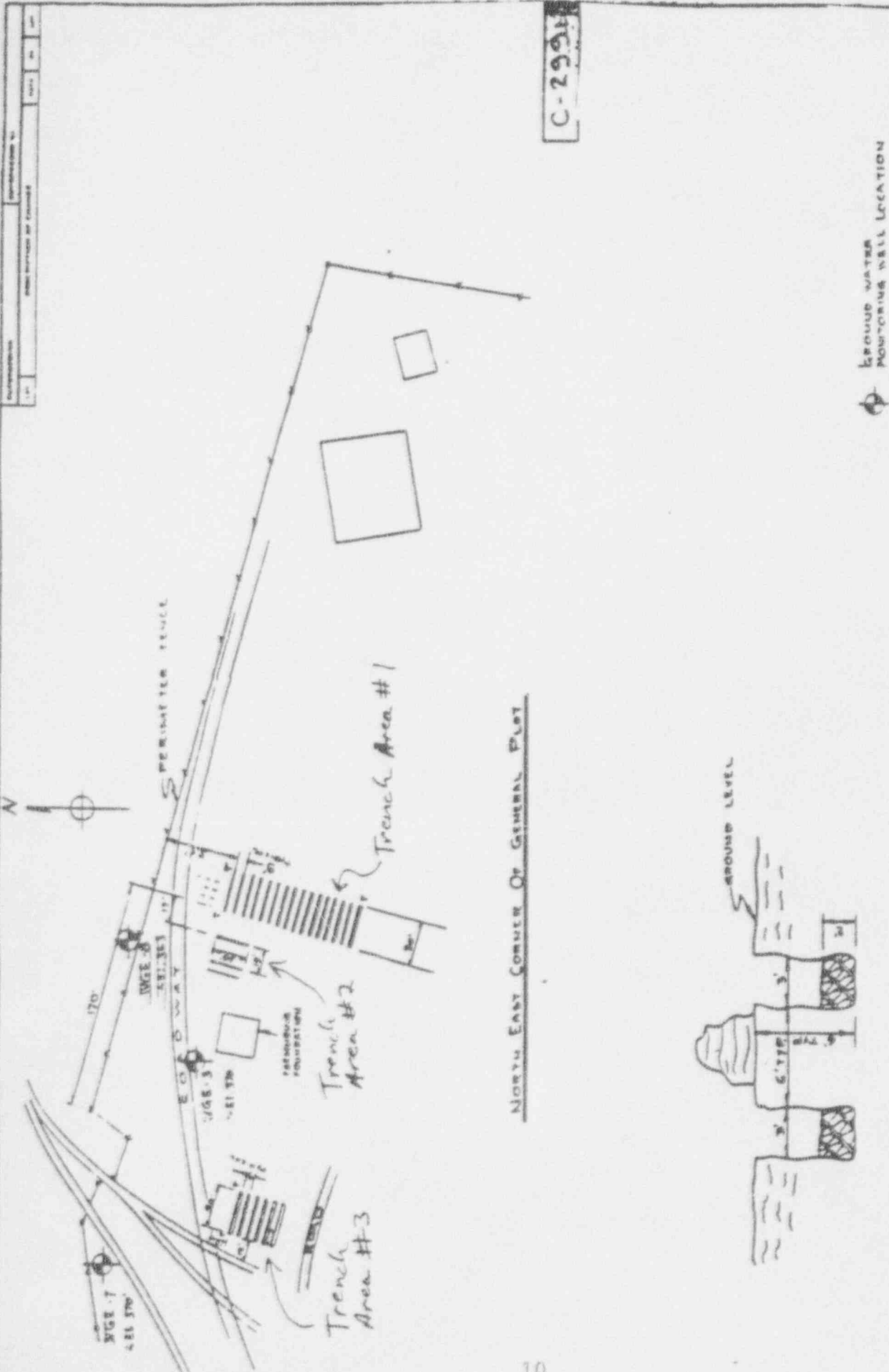
DOSE ASSESSMENT EVALUATION SUMMARY

Version of Dose Assessment*	Dose (mrem/yr)		
	Area 1	Area 2	Area 3
PNL Dose Assessment #1	1322	1027	1103
PNL Dose Assessment #2	924	687	738
Bechtel Dose Assessment #1	1.4 Run 1**	.3 Run 2**	.5 Run 3**
Bechtel Dose Assessment #2	22.5 Run 4**	6.1 Run 5**	8.7 Run 6**

* Only the parameters stated on Table 1 were changed (i.e., cover depth, erosion rate and density) to reflect site-specific inputs. All other inputs and their respective parameters remain constant from one dose assessment to another.

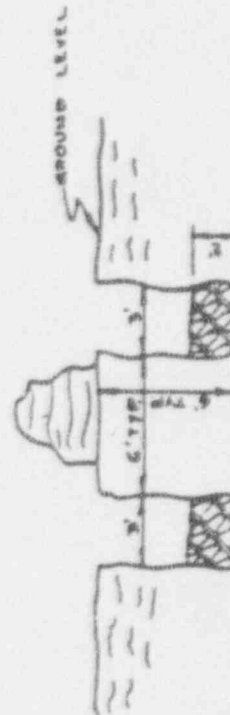
** Run # corresponds to the results of the Bechtel dose assessment simulations which were run using the RESRAD code (copies are attached).

Figure 1



C-2991

SECTION THROUGH TRENCHES
SCALE 1/4" = 1'-0"



MAG THORIUM (3 1/2%) TRENCHES FOR WASTE DISPOSAL
NORTH EAST CORNER OF GENERAL PLOT
VYMAN-GORDON CO.
WORCESTER, MASS.

DESIGNED BY	DATE	APPROVED BY	DATE
REVIEWED BY	DATE	APPROVED BY	DATE
SCALE	1" = 50'	SCALE	1" = 50'
SHEET	10-1-51	SHEET	10-1-51

C

References

Gilbert et al. 1989. *A Manual for Implementing Residual Radioactive Material Guidelines*. ANL/ES-160. DOE/CH/8901. Argonne National Laboratory, Argonne, Illinois, for U.S. Department of Energy. June 1989.

Goldberg-Zoino & Associates, GZA GeoEnvironmental, Inc., 1991. *Summary of Data Investigation of the Magnesium-Thorium Disposal Area*. File No. 3736.9. March 1991.

Goldberg-Zoino & Associates, GZA GeoEnvironmental, Inc., 1992. *April 1992 Sampling and Radiological Analyses Mg-Th Disposal Area*. June 9, 1992.

Knight, M.J. 1983. *The Effect of Soil Erosion on the Long-Term Stability of FUSRAP Near-Surface Waste-Burial Sites*. ANL/EIS-18, prepared by Division of Environmental Impact Studies, Argonne National Laboratory, Argonne, Illinois, for U.S. Department of Energy, Oak Ridge Operations Office. April 1983.

Pitts, J. 1984. *A Manual of Geology for Civil Engineers*. Halsted Press, New York, NY.

United States Nuclear Regulatory Commission (NRC), 1992a. *Site Decommissioning Management Plan*. SECY-92-200. Revision 2. April 1992. Washington, D.C.

United States Nuclear Regulatory Commission (NRC), 1992b. Letter to LTC(P) H.R. Huke, III, Defense Contract Management District Northeast, Defense Logistics Agency. May 10, 1993. Boston, Massachusetts.

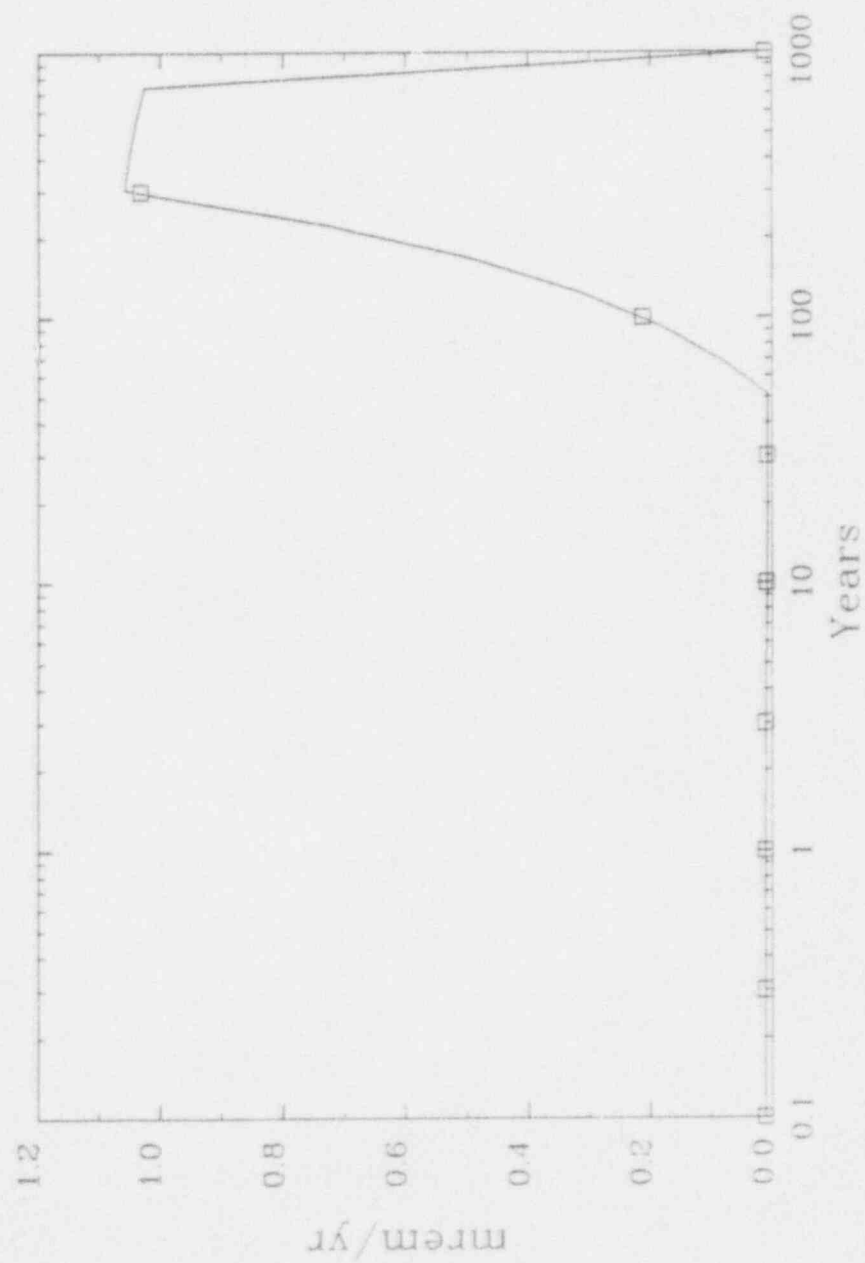
Wyman-Gordon Co., 1961. "General Plot & Waste Disposal Plan-Grafton Plant." E-64323-B. March 1961. Worcester, Massachusetts.

Wyman-Gordon Co., 1970. "Trenches for Waste Disposal North East Corner of General Plot." C-2991. Worcester, Massachusetts.

Wyman-Gordon Co., 1991. Letter to Mr. John H. Austin, Chief Decommissioning and Regulatory Issues Branch, Division of Low-Level Waste Management and Decommissioning, Nuclear Regulatory Commission. February 28, 1991. North Grafton, Massachusetts.

ATTACHMENT
AREA 1
RESRAD CODE RUN 1

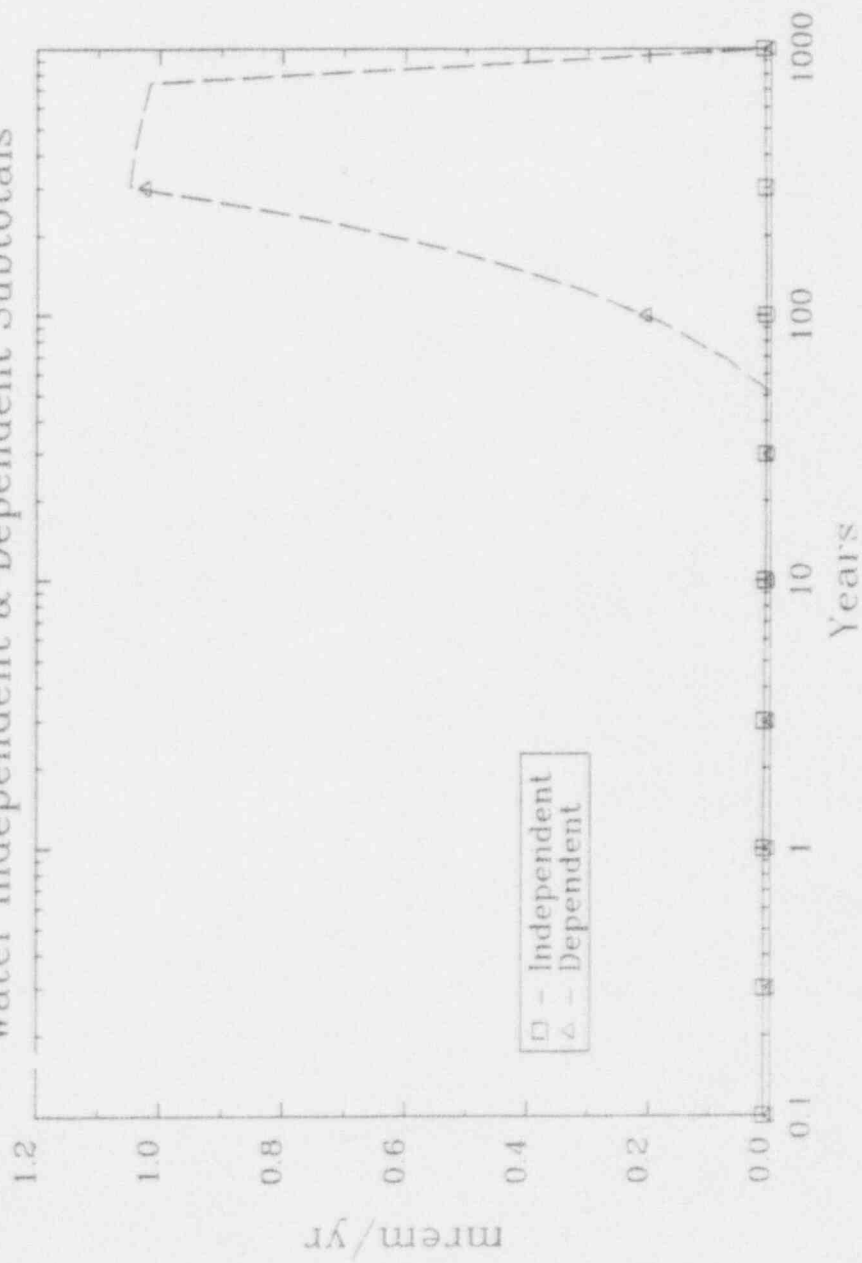
TOTAL DOSE: All Isotopes and Pathways Summed



WYMGRD22.DAT

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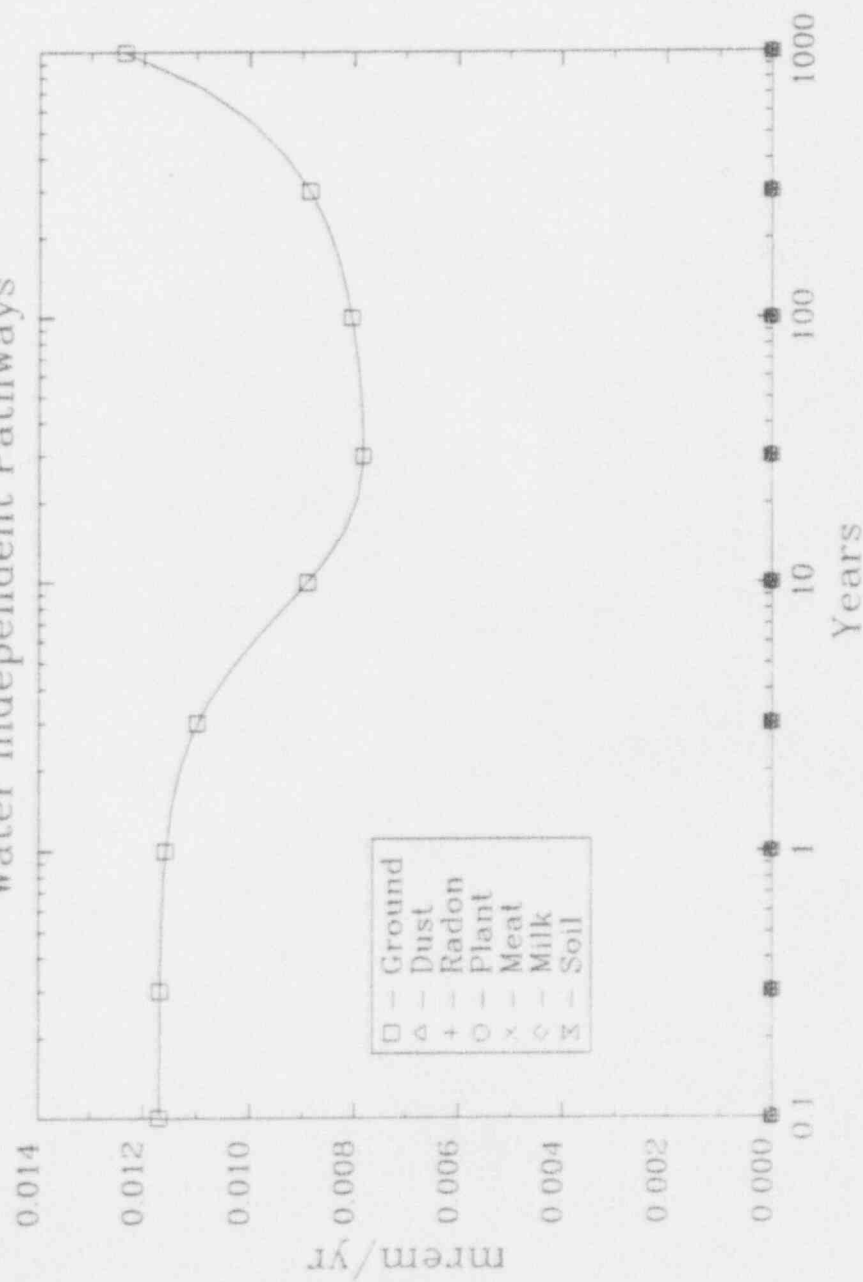
DOSE: All Isotopes Summed
Water Independent & Dependent Subtotals



WYMGRD22.DAT

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DOSE: All Isotopes Summed Water Independent Pathways

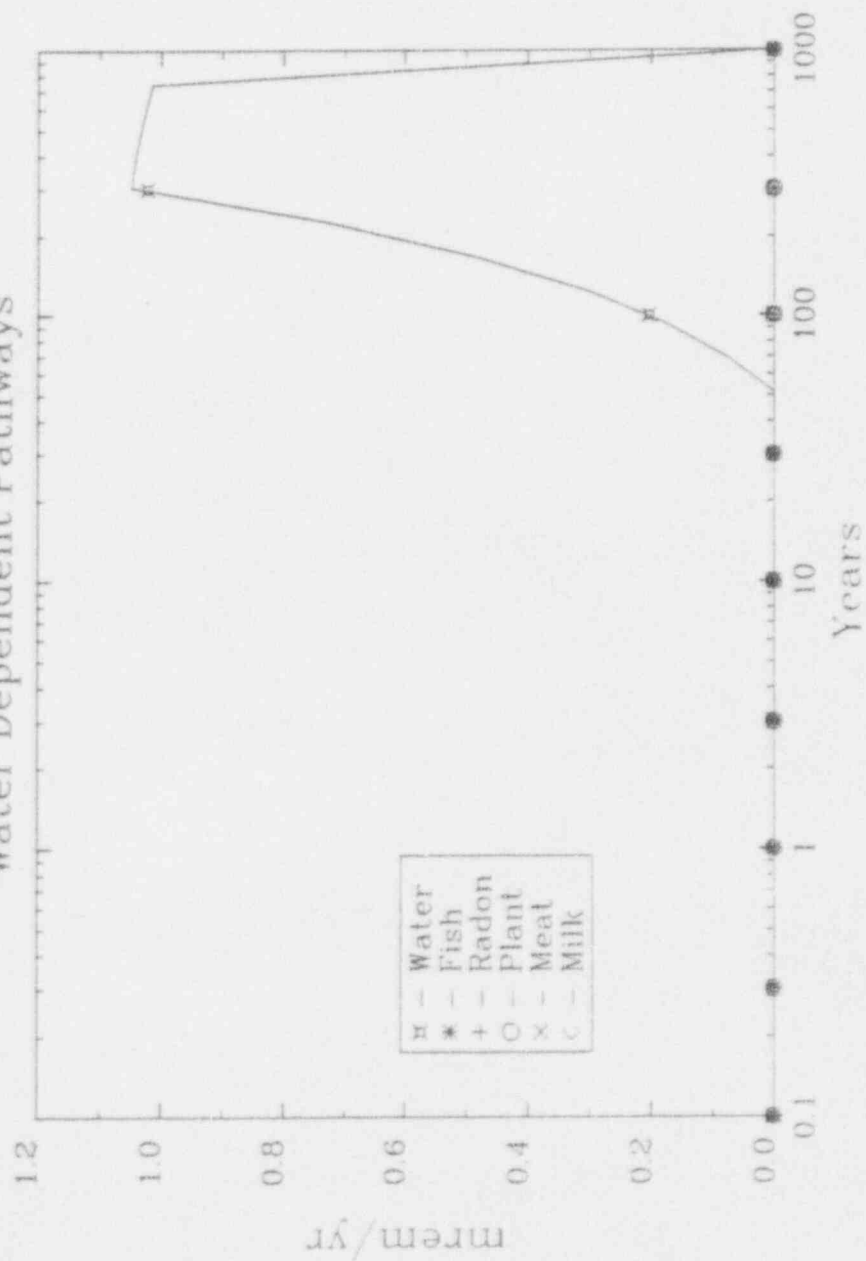


□ Ground
 △ Dust
 + Radon
 ○ Plant
 × Meat
 ◇ Milk
 ⌘ Soil

WYMGIRD22.DAT

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DOSE: All Isotopes Summed Water Dependent Pathways



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Time = 1.000E-01	10
Time = 3.000E-01	11
Time = 1.000E+00	12
Time = 3.000E+00	13
Time = 1.000E+01	14
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Dose Conversion Factor (and Related) Parameter Summary

Menu	Parameter	Current Value	Default	Parameter Name
A-1	Ground external gamma, volume DCF's, (m:cm/yr)/(pCi/cm**3):			
A-1	Ra-228+D, soil density = 1.0 g/cm**3	8.180E+00	8.180E+00	DCF1(1,1)
A-1	Ra-228+D, soil density = 1.8 g/cm**3	4.510E+00	4.510E+00	DCF1(1,2)
A-1	Th-228+D, soil density = 1.0 g/cm**3	1.330E+01	1.330E+01	DCF1(2,1)
A-1	Th-228+D, soil density = 1.8 g/cm**3	7.360E+00	7.360E+00	DCF1(2,2)
A-1	Th-232 , soil density = 1.0 g/cm**3	1.350E-03	1.350E-03	DCF1(3,1)
A-1	Th-232 , soil density = 1.8 g/cm**3	6.040E-04	6.040E-04	DCF1(3,2)
A-3	Depth factors, ground external gamma, dimensionless:			
A-3	Ra-228+D, soil density = 1.0 g/cm**3, thickness = .15 m	6.800E-01	6.800E-01	FD(1,1,1)
A-3	Ra-228+D, soil density = 1.0 g/cm**3, thickness = 0.5 m	9.700E-01	9.700E-01	FD(1,2,1)
A-3	Ra-228+D, soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,1)
A-3	Ra-228+D, soil density = 1.8 g/cm**3, thickness = .15 m	8.500E-01	8.500E-01	FD(1,1,2)
A-3	Ra-228+D, soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(1,2,2)
A-3	Ra-228+D, soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,2)
A-3	Th-228+D, soil density = 1.0 g/cm**3, thickness = .15 m	6.100E-01	6.100E-01	FD(2,1,1)
A-3	Th-228+D, soil density = 1.0 g/cm**3, thickness = 0.5 m	9.400E-01	9.400E-01	FD(2,2,1)
A-3	Th-228+D, soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(2,3,1)
A-3	Th-228+D, soil density = 1.8 g/cm**3, thickness = .15 m	7.500E-01	7.500E-01	FD(2,1,2)
A-3	Th-228+D, soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(2,2,2)
A-3	Th-228+D, soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(2,3,2)
A-3	Th-232 , soil density = 1.0 g/cm**3, thickness = .15 m	9.500E-01	9.500E-01	FD(3,1,1)

A-3	Th-232 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(3,2,1)
A-3	Th-232 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(3,3,1)
A-3	Th-232 , soil density = 1.8 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(3,1,2)
A-3	Th-232 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(3,2,2)
A-3	Th-232 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(3,3,2)

B-1	Dose conversion factors for dust inhalation, mrem/pCi:			
B-1	Ra-228+D	4.500E-03	4.500E-03	DCF2(1)
B-1	Th-228+D	3.100E-01	3.100E-01	DCF2(2)
B-1	Th-232	1.600E+00	1.600E+00	DCF2(3)

D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ra-228+D	1.200E-03	1.200E-03	DCF3(1)
D-1	Th-228+D	7.500E-04	7.500E-04	DCF3(2)
D-1	Th-232	2.800E-03	2.800E-03	DCF3(3)

D-34	Food transfer factors:			
D-34	Ra-228+D, plant/soil concentration ratio, dimensionless	1.400E-03	1.400E-03	RTF(1,1)
D-34	Ra-228+D, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	9.900E-04	9.900E-04	RTF(1,2)
D-34	Ra-228+D, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-04	2.000E-04	RTF(1,3)
D-34	Th-228+D, plant/soil concentration ratio, dimensionless	4.200E-03	4.200E-03	RTF(2,1)
D-34	Th-228+D, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
D-34	Th-228+D, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.500E-06	2.500E-06	RTF(2,3)

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Dose Conversion Factor (and Related) Parameter Summary (continued)

Menu	Parameter	Current Value	Default	Parameter Name
D-34	Th-232 , plant/soil concentration ratio, dimensionless	4.200E-03	4.200E-03	RTF(3,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(3,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.500E-06	2.500E-06	RTF(3,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ra-228+D, fish	5.000E+01	5.000E+01	BIOFAC(1,1)
D-5	Ra-228+D, crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(1,2)
D-5	Th-228+D, fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Th-228+D, crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(2,2)
D-5	Th-232 , fish	3.000E+01	3.000E+01	BIOFAC(3,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(3,2)

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 Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1,4' COVER, NIC,BNI
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Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	3.850E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	6.000E-01	1.000E+00	---	THICKO
R011	Length parallel to aquifer flow (m)	4.200E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.000E+02	1.000E+02	---	BRLO
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI

R011	Times for calculations (yr)	1.000E-01	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E-01	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+00	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+00	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+01	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	3.000E+02	3.000E+03	---	T(9)
R011	Times for calculations (yr)	1.000E+03	1.000E+04	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ra-228	1.320E+02	0.000E+00	---	SC(1)
R012	Initial principal radionuclide (pCi/g): Th-232	1.320E+02	0.000E+00	---	SC(2)
R012	Initial principal radionuclide (pCi/g): Th-232	1.320E+02	0.000E+00	---	SC(3)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	WC(1)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	WC(2)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	WC(3)
R013	Cover depth (m)	1.200E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.780E+00	1.600E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	6.000E-05	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.060E+00	1.600E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	0.000E+00	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	3.200E-01	2.000E-01	---	EP CZ
R013	Contaminated zone hydraulic conductivity (m/yr)	5.550E+03	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	4.050E+00	5.300E+00	---	BCZ
R013	Humidity in air (g/cm**3)	not used	8.000E+00	---	RUMID
R013	Evapotranspiration coefficient	6.800E-01	6.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.120E+00	1.000E+00	---	PRECIP
R013	Irrigation mode	0.000E+00	2.000E-01	---	RI
R013	Runoff coefficient	2.000E-01	2.000E-01	---	IDITCH
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	RUNOFF
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	WAREA
R014	Density of saturated zone (g/cm**3)	1.780E+00	1.600E+00	---	EPS
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	DENSAQ
R014	Saturated zone effective porosity	3.200E-01	2.000E-01	---	TPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.550E+03	1.000E+02	---	EPSZ
R014	Saturated zone hydraulic gradient	5.000E-02	2.000E-02	---	HCSZ
R014	Saturated zone b parameter	4.050E+00	5.300E+00	---	HGWT
R014	Water table drop rate (m/yr)	6.000E-04	1.000E-03	---	BSZ
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	VMT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	MB	ND	---	DWIBWT
R014	Individual's use of groundwater (m**3/yr)	1.500E+02	1.500E+02	---	MODEL
R014	Residual Radioactivity Program, Version 4.60	05/04/93 12:49	Page 5	---	UN
Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1, 4' COVER, NIC, BNI					
File : WYMG022.DAT					

Site-Specific Parameter Summary (continued)				
Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)
R015	Number of unsaturated zone strata	1	1	---
R015	Unsat. zone 1, thickness (m)	1.500E+00	4.000E+00	---
R015	Unsat. zone 1, soil density (g/cm**3)	1.780E+00	1.600E+00	---
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---
R015	Unsat. zone 1, effective porosity	3.200E-01	2.000E-01	---
R015	Unsat. zone 1, soil-specific b parameter	4.050E+00	5.300E+00	---
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	5.550E+03	1.000E+02	---
Parameter Name				
				NS
				H(1)
				DENSUZ(1)
				TPUZ(1)
				EPUZ(1)
				BUZL(1)
				HCUZ(1)

Menu	Parameter	User Input	Default	Used by RESRAD (if different from user input)	Parameter Name
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+00	7.000E+01	---	DCACTC(1)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+00	7.000E+01	---	DCACTUC(1,1)
R016	Saturated zone (cm**3/g)	7.000E+00	7.000E+01	---	DCACTSC(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.301E-02	REACH(1)
R016	Distribution coefficients for Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+03	6.000E+04	---	DCACTC(2)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+03	6.000E+04	---	DCACTUC(2,1)
R016	Saturated zone (cm**3/g)	6.000E+03	6.000E+04	---	DCACTSC(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.513E-05	REACH(2)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	6.000E+03	6.000E+04	---	DCACTC(3)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+03	6.000E+04	---	DCACTUC(3,1)
R016	Saturated zone (cm**3/g)	6.000E+03	6.000E+04	---	DCACTSC(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.513E-05	REACH(3)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	2.000E-04	2.000E-04	---	LMNH
R017	Dilution length for airborne dust, inhalation (m)	3.000E+00	3.000E+00	---	LM
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHE3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHE1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor, external gamma	8.900E-01	1.000E+00	---	FSL
R017	Fractions of annular areas within AREA:				
R017	Outer annular radius (m) = $\sqrt{(1/\pi)}$	not used	1.000E+00	---	FRACA(1)
R017	Outer annular radius (m) = $\sqrt{(10/\pi)}$	not used	1.000E+00	---	FRACA(2)
R017	Outer annular radius (m) = $\sqrt{(20/\pi)}$	not used	1.000E+00	---	FRACA(3)
R017	Outer annular radius (m) = $\sqrt{(50/\pi)}$	not used	1.000E+00	---	FRACA(4)
R017	Outer annular radius (m) = $\sqrt{(100/\pi)}$	not used	1.000E+00	---	FRACA(5)
R017	Outer annular radius (m) = $\sqrt{(200/\pi)}$	not used	1.000E+00	---	FRACA(6)
R017	Outer annular radius (m) = $\sqrt{(500/\pi)}$	not used	1.000E+00	---	FRACA(7)
R017	Outer annular radius (m) = $\sqrt{(1000/\pi)}$	not used	1.000E+00	---	FRACA(8)
R017	Outer annular radius (m) = $\sqrt{(5000/\pi)}$	not used	1.000E+00	---	FRACA(9)
R017	Outer annular radius (m) = $\sqrt{(1.E+04/\pi)}$	not used	1.000E+00	---	FRACA(10)
R017	Outer annular radius (m) = $\sqrt{(1.E+05/\pi)}$	not used	0.000E+00	---	FRACA(11)
R017	Outer annular radius (m) = $\sqrt{(1.E+06/\pi)}$	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	D1ET(1)
R018	Residual Radioactivity Program, Version 4.60	05/04/93 12:49	Page 6		
	Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1, 4' COVER, NTC,BNI				
	File : WYMG022.DAT				
Menu	Parameter	User Input	Default	Used by RESRAD (if different from user input)	Parameter Name
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	D1ET(2)
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	D1ET(3)
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	D1ET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	D1ET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	D1ET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DW1
R018	Fraction of drinking water from site	1.000E+00	1.000E+00	---	FDW
R018	Fraction of aquatic food from site	5.000E-01	5.000E-01	---	FRQ

R019	Livestock fodder intake for meat (kg/day)	6.800E+01	---	LF15
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	---	LF16
R019	Livestock water intake for meat (L/day)	5.000E+01	---	LF15
R019	Livestock water intake for milk (L/day)	1.600E+02	---	LF16
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	---	FGDW
R019	Livestock water fraction from ground water	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	0.000E+00	---	FGWIR
R021	Thickness of building foundation (m)	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	1.000E-01	---	PH2OCV
R021	Volumetric water content of the foundation	5.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec): in cover material	2.000E-06	---	DIFCV
R021	in foundation material	2.000E-08	---	DIFFL
R021	in contaminated zone soil	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	2.000E+00	---	HMIX
R021	Average annual wind speed (m/sec)	2.000E+00	---	WIND
R021	Average building air exchange rate (1/hr)	2.000E+00	---	REXG
R021	Height of the building (room) (m)	1.000E+00	---	HRM
R021	Building interior area factor	2.500E+00	---	FAL
R021	Building depth below ground surface (m)	0.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	1.000E+00	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	---	EMANA(2)
R021		1.000E-01	---	

code computed (time dependent)

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1,4' COVER, MIC,BNI
File : WYMGRO22.DAT

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	active

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1,4' COVER, MIC,BNI
File : WYMGRO22.DAT

Contaminated Zone Dimensions	Initial Soil Concentrations, pCi/g
Area: 385.00 square meters	Ra-228 1.320E+02
Thickness: 0.60 meters	Th-228 1.320E+02

Cover Depth: 1.20 meters

1.320E+02

Total Dose TD05E(t), mrem/yr
Basic Radiation Dose Limit = 100 mrem/yr

Total Mixture Sum $M(t)$ = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E-01	3.000E-01	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TOUSE(t):	1.169E-02	1.169E-02	1.168E-02	1.158E-02	1.099E-02	8.905E-03	7.823E-03	2.118E-01	1.032E+00	1.236E-02
M(t):	1.169E-04	1.169E-04	1.168E-04	1.158E-04	1.099E-04	8.905E-05	7.823E-05	2.118E-03	1.032E-02	1.236E-04
Maximum TOUSE(t):	1.410E+00	mrem/yr	at $t =$		390.7 $\pm$ 0.4 years					

Total Dose Contributions 10PSE(i, p, t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 390.7 years

[illegible]

Total Dose Contributions TD05E(i, p, t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 390.7 years

Radio- Nuclide	Water		Fish		Radon		Water Dependent Pathways plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.401E+00	0.9930	3.560E-04	0.0003	1.320E-05	0.0000	0.000E+00	0.0000	1.686E-04	0.0001	1.548E-04	0.0001	1.410E+00	1.0000
Total	1.401E+00	0.9930	3.560E-04	0.0003	1.320E-05	0.0000	0.000E+00	0.0000	1.686E-04	0.0001	1.548E-04	0.0001	1.410E+00	1.0000

*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1, 4' COVER, NIC, BNI

File : WYMGD22.DAT

Total Dose Contributions TDSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

[illegible]

Total Dose Contributions TDSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Radio- nuclide	Water Dependent Pathways			Milk	All Pathways*
	Water	Fish	Radon plant		
Meat					
mem/vr	fract.	mem/vr	fract.	mem/vr	fract.
mem/vr	fract.	mem/vr	fract.	mem/vr	fract.

Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0124
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	2.231E-07
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	7.725E-03
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	7.823E-03

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1,4, COVER, NIC,BNI

File : WYMGRO22.DAT

Total Dose Contributions TD0SE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Radio- Nuclide	Ground	Dust	Radon	Water Independent Pathways	Meat	Milk	Soil
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr
Ra-228	2.709E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00
Th-228	2.230E-18	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00
Th-232	8.053E-03	0.0380	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00
Total	8.053E-03	0.0380	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00

Total Dose Contributions TD0SE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Radio- Nuclide	Water	Fish	Radon	Water Dependent Pathways	Meat	Milk	All Pathways*
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr
Ra-228	2.432E-06	0.0000	7.634E-10	0.0000	1.446E-09	0.0000	2.439E-06
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.230E-18
Th-232	2.036E-01	0.9614	5.212E-05	0.0002	2.736E-05	0.0001	2.118E-01
Total	2.036E-01	0.9614	5.213E-05	0.0002	2.736E-05	0.0001	2.118E-01

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1,4, COVER, NIC,BNI

File : WYMGRO22.DAT

Total Dose Contributions TD0SE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Radio- Nuclide	Ground	Dust	Radon	Water Independent Pathways	Meat	Milk	Soil
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr
Ra-228	3.594E-26	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00
Th-232	8.858E-03	0.0086	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00
Total	8.858E-03	0.0086	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00

Total Dose Contributions TD0SE(i,p,t) for Individual Radionuclides (i) and Pathways (p) As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Radio- Nuclide	Water	Fish	Radon	Water Dependent Pathways	Meat	Milk	All Pathways*
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00
Th-232	8.858E-03	0.0086	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00
Total	8.858E-03	0.0086	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00

Ra-228	2.890E-22	0.0000	9.070E-26	0.0000	4.829E-25	0.0000	0.000E+00	0.0000	1.718E-25	0.0000	4.014E-28	0.0000	2.897E-22	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.022E+00	0.9909	2.595E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	1.203E-04	0.0001	1.136E-04	0.0001	1.032E+00	1.0000
Total	1.022E+00	0.9909	2.595E-04	0.0003	4.829E-25	0.0000	0.000E+00	0.0000	1.203E-04	0.0001	1.136E-04	0.0001	1.032E+00	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1,4' COVER, NTC,BNI

File : WYMGD22.DAT

Total Dose Contributions TDSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways

Radio- Nuclide	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.236E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.236E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.236E-02	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.236E-02	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1,4' COVER, NTC,BNI

File : WYMGD22.DAT

Dose/Source Ratios Summed Over All Pathways

Parent and Progeny Principal Radionuclide Contributions Indicated

DSR(j,t) (mrem/yr)/(pCi/g)

Parent (i)	Product (j)	Branch Fraction	t=	0.000E+00	1.000E-01	3.000E-01	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-228	Ra-228	1.000E+00		1.024E-06	1.306E-06	9.695E-07	8.531E-07	5.921E-07	1.649E-07	4.279E-09	1.203E-14	1.660E-30	0.000E+00
Ra-228	Th-228			0.000E+00	3.088E-06	8.773E-06	2.420E-05	4.256E-05	2.373E-05	7.325E-07	1.847E-08	2.195E-24	0.000E+00
Ra-228	DSR(j)			1.024E-06	4.093E-06	9.742E-06	2.505E-05	4.315E-05	2.390E-05	7.368E-07	1.847E-08	2.195E-24	0.000E+00
Th-228	Th-228	1.000E+00		8.757E-05	8.446E-05	7.856E-05	6.098E-05	2.957E-05	2.349E-06	1.690E-09	1.689E-20	0.000E+00	0.000E+00
Th-232	Th-232	1.000E+00		2.046E-22	2.047E-22	2.047E-22	2.050E-22	2.059E-22	2.088E-22	2.176E-22	2.510E-22	3.778E-22	1.580E-21
Th-232	Ra-228			0.000E+00	1.221E-08	3.598E-08	1.127E-07	2.850E-07	5.687E-07	6.833E-07	1.490E-03	7.748E-03	1.317E-06
Th-232	Th-228			0.000E+00	1.875E-08	1.628E-07	1.597E-06	1.022E-05	4.065E-05	5.784E-05	1.143E-04	6.628E-05	9.235E-05
Th-232	DSR(j)			2.046E-22	3.096E-08	1.987E-07	1.709E-06	1.050E-05	4.122E-05	5.852E-05	1.604E-03	7.815E-03	9.367E-05

The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g

Basic Radiation Dose Limit = 100 mrem/yr

3Nuclide

(i)	t = 0.000E+00	1.000E-01	3.000E-01	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-228	9.765E+07	2.443E+07	1.026E+07	3.992E+06	2.318E+06	4.185E+06	1.357E+08	5.413E+09	*2.721E+14	*2.721E+14
Th-228	1.142E+06	1.184E+06	1.273E+06	1.640E+06	3.381E+06	4.257E+07	5.916E+10	*8.192E+14	*8.192E+14	*8.192E+14
Th-232	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	6.232E+04	1.280E+04	*1.092E+05

*At specific activity limit

0

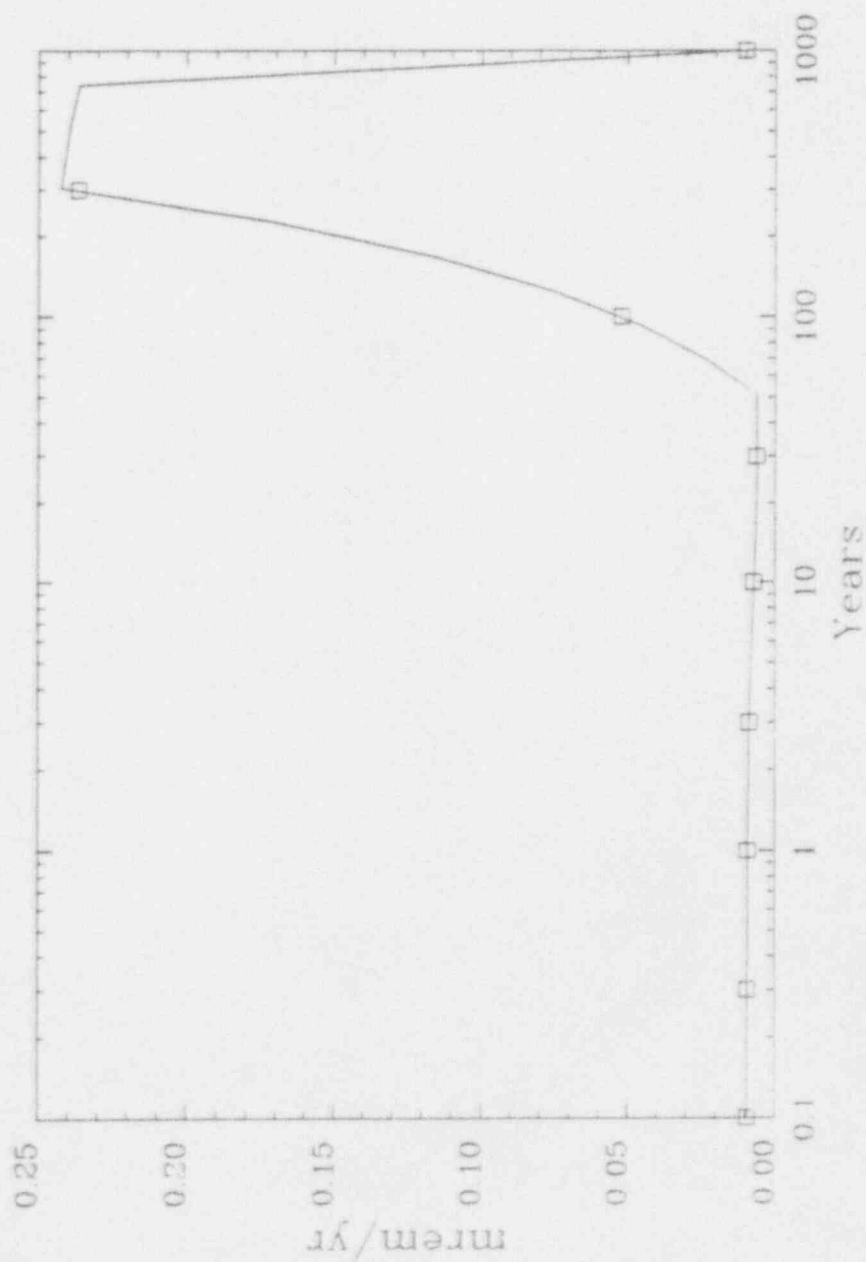
Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 390.7 ± 0.4 years
DSR(i,tmin) G(i,tmin) DSR(i,tmax) G(i,tmax)

(i)	pCi/g	tmin (years)	DSR(i,tmin) (pCi/g)	G(i,tmin)	DSR(i,tmax) (pCi/g)	G(i,tmax)
Ra-228	1.320E+02	3.780 ± 0.004	4.418E-05	2.264E+06	0.000E+00	*2.721E+14
Th-228	1.320E+02	0.000E+00	8.757E-05	1.142E+06	0.000E+00	*8.192E+14
Th-232	1.320E+02	409.4 ± 0.4	1.126E-02	8.879E+03	1.069E-02	9.359E+03

*At specific activity limit

ATTACHMENT
AREA 2
RESRAD CODE RUN 2

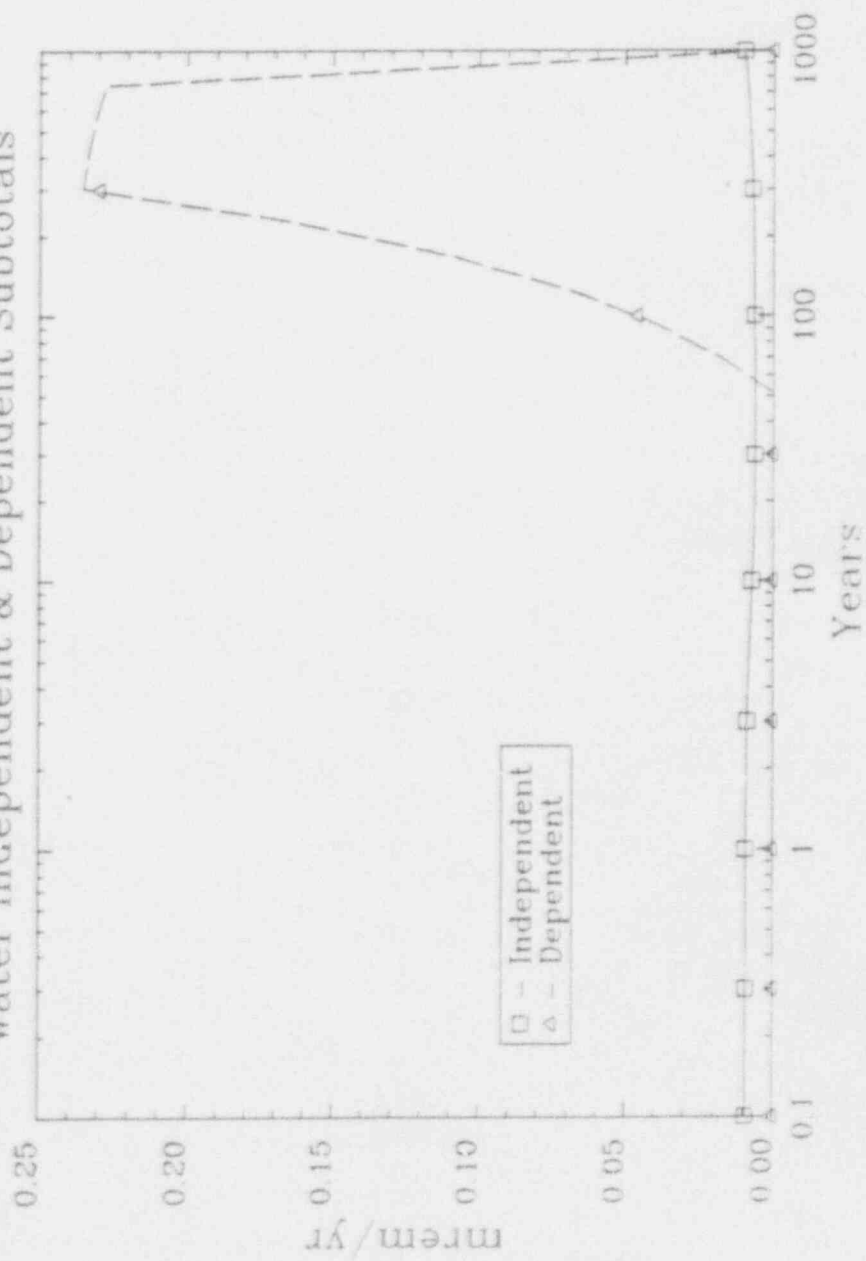
TOTAL DOSE: All Isotopes and Pathways Summed



WYMGRD23 DAT

05/04/93 13 03

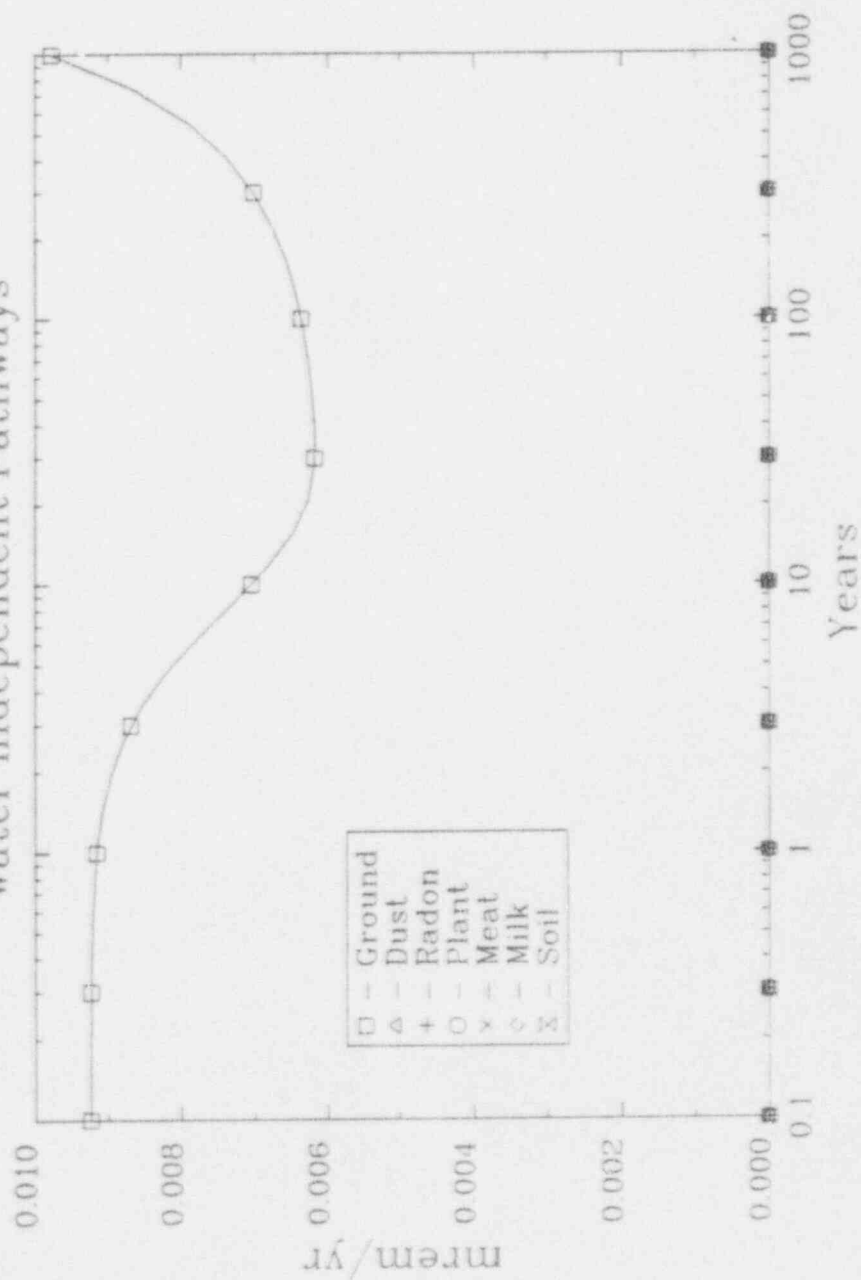
DOSE: All Isotopes Summed Water Independent & Dependent Subtotals



WYMGRD23 DAT

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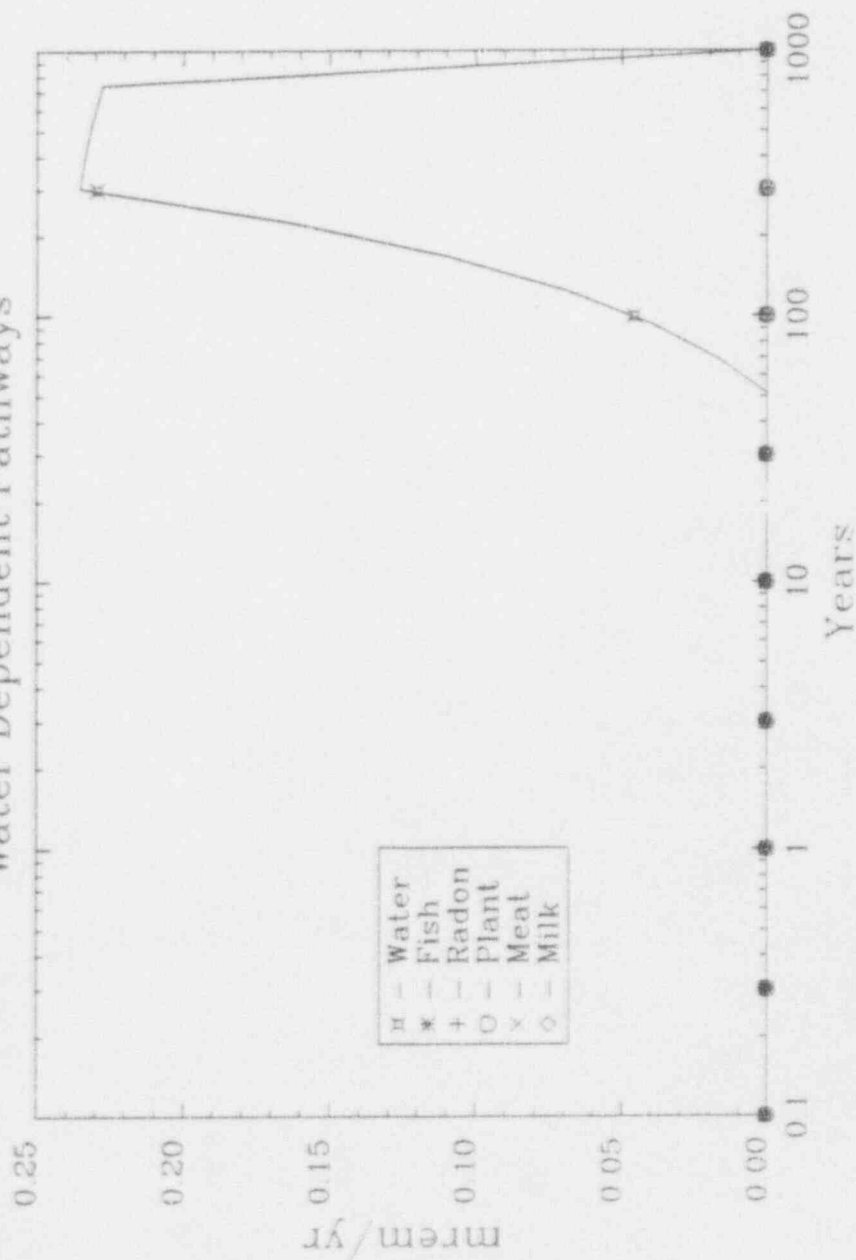
DOSE: All Isotopes Summed Water Independent Pathways



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DOSE: All Isotopes Summed Water Dependent Pathways



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Time = 1.000E-01	10
Time = 3.000E-01	11
Time = 1.000E+00	12
Time = 3.000E+00	13
Time = 1.000E+01	14
Time = 3.000E+01	15
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Dose Conversion Factor (and Related) Parameter Summary

Menu	Parameter	Current Value	Default	Parameter Name
A-1	Ground external gamma, volume DCF's, (mrem/yr)/(pCi/cm**3):			
A-1	Ra-228+D, soil density = 1.0 g/cm**3	8.180E+00	8.180E+00	DCF1(1,1)
A-1	Ra-228+D, soil density = 1.8 g/cm**3	4.510E+00	4.510E+00	DCF1(1,2)
A-1	Th-228+D, soil density = 1.0 g/cm**3	1.330E+01	1.330E+01	DCF1(2,1)
A-1	Th-228+D, soil density = 1.8 g/cm**3	7.360E+00	7.360E+00	DCF1(2,2)
A-1	Th-232 , soil density = 1.0 g/cm**3	1.350E-03	1.350E-03	DCF1(3,1)
A-1	Th-232 , soil density = 1.8 g/cm**3	6.040E-04	6.040E-04	DCF1(3,2)
A-3	Depth factors, ground external gamma, dimensionless:			
A-3	Ra-228+D, soil density = 1.0 g/cm**3, thickness = .15 m	6.800E-01	6.800E-01	FD(1,1,1)
A-3	Ra-228+D, soil density = 1.0 g/cm**3, thickness = 0.5 m	9.700E-01	9.700E-01	FD(1,2,1)
A-3	Ra-228+D, soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,1)
A-3	Ra-228+D, soil density = 1.8 g/cm**3, thickness = .15 m	8.500E-01	8.500E-01	FD(1,1,2)
A-3	Ra-228+D, soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(1,2,2)
A-3	Ra-228+D, soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,2)
A-3	Th-228+D, soil density = 1.0 g/cm**3, thickness = .15 m	6.100E-01	6.100E-01	FD(2,1,1)
A-3	Th-228+D, soil density = 1.0 g/cm**3, thickness = 0.5 m	9.400E-01	9.400E-01	FD(2,2,1)
A-3	Th-228+D, soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(2,3,1)
A-3	Th-228+D, soil density = 1.8 g/cm**3, thickness = .15 m	7.500E-01	7.500E-01	FD(2,1,2)
A-3	Th-228+D, soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(2,2,2)
A-3	Th-228+D, soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(2,3,2)
A-3	Th-232 , soil density = 1.0 g/cm**3, thickness = .15 m	9.500E-01	9.500E-01	FD(3,1,1)

A-3	Th-232 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(3,2,1)
A-3	Th-232 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(3,3,1)
A-3	Th-232 , soil density = 1.8 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(3,1,2)
A-3	Th-232 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(3,2,2)
A-3	Th-232 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(3,3,2)

B-1	Dose conversion factors for dust inhalation, mrem/pCi:			
B-1	Ra-228+D	4.500E-03	4.500E-03	DCF2(1)
B-1	Th-228+D	3.100E-01	3.100E-01	DCF2(2)
B-1	Th-232	1.600E+00	1.600E+00	DCF2(3)

D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ra-228+D	1.200E-03	1.200E-03	DCF3(1)
D-1	Th-228+D	7.500E-04	7.500E-04	DCF3(2)
D-1	Th-232	2.800E-03	2.800E-03	DCF3(3)

D-34	Food transfer factors:			
D-34	Ra-228+D, plant/soil concentration ratio, dimensionless	1.400E-03	1.400E-03	RTF(1,1)
D-34	Ra-228+D, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	9.900E-04	9.900E-04	RTF(1,2)
D-34	Ra-228+D, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-04	2.000E-04	RTF(1,3)
D-34	Th-228+D, plant/soil concentration ratio, dimensionless	4.200E-03	4.200E-03	RTF(2,1)
D-34	Th-228+D, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
D-34	Th-228+D, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.500E-06	2.500E-06	RTF(2,3)

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Dose Conversion Factor (and Related) Parameter Summary (continued)

Menu	Parameter	Current Value	Default	Parameter Name
D-34	Th-232 , plant/soil concentration ratio, dimensionless	4.200E-03	4.200E-03	RTF(3,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(3,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.500E-06	2.500E-06	RTF(3,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ra-228+D, fish	5.000E+01	5.000E+01	BIOFAC(1,1)
D-5	Ra-228+D, crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(1,2)
D-5	Th-228+D, fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Th-228+D, crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(2,2)
D-5	Th-232 , fish	3.000E+01	3.000E+01	BIOFAC(3,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(3,2)

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Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	8.640E+01	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	6.000E-01	1.000E+00	---	THICKD
R011	Length parallel to aquifer flow (m)	9.500E+00	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.000E+02	1.000E+02	---	BRLO
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI

Menu	Parameter	User Input	Default	Used by RESRAD (if different from user input)	Parameter Name
R011	Times for calculations (yr)	1.000E-01	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E-01	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+00	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+00	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+01	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	3.000E+02	3.000E+03	---	T(9)
R011	Times for calculations (yr)	1.000E+03	1.000E+04	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ra-228	1.320E+02	0.000E+00	---	S(1)
R012	Initial principal radionuclide (pCi/g): Th-228	1.320E+02	0.000E+00	---	S(2)
R012	Initial principal radionuclide (pCi/g): Th-232	1.320E+02	0.000E+00	---	S(3)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W(1)
R012	Concentration in groundwater (pCi/L): Th-228	not used	0.000E+00	---	W(2)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W(3)
R013	Cover depth (m)	1.200E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.780E+00	1.600E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	6.000E-05	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.060E+00	1.600E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	0.000E+00	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	3.200E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	5.550E+03	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	4.050E+00	5.300E+00	---	BCZ
R013	Humidity in air (g/cm**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	6.800E-01	6.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.120E+00	1.000E+00	---	PRECIP
R013	Irrigation mode	0.000E+00	2.000E-01	---	RI
R013	Runoff coefficient	overhead	overhead	---	IDITCH
R013	Watershed area for nearby stream or pond (m**2)	2.000E-01	2.000E-01	---	RUNOFF
R013	Accuracy for water/soil computations	1.000E+06	1.000E+06	---	WAREA
R013		1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.780E+00	1.600E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	3.200E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.550E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	5.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	6.000E-04	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWTBWT
R014	Model: Nondispersion (NO) or Mass-Balance (MB)	MB	NO	---	MODEL
R014	Individual's use of groundwater (m**3/yr)	1.500E+02	1.500E+02	---	UN

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (if different from user input)	Parameter Name
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	1.500E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.780E+00	1.600E+00	---	DENSAZ(1)
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	3.200E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	4.050E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	5.550E+03	1.000E+02	---	HCUZ(1)

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R016	Distribution coefficients for Ra-228	7.000E+00	7.000E+01	---	DCACTC(1)
R016	Contaminated zone (cm**3/g)	7.000E+00	7.000E+01	---	DCACTU(1,1)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+00	7.000E+01	---	DCACTS(1)
R016	Saturated zone (cm**3/g)	0.000E+00	0.000E+00	6.301E-02	RLEACH(1)
R016	Leach rate (/yr)				
R016	Distribution coefficients for Th-228	6.000E+03	6.000E+04	---	DCACTC(2)
R016	Contaminated zone (cm**3/g)	6.000E+03	6.000E+04	---	DCACTU(2,1)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+03	6.000E+04	---	DCACTS(2)
R016	Saturated zone (cm**3/g)	0.000E+00	0.000E+00	7.513E-05	RLEACH(2)
R016	Leach rate (/yr)				
R016	Distribution coefficients for Th-232	6.000E+03	6.000E+04	---	DCACTC(3)
R016	Contaminated zone (cm**3/g)	6.000E+03	6.000E+04	---	DCACTU(3,1)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+03	6.000E+04	---	DCACTS(3)
R016	Saturated zone (cm**3/g)	0.000E+00	0.000E+00	7.513E-05	RLEACH(3)
R016	Leach rate (/yr)				
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	2.000E-04	2.000E-04	---	MLINH
R017	Dilution length for airborne dust, inhalation (m)	3.000E+00	3.000E+00	---	LM
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor, external gamma	9.800E-01	1.000E+00	---	FS1
R017	Fractions of annular areas within AREA:				
R017	Outer annular radius (m) = $\sqrt{(1/\pi)}$	not used	1.000E+00	---	FRACA(1)
R017	Outer annular radius (m) = $\sqrt{(10/\pi)}$	not used	1.000E+00	---	FRACA(2)
R017	Outer annular radius (m) = $\sqrt{(20/\pi)}$	not used	1.000E+00	---	FRACA(3)
R017	Outer annular radius (m) = $\sqrt{(50/\pi)}$	not used	1.000E+00	---	FRACA(4)
R017	Outer annular radius (m) = $\sqrt{(100/\pi)}$	not used	1.000E+00	---	FRACA(5)
R017	Outer annular radius (m) = $\sqrt{(200/\pi)}$	not used	1.000E+00	---	FRACA(6)
R017	Outer annular radius (m) = $\sqrt{(500/\pi)}$	not used	1.000E+00	---	FRACA(7)
R017	Outer annular radius (m) = $\sqrt{(1000/\pi)}$	not used	1.000E+00	---	FRACA(8)
R017	Outer annular radius (m) = $\sqrt{(5000/\pi)}$	not used	1.000E+00	---	FRACA(9)
R017	Outer annular radius (m) = $\sqrt{(1.E+04/\pi)}$	not used	1.000E+00	---	FRACA(10)
R017	Outer annular radius (m) = $\sqrt{(1.E+05/\pi)}$	not used	0.000E+00	---	FRACA(11)
R017	Outer annular radius (m) = $\sqrt{(1.E+06/\pi)}$	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)

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Site-Specific Parameter Summary (continued)				
Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---
R018	Fraction of drinking water from site	1.000E+00	1.000E+00	---
R018	Fraction of aquatic food from site	5.000E-01	5.000E-01	---

Parameter Name

DIET(2)
DIET(3)
DIET(4)
DIET(5)
DIET(6)
SOIL
DWI
FDW
FR9

R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LF15
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LF16
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LM15
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LM16
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	TM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGNDW
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGMLW
R019	Irrigation fraction from ground water	0.000E+00	1.000E+00	---	FGWIR
R021	Thickness of building foundation (m)	1.500E-01	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	2.400E+00	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	4.000E-01	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	1.000E-01	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	1.000E-01	1.000E-01	---	PH20CV
R021	Volumetric water content of the foundation	5.000E-02	5.000E-02	---	PH20FL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	2.000E-06	2.000E-06	---	DIFCV
R021	in foundation material	2.000E-08	2.000E-08	---	DIFFL
R021	in contaminated zone soil	2.000E-06	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	2.000E+00	2.000E+00	---	HM1X
R021	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R021	Average building air exchange rate (1/hr)	1.000E+00	1.000E+00	---	REXG
R021	Height of the building (room) (m)	2.500E+00	2.500E+00	---	HRM
R021	Building interior area factor	0.000E+00	0.000E+00	---	FBI
R021	Building depth below ground surface (m)	1.000E+00	1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.000E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	1.000E-01	1.000E-01	---	EMANA(2)

code computed (time dependent)

Residual Radioactivity Program, Version 4.60 05/04/93 13:03 Page 7
 Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4*CAP, BNI
 File : WYMGRO23.DAT

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	active

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 Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4*CAP, BNI
 File : WYMGRO23.DAT

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	86.40 square meters	Ra-228	1.320E+02
Thickness:	0.60 meters	Th-228	1.320E+02

Th-232 1.320E+02

Basic Radiation Dose Limit = 100 mrem/yr

Total Mixture Sum $M(t)$ = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E-01	3.000E-01	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TOOSE(t):	9.246E-03	9.244E-03	9.236E-03	9.157E-03	8.686E-03	7.040E-03	6.185E-03	5.208E-02	2.365E-01	9.775E-03
M(t):	9.246E-05	9.244E-05	9.236E-05	9.157E-05	8.686E-05	7.040E-05	6.185E-05	5.208E-04	2.365E-03	9.775E-04

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 390.7 years

[illegible]

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 390.7 years

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	3.143E-01	0.9770	7.991E-05	0.0002	2.962E-06	0.0000	0.000E+00	0.0000	8.493E-06	0.0000	7.795E-06	0.0000	3.217E-01	1.0000
Total	3.143E-01	0.9770	7.991E-05	0.0002	2.962E-06	0.0000	0.000E+00	0.0000	8.493E-06	0.0000	7.795E-06	0.0000	3.217E-01	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4' CAP. BNI

File : WYMGRD23.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

[illegible]

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

[illegible]

*Sum of all water independent and dependent pathways.

Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4'CAP, BNI

File : WYMGRO23.DAT

C

5

9

^a*Sum of all water independent and dependent pathways.

Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4' CAP, BNI

File : WYMGRD23.DAT

2

6

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[illegible]

Total Dose Contributions TDSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1,000E+00 years

Total Dose Contributions TDose(i,p,t) for Individual Radionuclides (i) and Pathways (p)
AS mrem/yr and Fraction of Total Dose At t = 1,000E+00 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Total Dose Contributions $TD(50; i, p, t)$ for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At $t = 3,000 \pm 00$ years

[illegible]

0*Sum of all water independent and dependent pathways

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4' CAP. BNI

File : WYMGRO23.DAT

Total Dose Contributions, $TDOSE(i,p,t)$ for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways

[illegible]

Total Dose Contributions $TD_{DOSE}(i,p,t)$ for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	5.458E-07	0.0000	1.713E-10	0.0000	9.121E-10	0.0000	0.000E+00	0.0000	7.281E-11	0.0000	1.701E-13	0.0000	5.471E-07	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.763E-18	0.0000
Th-232	4.570E-02	0.8774	1.170E-05	0.0002	2.665E-06	0.0001	0.000E+00	0.0000	1.378E-06	0.0000	1.100E-06	0.0000	5.208E-02	1.0000
Total	4.570E-02	0.8774	1.170E-05	0.0002	2.666E-06	0.0001	0.000E+00	0.0000	1.378E-06	0.0000	1.100E-06	0.0000	5.208E-02	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4'CAP. BN1

File : WYMGRD23.DAT

Total dose Contributions $TD_{DOSE}(i,p,t)$ for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways

[illegible]

Total Dose Contributions $TD_{DOSE}(i,p,t)$ for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Dependent Pathways

[illegible]

Ra-228	6.485E-23	0.0000	2.036E-26	0.0000	1.084E-25	0.0000	0.000E+00	0.0000	8.651E-27	0.0000	0.000E+00	0.0000	6.501E-23	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.294E-01	0.9701	5.824E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	6.060E-06	0.0000	5.721E-06	0.0000	2.365E-01	1.0000
Total	2.294E-01	0.9701	5.824E-05	0.0002	1.084E-25	0.0000	0.000E+00	0.0000	6.060E-06	0.0000	5.721E-06	0.0000	2.365E-01	1.0000

0*Sum of all water independent and dependent pathways.
 1Residual Radioactivity Program, Version 4.60 05/04/93 13:03 Page 18
 Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4*CAP, BNI
 File : WYMGRO23.DAT

Total Dose Contributions TD0SE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As mrem/yr and fraction of Total Dose At t = 1.000E+03 years

Radio- Nuclide	Water Independent Pathways				Water Dependent Pathways				All Pathways*			
	mrem/yr	fract.	Dust	Radon	mrem/yr	fract.	Plant	Meat	mrem/yr	fract.	Milk	Soil
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	9.775E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	9.775E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TD0SE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As mrem/yr and fraction of Total Dose At t = 1.000E+03 years

Radio- Nuclide	Water Independent Pathways				Water Dependent Pathways				All Pathways*			
	mrem/yr	fract.	Fish	Radon	mrem/yr	fract.	Plant	Meat	mrem/yr	fract.	Milk	Soil
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4*CAP, BNI

File : WYMGRO23.DAT

Dose/Source Ratios Summed Over All Pathways												
Parent and Progeny Principal Radionuclide Contributions Indicated												
OParent (i)	Product (j)	Branch Fraction	DSR(i,j,t) (mrem/yr)/(pCi/g)									
t = 0.000E+00			1.000E-01	3.000E-01	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
Ra-228	Ra-228	1.000E+00	8.096E-07	7.950E-07	7.665E-07	6.745E-07	4.682E-07	1.304E-07	3.383E-09	9.511E-15	1.312E-30	0.000E+00
Ra-228	Th-228		0.000E+00	2.441E-06	6.936E-06	1.913E-05	3.365E-05	1.876E-05	5.792E-07	4.145E-09	4.925E-25	0.000E+00
Ra-228	Th-232		8.096E-07	3.236E-06	7.702E-06	1.980E-05	3.411E-05	1.889E-05	5.825E-07	4.145E-09	4.925E-25	0.000E+00
Th-228	Th-228	1.000E+00	6.923E-05	6.677E-05	6.211E-05	4.821E-05	2.338E-05	1.957E-06	1.336E-09	1.336E-20	0.000E+00	0.000E+00
Th-228	Th-232		1.618E-22	1.618E-22	1.619E-22	1.621E-22	1.628E-22	1.651E-22	1.720E-22	1.985E-22	2.987E-22	1.249E-21
Th-232	Ra-228		0.000E+00	9.655E-09	2.845E-08	8.908E-08	2.253E-07	4.496E-07	5.402E-07	3.348E-04	1.739E-03	1.042E-06
Th-232	Th-228		0.000E+00	1.482E-08	1.287E-07	1.262E-06	8.079E-06	3.214E-05	4.573E-05	5.977E-05	5.240E-05	7.301E-05
Th-232	Th-232		1.618E-22	2.448E-08	1.571E-07	1.351E-06	8.304E-06	3.259E-05	4.627E-05	3.946E-04	1.791E-03	7.406E-05

The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
 Basic Radiation Dose Limit = 100 mrem/yr

0Nuclide

(i)	t = 0.000E+00	1.000E-01	3.000E-01	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-228	1.235E+08	3.090E+07	1.298E+07	5.049E+06	2.931E+06	5.293E+06	1.717E+08	2.413E+10	*2.721E+14	*2.721E+14
Th-228	1.444E+06	1.498E+06	1.610E+06	2.074E+06	4.277E+06	5.384E+07	7.483E+10	*8.192E+14	*8.192E+14	*8.192E+14
Th-232	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	5.582E+04	*1.092E+05

*At specific activity limit

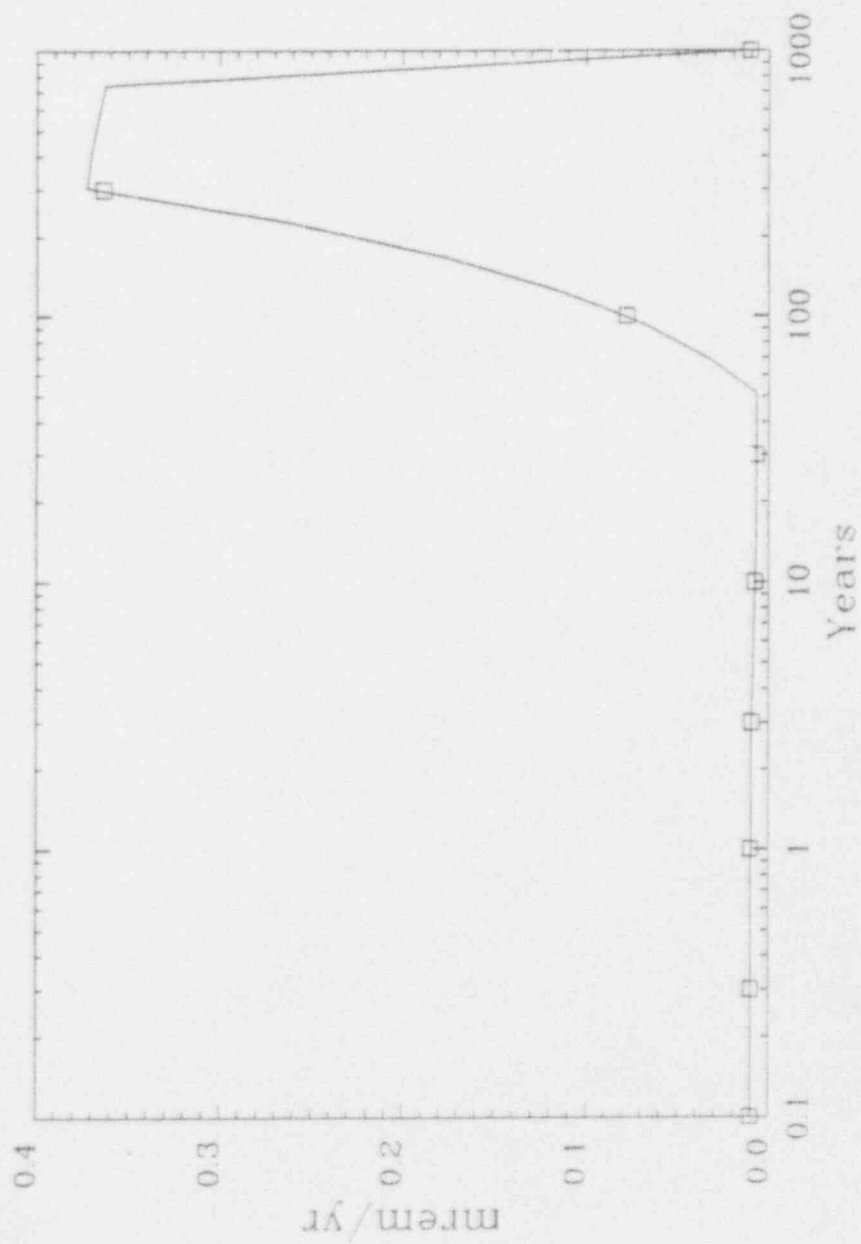
Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 390.7 ± 0.4 years
DSR(i,tmin) G(i,tmin) DSR(i,tmax) G(i,tmax)
(i) pCi/g (years) (pCi/g) (pCi/g)

Ra-228	1.320E+02	3.780 ± 0.004	3.493E-05	2.865E+06	0.000E+00	*2.721E+14
Th-228	1.320E+02	0.000E+00	6.923E-05	1.444E+06	0.000E+00	*8.192E+14
Th-232	1.320E+02	409.4 ± 0.4	2.567E-03	3.896E+04	2.437E-03	4.103E+04

*At specific activity limit

ATTACHMENT
AREA 3
RESRAD CODE RUN 3

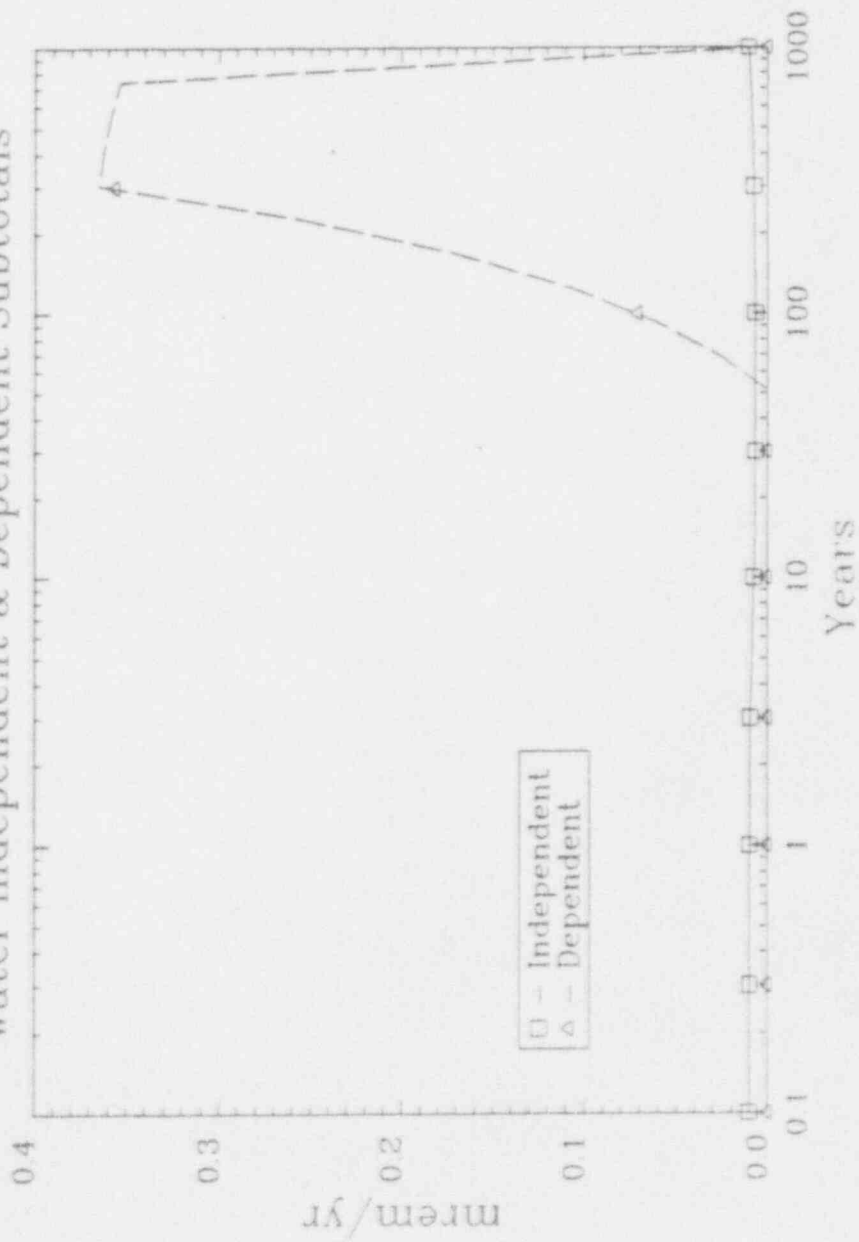
TOTAL DOSE: All Isotopes and Pathways Summed



WYMGRD24.DAT

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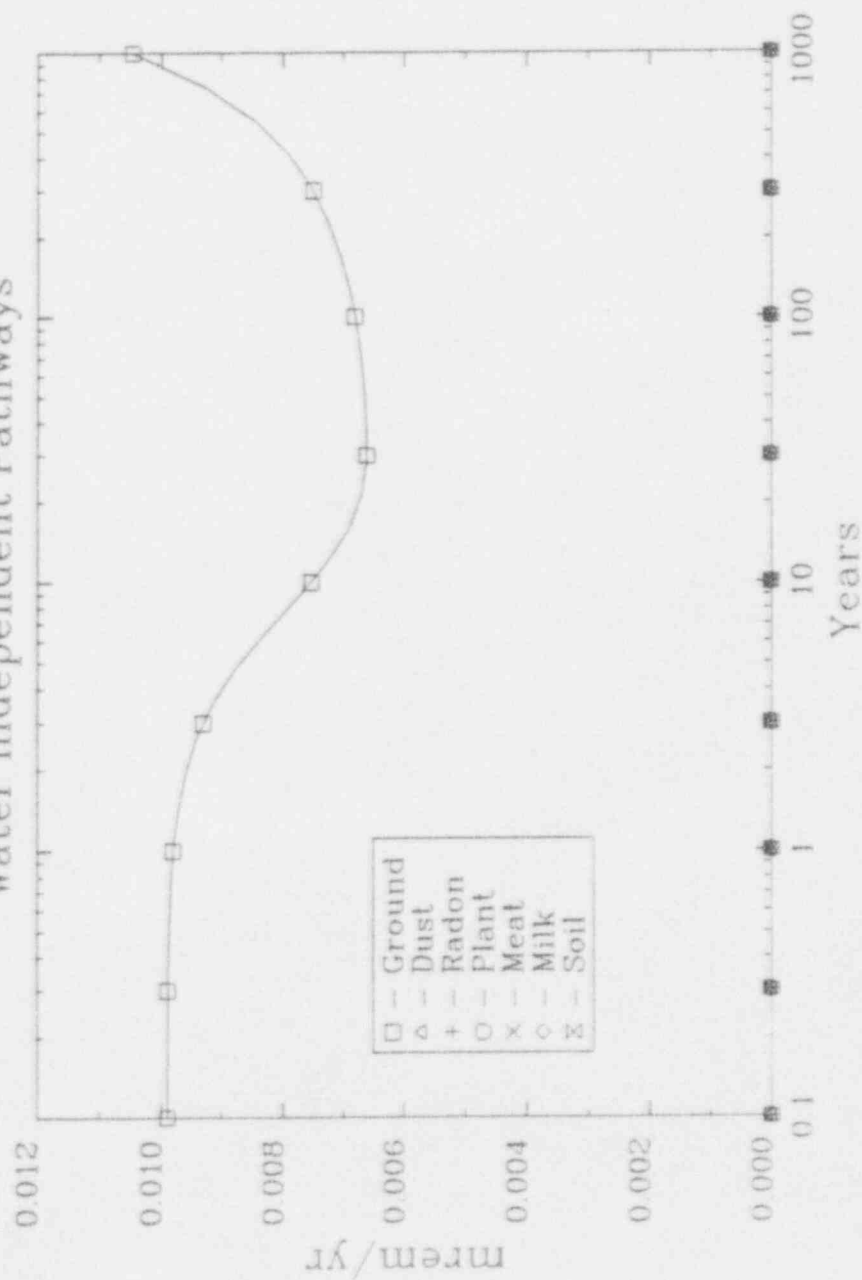
DOSE: All Isotopes Summed
Water Independent & Dependent Subtotals



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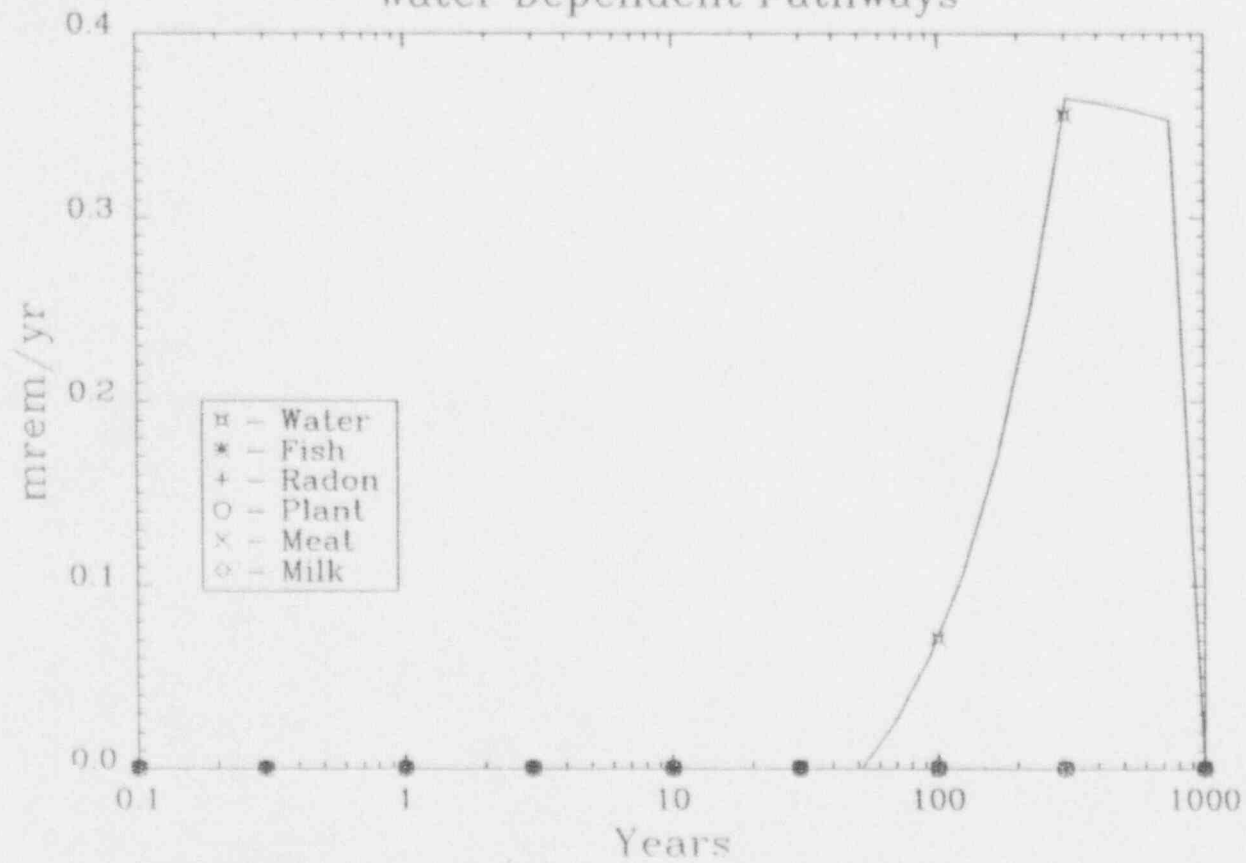
DOSE: All Isotopes Summed Water Independent Pathways



WYMGRED24.DAT

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DOSE: All Isotopes Summed
Water Dependent Pathways



WYMGRD24 DAT

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Time = 3.000E-01	11
Time = 1.000E+00	12
Time = 3.000E+00	13
Time = 1.000E+01	14
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Dose Conversion Factor (and Related) Parameter Summary

Menu	Parameter	Current Value	Default	Parameter Name
A-1	Ground external gamma, volume DCF's, (mrem/yr)/(pCi/cm**3):			
A-1	Ra-228+D, soil density = 1.0 g/cm**3	8.180E+00	8.180E+00	DCF1(1,1)
A-1	Ra-228+D, soil density = 1.8 g/cm**3	4.510E+00	4.510E+00	DCF1(1,2)
A-1	Th-228+D, soil density = 1.0 g/cm**3	1.330E+01	1.330E+01	DCF1(2,1)
A-1	Th-228+D, soil density = 1.8 g/cm**3	7.360E+00	7.360E+00	DCF1(2,2)
A-1	Th-232 , soil density = 1.0 g/cm**3	1.350E-03	1.350E-03	DCF1(3,1)
A-1	Th-232 , soil density = 1.8 g/cm**3	6.040E-04	6.040E-04	DCF1(3,2)
A-3	Depth factors, ground external gamma, dimensionless:			
A-3	Ra-228+D, soil density = 1.0 g/cm**3, thickness = .15 m	6.800E-01	6.800E-01	FD(1,1,1)
A-3	Ra-228+D, soil density = 1.0 g/cm**3, thickness = 0.5 m	9.700E-01	9.700E-01	FD(1,2,1)
A-3	Ra-228+D, soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,1)
A-3	Ra-228+D, soil density = 1.8 g/cm**3, thickness = .15 m	8.500E-01	8.500E-01	FD(1,1,2)
A-3	Ra-228+D, soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(1,2,2)
A-3	Ra-228+D, soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,2)
A-3	Th-228+D, soil density = 1.0 g/cm**3, thickness = .15 m	6.100E-01	6.100E-01	FD(2,1,1)
A-3	Th-228+D, soil density = 1.0 g/cm**3, thickness = 0.5 m	9.400E-01	9.400E-01	FD(2,2,1)
A-3	Th-228+D, soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(2,3,1)
A-3	Th-228+D, soil density = 1.8 g/cm**3, thickness = .15 m	7.500E-01	7.500E-01	FD(2,1,2)
A-3	Th-228+D, soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(2,2,2)
A-3	Th-228+D, soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(2,3,2)
A-3	Th-232 , soil density = 1.0 g/cm**3, thickness = .15 m	9.500E-01	9.500E-01	FD(3,1,1)

A-3	Th-232 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(3,2,1)
A-3	Th-232 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(3,3,1)
A-3	Th-232 , soil density = 1.8 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(3,1,2)
A-3	Th-232 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(3,2,2)
A-3	Th-232 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(3,3,2)
B-1	Dose conversion factors for dust inhalation, mrem/pCi:			
B-1	Ra-228+D	4.500E-03	4.500E-03	DCF2(1)
B-1	Th-228+D	3.100E-01	3.100E-01	DCF2(2)
B-1	Th-232	1.600E+00	1.600E+00	DCF2(3)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ra-228+D	1.200E-03	1.200E-03	DCF3(1)
D-1	Th-228+D	7.500E-04	7.500E-04	DCF3(2)
D-1	Th-232	2.800E-03	2.800E-03	DCF3(3)
D-34	Food transfer factors:			
D-34	Ra-228+D, plant/soil concentration ratio, dimensionless	1.400E-03	1.400E-03	RTF(1,1)
D-34	Ra-228+D, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	9.900E-04	9.900E-04	RTF(1,2)
D-34	Ra-228+D, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-04	2.000E-04	RTF(1,3)
D-34	Th-228+D, plant/soil concentration ratio, dimensionless	4.200E-03	4.200E-03	RTF(2,1)
D-34	Th-228+D, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
D-34	Th-228+D, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.500E-06	2.500E-06	RTF(2,3)

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 3, 4'CAP, BNI

File : WYMGRD24.DAT

Dose Conversion Factor (and Related) Parameter Summary (continued)

Menu	Parameter	Current Value	Default	Parameter Name
D-34	Th-232 , plant/soil concentration ratio, dimensionless	4.200E-03	4.200E-03	RTF(3,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(3,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.500E-06	2.500E-06	RTF(3,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ra-228+D, fish	5.000E+01	5.000E+01	BIOFAC(1,1)
D-5	Ra-228+D, crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(1,2)
D-5	Th-228+D, fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Th-228+D, crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(2,2)
D-5	Th-232 , fish	3.000E+01	3.000E+01	BIOFAC(3,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(3,2)

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 3, 4'CAP, BNI

File : WYMGRD24.DAT

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (if different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	1.340E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	6.000E-01	1.000E+00	---	THICKO
R011	Length parallel to aquifer flow (m)	1.460E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.000E+02	1.000E+02	---	BRLD
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Times for calculations (yr)	1.000E-01	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E-01	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+00	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+00	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+01	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	3.000E+02	3.000E+03	---	T(9)
R011	Times for calculations (yr)	1.000E+03	1.000E+04	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ra-228	1.320E+02	0.000E+00	---	S(1)
R012	Initial principal radionuclide (pCi/g): Th-228	1.320E+02	0.000E+00	---	S(2)
R012	Initial principal radionuclide (pCi/g): Th-232	1.320E+02	0.000E+00	---	S(3)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W(1)
R012	Concentration in groundwater (pCi/L): Th-228	not used	0.000E+00	---	W(2)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W(3)
R013	Cover depth (m)	1.200E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.780E+00	1.600E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	6.000E-05	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.060E+00	1.600E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	0.000E+00	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	3.200E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	5.550E+03	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	4.050E+00	5.300E+00	---	BCZ
R013	Humidity in air (g/cm**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	6.800E-01	6.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.120E+00	1.000E+00	---	PRECIP
R013	Irrigation mode	0.000E+00	2.000E-01	---	RI
R013	Rumoff coefficient	overhead	overhead	---	IDITCH
R013	Watershed area for nearby stream or pond (m**2)	2.000E-01	2.000E-01	---	RUNOFF
R013	Accuracy for water/soil computations	1.000E+06	1.000E+06	---	WAREA
R014	Density of saturated zone (g/cm**3)	1.000E-03	1.000E-03	---	EPS
R014	Saturated zone total porosity	1.780E+00	1.600E+00	---	DENSAQ
R014	Saturated zone effective porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	3.200E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic gradient	5.550E+03	1.000E+02	---	HCSZ
R014	Saturated zone b parameter	5.000E-02	2.000E-02	---	HGWT
R014	Water table drop rate (m/yr)	5.300E+00	5.300E+00	---	BSZ
R014	Well pump intake depth (m below water table)	6.000E-04	1.000E-03	---	WMT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	1.000E+01	1.000E+01	---	DWTRMT
R014	Individual's use of groundwater (m**3/yr)	MB	ND	---	MODEL
R014	Residual Radioactivity Program, Version 4.60	1.500E+02	1.500E+02	---	UM
Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 3, 4"CAP, BMI					
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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	1.500E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.780E+00	1.600E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	3.200E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	4.050E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	5.550E+03	1.000E+02	---	HCUZ(1)

Distribution coefficients for Ra-228

R016	Contaminated zone (cm**3/g)	7.000E+00	7.000E+01	---	DCACTC(1)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+00	7.000E+01	---	DCACTU(1,1)
R016	Saturated zone (cm**3/g)	7.000E+00	7.000E+01	---	DCACTS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.301E-02	REACH(1)

Distribution coefficients for Th-228

R016	Contaminated zone (cm**3/g)	6.000E+03	6.000E+04	---	DCACTC(2)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+03	6.000E+04	---	DCACTU(2,1)
R016	Saturated zone (cm**3/g)	6.000E+03	6.000E+04	---	DCACTS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.513E-05	REACH(2)

Distribution coefficients for Th-232

R016	Contaminated zone (cm**3/g)	6.000E+03	6.000E+04	---	DCACTC(3)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+03	6.000E+04	---	DCACTU(3,1)
R016	Saturated zone (cm**3/g)	6.000E+03	6.000E+04	---	DCACTS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.513E-05	REACH(3)

Inhalation rate (m**3/yr)

R017	Mass loading for inhalation (g/m**3)	8.400E+03	8.400E+03	---	INHALR
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Dilution length for airborne dust, inhalation (m)

R017	Exposure duration	2.000E-04	2.000E-04	---	MLINH
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Shielding factor, inhalation

R017	Shielding factor, external gamma	3.000E+00	3.000E+00	---	LM
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Fraction of time spent indoors

R017	Fraction of time spent outdoors (on site)	3.000E+01	3.000E+01	---	ED
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Shape factor, external gamma

R017	Fractions of annular areas within AREA:	4.000E-01	4.000E-01	---	SHF3
------	---	-----------	-----------	-----	------

Outer annular radius (m) = $\sqrt{(1/\pi)}$

R017	Outer annular radius (m) = $\sqrt{(10/\pi)}$	7.000E-01	7.000E-01	---	SHF1
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Outer annular radius (m) = $\sqrt{(20/\pi)}$

R017	Outer annular radius (m) = $\sqrt{(50/\pi)}$	5.000E-01	5.000E-01	---	FIND
------	--	-----------	-----------	-----	------

Outer annular radius (m) = $\sqrt{(100/\pi)}$

R017	Outer annular radius (m) = $\sqrt{(200/\pi)}$	2.500E-01	2.500E-01	---	FOTD
------	---	-----------	-----------	-----	------

Outer annular radius (m) = $\sqrt{(500/\pi)}$

R017	Outer annular radius (m) = $\sqrt{(1000/\pi)}$	9.600E-01	1.000E+00	---	FST
------	--	-----------	-----------	-----	-----

Outer annular radius (m) = $\sqrt{(1.E+04/\pi)}$

R017	Outer annular radius (m) = $\sqrt{(1.E+05/\pi)}$	not used	1.000E+00	---	FRACA(1)
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Outer annular radius (m) = $\sqrt{(1.E+06/\pi)}$

R017	Outer annular radius (m) = $\sqrt{(1.E+06/\pi)}$	not used	1.000E+00	---	FRACA(2)
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Fruits, vegetables and grain consumption (kg/yr)

R018	Residual Radioactivity Program, Version 4.60	1.600E+02	1.600E+02	---	FRACA(3)
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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 3, 4-CAP, BNI
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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (if different from user input)	Parameter Name
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DWI
R018	Fraction of drinking water from site	1.000E+00	1.000E+00	---	FDW
R018	Fraction of aquatic food from site	5.000E-01	5.000E-01	---	FR9

R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LF15
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LF16
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LM15
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LM16
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DR00T
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	0.000E+00	1.000E+00	---	FGWIR
R021	Thickness of building foundation (m)	1.500E-01	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	2.400E+00	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	4.000E-01	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	1.000E-01	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	1.000E-01	1.000E-01	---	PH20CV
R021	Volumetric water content of the foundation	5.000E-02	5.000E-02	---	PH20FL
R021	Diffusion coefficient for radon gas (m/sec): in cover material	2.000E-06	2.000E-06	---	DIFCV
R021	in foundation material	2.000E-08	2.000E-08	---	DIFFL
R021	in contaminated zone soil	2.000E-06	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	2.000E+00	2.000E+00	---	HMX
R021	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R021	Average building air exchange rate (1/hr)	1.000E+00	1.000E+00	---	REXG
R021	Height of the building (room) (m)	2.500E+00	2.500E+00	---	HRM
R021	Building interior area factor	0.000E+00	0.000E+00	---	FAT
R021	Building depth below ground surface (m)	1.000E+00	1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.000E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	1.000E-01	1.000E-01	---	EMANA(2)

code computed (time dependent)

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	active

Contaminated Zone Dimensions Initial Soil Concentrations, pCi/g

Area: 134.00 square meters Ra-228 1.320E+02
Thickness: 0.60 meters Th-228 1.320E+02

Cover Depth: 1.20 meters

74-232

1.320E+02

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 100 mrem/yr

Total Mixture Sum $M(t)$ = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E-01	3.000E-01	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TOOSE(t):	9.896E-03	9.895E-03	9.886E-03	9.801E-03	9.297E-03	7.536E-03	6.620E-03	7.772E-02	3.634E-01	1.046E-02
M(t):	9.896E-05	9.895E-05	9.886E-05	9.801E-05	9.297E-05	7.536E-05	6.620E-05	7.772E-04	3.634E-03	1.046E-04
Maximum TOOSE(t):	4.955E-01	mrem/yr	at t = 390.7 ± 0.4 years							

Total Dose Contributions TDOSE(*i*,*p*,*t*) for Individual Radionuclides (*i*) and Pathways (*p*)

As mrem/yr and Fraction of Total Dose At t = 390.7 years

Water Independent Pathways

[illegible]

Total Dose Contributions TDose(i,p,t) for Individual Radionuclides (i) and Pathways (p)

This is mrem/yr and Fraction of Total Dose At $t = 390.7$ years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	4.875E-01	0.9839	1.239E-04	0.0003	4.594E-06	0.0000	0.000E+00	0.0000	2.043E-05	0.0000	1.875E-05	0.0000	4.925E-01	1.0000
Total	4.875E-01	0.9839	1.239E-04	0.0003	4.594E-06	0.0000	0.000E+00	0.0000	2.043E-05	0.0000	1.875E-05	0.0000	4.925E-01	1.0000

*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 3. 4'CAP, BNI

File : WYMGD24.DAT

Total Dose Contributions TDose(i,p,t) for Individual Radionuclides (i) and Pathways (p)

mrem/yr and Fraction of Total Dose At $t = 0.000E+00$ years

Water Independent Pathways

[illegible]

Total Dose Contributions TD05E(i,p,t) for Individual Radionuclides (i) and Pathways (p)

mrem/yr and Fraction of Total Dose At $t = 0.000E+00$ years

Water Dependent Pathways

[illegible]

File : WTMGRD24.DAT

As mrem/yr and Fraction of Total Dose At $t = 1.000E-01$ years

Water Independent Pathways

9

As mrem/yr and Fraction of Total Dose At t = 1.000E-01 years

Water Dependent Pathways

File : WYMGD24.DAT

As mrem/yr and Fraction of Total Dose At $t = 3.000E-01$ years

Water Independent Pathways

3

As mrem/yr and Fraction of Total Dose At t = 3.000E-01 years

Water Dependent Pathways

[illegible]

*sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 3, 4' CAP, BN1

File : WYMGRD24.DAT

Total Dose Contributions $TD_{DOSE}(i,p,t)$ for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Independent Pathways

[illegible]

Total Dose Contributions $TDOSE(i,p,t)$ for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.798E-03	0.2855
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.812E-03	0.6950
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.909E-04	0.0195
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.801E-03	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 3, 4'CAP, BNI

File : WYMGRD24.DAT

Total Dose Contributions $TD_{DOSE}(i,p,t)$ for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways

[illegible]

Total Dose Contributions $TD_{DOSE}(i,p,t)$ for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

[illegible]

0*Sum of all water independent and dependent pathways.

Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 3, 4'CAP. BNI

File : WYMG24.DAT

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

0

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

0*Sum of all water independent and dependent pathways.

Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 3, 4'CAP. BNI

File : WYMGD24.DAT

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

10

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

[illegible]

Ra-228	1.006E-22	0.0000	3.157E-26	0.0000	1.681E-25	0.0000	0.000E+00	0.0000	2.081E-26	0.0000	0.000E+00	0.0000	1.008E-22	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	3.558E-01	0.9790	9.033E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	1.458E-05	0.0000	1.376E-05	0.0000	3.634E-01	1.0000
Total	3.558E-01	0.9790	9.033E-05	0.0002	1.681E-25	0.0000	0.000E+00	0.0000	1.458E-05	0.0000	1.376E-05	0.0000	3.634E-01	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 3, 4'CAP, BNI

File : WYMGRD24.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Radio- Nuclide	Ground		Dust		Water Independent Pathways				Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.046E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.046E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Radio- Nuclide	Water		Fish		Water Dependent Pathways				Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.046E-02	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.046E-02	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 3, 4'CAP, BNI

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Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

OParent (i)	Product (j)	Branch Fraction	DSR(j,t) (mrem/yr)/(pCi/g)											
			t = 0.000E+00	1.000E-01	3.000E-01	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03		
Ra-228	Ra-228	1.000E+00	8.666E-07	8.509E-07	8.204E-07	7.220E-07	5.011E-07	1.396E-07	3.621E-09	1.018E-14	1.405E-30	0.000E+00		
Ra-228	Th-228		0.000E+00	2.613E-06	7.424E-06	2.048E-05	3.601E-05	2.008E-05	6.199E-07	6.428E-09	7.638E-25	0.000E+00		
Ra-228	DSR(j)		8.666E-07	3.464E-06	8.244E-06	2.120E-05	3.652E-05	2.022E-05	6.235E-07	6.428E-09	7.638E-25	0.000E+00		
Th-228	Th-228	1.000E+00	7.411E-05	7.147E-05	6.648E-05	5.161E-05	2.503E-05	1.988E-06	1.430E-09	1.430E-20	0.000E+00	0.000E+00		
Th-232	Th-232	1.000E+00	1.732E-22	1.732E-22	1.733E-22	1.735E-22	1.742E-22	1.767E-22	1.841E-22	2.124E-22	3.197E-22	1.337E-21		
Th-232	Ra-228		0.000E+00	1.033E-08	3.045E-08	9.535E-08	2.412E-07	4.812E-07	5.783E-07	5.190E-04	2.697E-03	1.115E-06		
Th-232	Th-228		0.000E+00	1.587E-08	1.377E-07	1.351E-06	8.648E-06	3.440E-05	4.895E-05	6.980E-05	5.609E-05	7.815E-05		
Th-232	DSR(j)		1.732E-22	2.620E-08	1.682E-07	1.447E-06	8.889E-06	3.488E-05	4.953E-05	5.888E-04	2.753E-03	7.927E-05		

The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 100 mrem/yr

0Nuclide

(i)	t = 0.000E+00	1.000E-01	3.000E-01	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ra-228	1.154E+08	2.887E+07	1.213E+07	4.717E+06	2.739E+06	5.345E+05	1.604E+08	1.556E+10	*2.721E+14	*2.721E+14
Th-228	1.369E+06	1.399E+06	1.504E+06	1 over 1.000E+05	1 over 1.000E+05	5.030E+07	6.991E+10	*8.192E+14	*8.192E+14	*8.192E+14
Th-232	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05

*At specific activity limit

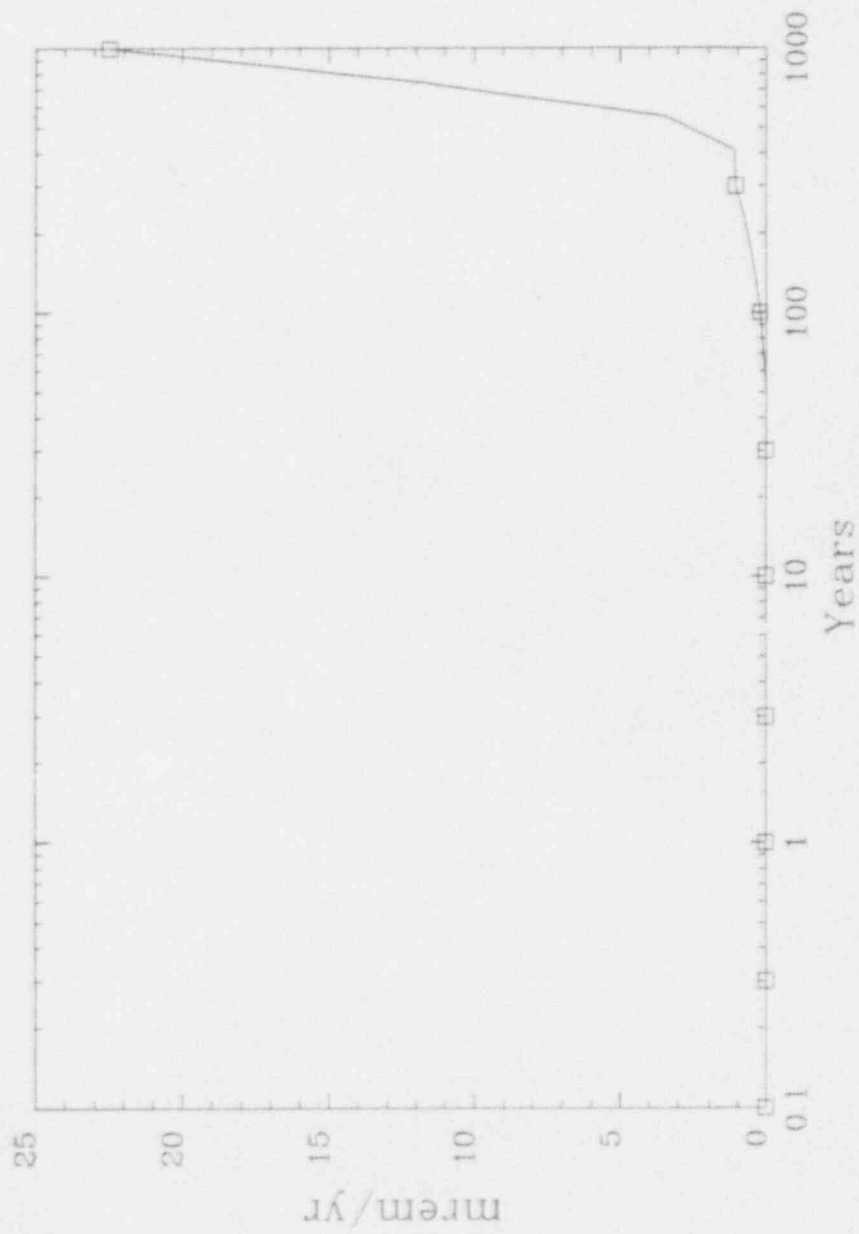
Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
 and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
 at tmin = time of minimum single radionuclide soil guideline
 and at tmax = time of maximum total dose = 390.7 ± 0.4 years
 DSR(i,tmin) G(i,tmin) DSR(i,tmax) G(i,tmax)
 (i) (pCi/g) (pCi/g)

Ra-228	1.320E+02	3.780 ± 0.004	3.739E-05	2.675E+06	0.000E+00	*2.721E+14
Th-228	1.320E+02	0.000E+00	7.411E-05	1.369E+06	0.000E+00	*8.192E+14
Th-232	1.320E+02	409.4 ± 0.4	3.954E-03	2.529E+04	3.754E-03	2.664E+04

*At specific activity limit

ATTACHMENT
AREA 1
RESRAD CODE RUN 4

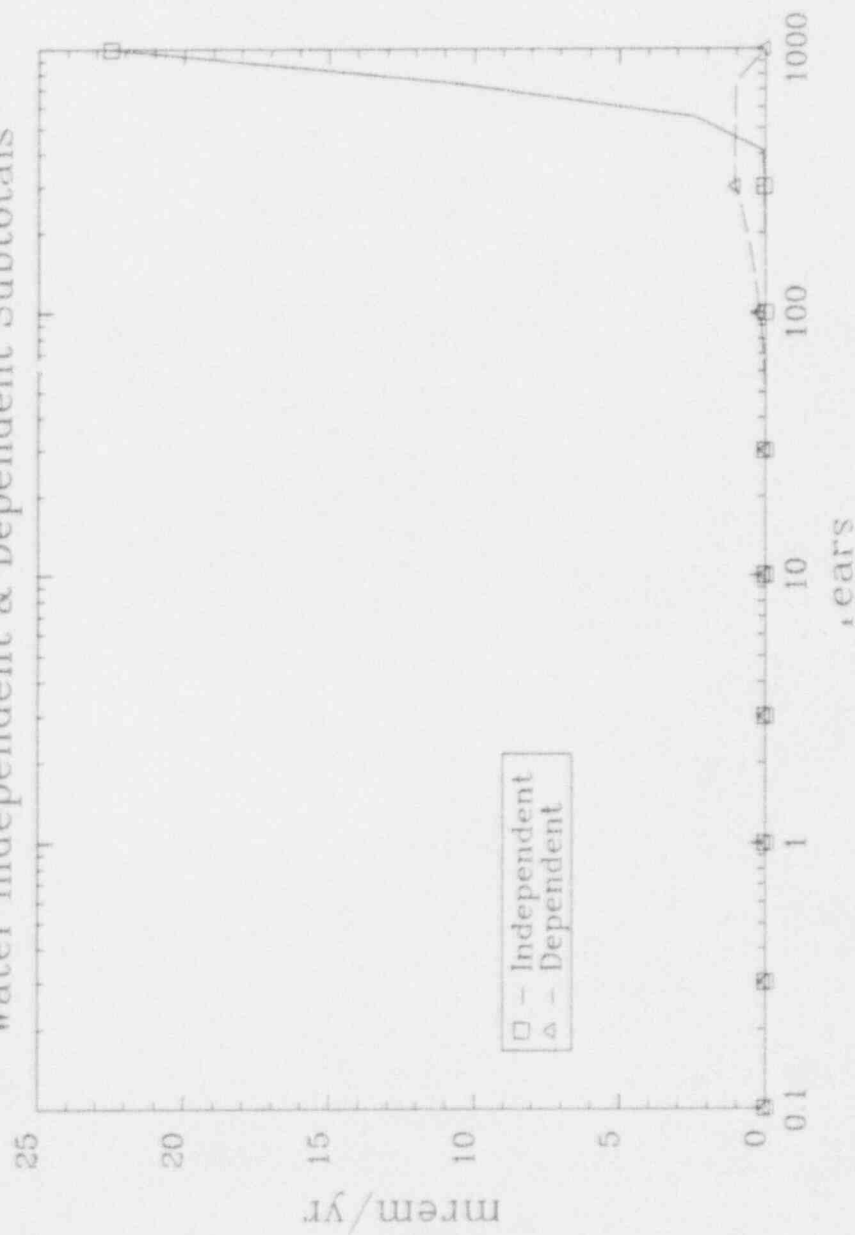
TOTAL DOSE: All Isotopes and Pathways Summed



WYMGRD16.DAT

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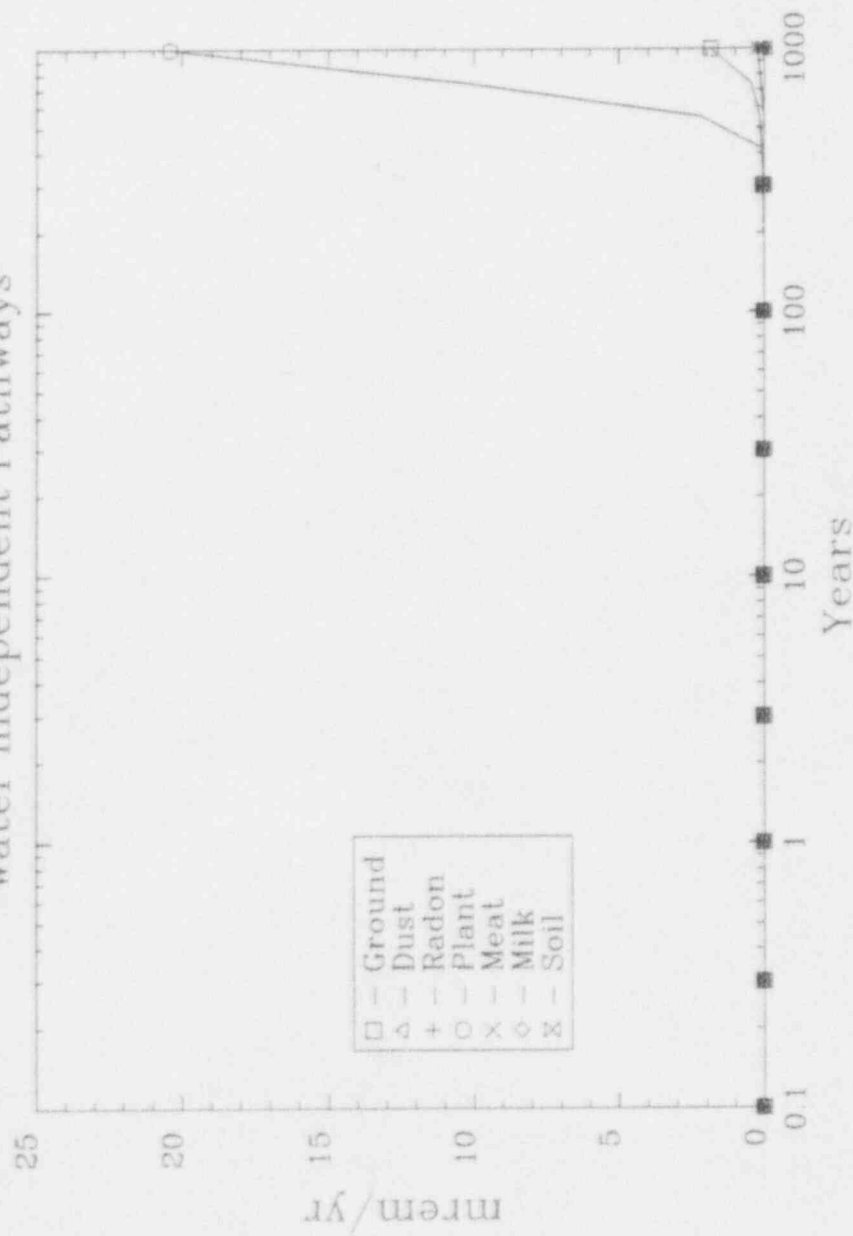
DOSE: All Isotopes Summed
Water Independent & Dependent Subtotals



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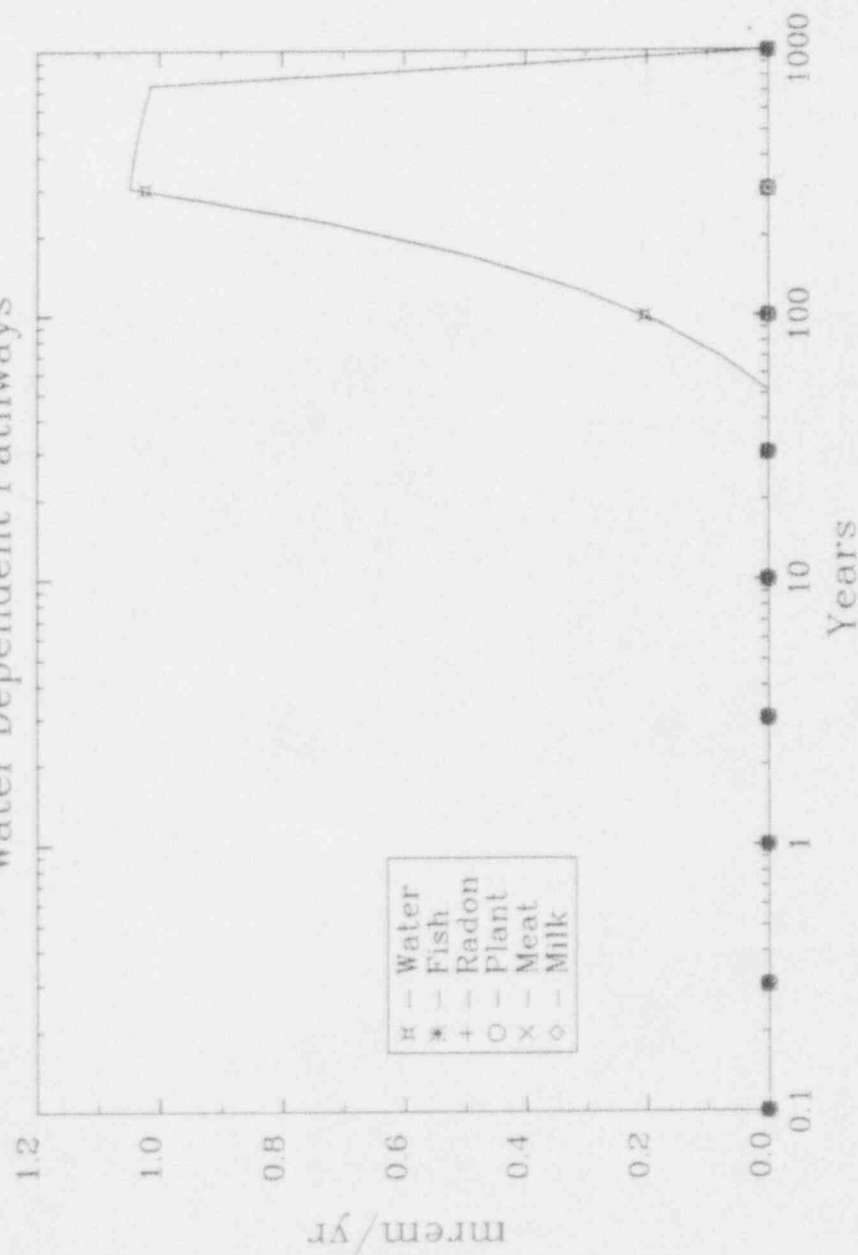
DOSE: All Isotopes Summed Water Independent Pathways



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DOSE: All Isotopes Summed Water Dependent Pathways



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Time = 3.000E-01	11
Time = 1.000E+00	12
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Dose Conversion Factor (and Related) Parameter Summary

Menu	Parameter	Current Value	Default	Parameter Name
A-1	Ground external gamma, volume DCF's, (mrem/yr)/(pCi/cm**3):			
A-1	Ra-228+D, soil density = 1.0 g/cm**3	8.180E+00	8.180E+00	DCF1(1,1)
A-1	Ra-228+D, soil density = 1.8 g/cm**3	4.510E+00	4.510E+00	DCF1(1,2)
A-1	Th-228+D, soil density = 1.0 g/cm**3	1.330E+01	1.330E+01	DCF1(2,1)
A-1	Th-228+D, soil density = 1.8 g/cm**3	7.360E+00	7.360E+00	DCF1(2,2)
A-1	Th-232 , soil density = 1.0 g/cm**3	1.350E-03	1.350E-03	DCF1(3,1)
A-1	Th-232 , soil density = 1.8 g/cm**3	6.040E-04	6.040E-04	DCF1(3,2)
A-3	Depth factors, ground external gamma, dimensionless:			
A-3	Ra-228+D, soil density = 1.0 g/cm**3, thickness = .15 m	6.800E-01	6.800E-01	FD(1,1,1)
A-3	Ra-228+D, soil density = 1.0 g/cm**3, thickness = 0.5 m	9.700E-01	9.700E-01	FD(1,2,1)
A-3	Ra-228+D, soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,1)
A-3	Ra-228+D, soil density = 1.8 g/cm**3, thickness = .15 m	8.500E-01	8.500E-01	FD(1,1,2)
A-3	Ra-228+D, soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(1,2,2)
A-3	Ra-228+D, soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,2)
A-3	Th-228+D, soil density = 1.0 g/cm**3, thickness = .15 m	6.100E-01	6.100E-01	FD(2,1,1)
A-3	Th-228+D, soil density = 1.0 g/cm**3, thickness = 0.5 m	9.400E-01	9.400E-01	FD(2,2,1)
A-3	Th-228+D, soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(2,3,1)
A-3	Th-228+D, soil density = 1.8 g/cm**3, thickness = .15 m	7.500E-01	7.500E-01	FD(2,1,2)
A-3	Th-228+D, soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(2,2,2)
A-3	Th-228+D, soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(2,3,2)
A-3	Th-232 , soil density = 1.0 g/cm**3, thickness = .15 m	7.500E-01	7.500E-01	FD(3,1,1)

A-3	Th-232 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(3,2,1)
A-3	Th-232 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(3,3,1)
A-3	Th-232 , soil density = 1.8 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(3,1,2)
A-3	Th-232 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(3,2,2)
A-3	Th-232 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(3,3,2)
B-1	Dose conversion factors for dust inhalation, mrem/pCi:			
B-1	Ra-228+D	4.500E-03	4.500E-03	DCF2(1)
B-1	Th-228+D	3.100E-01	3.100E-01	DCF2(2)
B-1	Th-232	1.600E+00	1.600E+00	DCF2(3)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ra-228+D	1.200E-03	1.200E-03	DCF3(1)
D-1	Th-228+D	7.500E-04	7.500E-04	DCF3(2)
D-1	Th-232	2.800E-03	2.800E-03	DCF3(3)
D-34	Food transfer factors:			
D-34	Ra-228+D, plant/soil concentration ratio, dimensionless	1.400E-03	1.400E-03	RTF(1,1)
D-34	Ra-228+D, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	9.900E-04	9.900E-04	RTF(1,2)
D-34	Ra-228+D, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-04	2.000E-04	RTF(1,3)
D-34	Th-228+D, plant/soil concentration ratio, dimensionless	4.200E-03	4.200E-03	RTF(2,1)
D-34	Th-228+D, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
D-34	Th-228+D, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.500E-06	2.500E-06	RTF(2,3)

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Summary : DOSF ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1,4' COVER, NIC,BNI
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Dose Conversion Factor (and Related) Parameter Summary (continued)

Menu	Parameter	Current Value	Default	Parameter Name
D-34	Th-232 , plant/soil concentration ratio, dimensionless	4.200E-03	4.200E-03	RTF(3,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(3,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.500E-06	2.500E-06	RTF(3,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ra-228+D, fish	5.000E+01	5.000E+01	BIOFAC(1,1)
D-5	Ra-228+D, crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(1,2)
D-5	Th-228+D, fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Th-228+D, crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(2,2)
D-5	Th-232 , fish	3.000E+01	3.000E+01	BIOFAC(3,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(3,2)

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1,4' COVER, NIC,BNI
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Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	3.850E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	6.000E-01	1.000E+00	---	THICKD
R011	Length parallel to aquifer flow (m)	4.200E+01	1.000E+02	---	LCZPAG
R011	Basic radiation dose limit (mrem/yr)	1.000E+02	1.000E+02	---	BRLD
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI

		1.000E-01	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E-01	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+00	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+00	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+01	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	3.000E+02	3.000E+03	---	T(9)
R011	Times for calculations (yr)	1.000E+03	1.000E+04	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ra-228	1.320E+02	0.000E+00	---	S(1)
R012	Initial principal radionuclide (pCi/g): Th-228	1.320E+02	0.000E+00	---	S(2)
R012	Initial principal radionuclide (pCi/g): Th-232	1.320E+02	0.000E+00	---	S(3)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	M(1)
R012	Concentration in groundwater (pCi/L): Th-228	not used	0.000E+00	---	M(2)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	M(3)
R013	Cover depth (m)	1.200E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.780E+00	1.600E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	6.000E-04	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.060E+00	1.600E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	0.000E+00	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	3.200E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	5.550E+03	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	4.050E+00	5.300E+00	---	BCZ
R013	Humidity in air (g/cm**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	6.800E-01	6.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.120E+00	1.000E+00	---	PRECIP
R013	Irrigation mode	0.000E+00	2.000E-01	---	RI
R013	Runoff coefficient	overhead	overhead	---	IDITCH
R013	Watershed area for nearby stream or pond (m**2)	2.000E-01	2.000E-01	---	RUNOFF
R013	Accuracy for water/soil computations	1.000E+06	1.000E+06	---	WAREA
R013		1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.780E+00	1.600E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TFsZ
R014	Saturated zone effective porosity	3.200E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.550E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	5.000E-02	2.000E-02	---	HGMT
R014	Saturated zone b parameter	4.050E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	6.000E-04	1.000E-03	---	VMT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBMT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	MB	ND	---	MODEL
R014	Individual's use of groundwater (m**3/yr)	1.500E+02	1.500E+02	---	UW

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (if different from user input)	Parameter Name
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	1.500E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.780E+00	1.600E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	3.200E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	4.050E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	5.550E+03	1.000E+02	---	HCUZ(1)

Distribution coefficients for Ra-228

R016	Contaminated zone (cm**3/g)	7.000E+00	7.000E+01	---	DCACT(1)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+00	7.000E+01	---	DCACT(1,1)
R016	Saturated zone (cm**3/g)	7.000E+00	7.000E+01	---	DCACTS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.301E-02	REACH(1)

Distribution coefficients for Th-228

R016	Contaminated zone (cm**3/g)	6.000E+03	6.000E+04	---	DCACT(2)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+03	6.000E+04	---	DCACT(2,1)
R016	Saturated zone (cm**3/g)	6.000E+03	6.000E+04	---	DCACTS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.513E-05	REACH(2)

Distribution coefficients for Th-232

R016	Contaminated zone (cm**3/g)	6.000E+03	6.000E+04	---	DCACT(3)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+03	6.000E+04	---	DCACT(3,1)
R016	Saturated zone (cm**3/g)	6.000E+03	6.000E+04	---	DCACTS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.513E-05	REACH(3)

Inhalation rate (m**3/yr)
Mass loading for inhalation (g/m**3)
Dilution length for airborne dust, inhalation (m)

R017	Exposure duration	8.400E+03	8.400E+03	---	INHALR
R017	Shielding factor, inhalation	2.000E-04	2.000E-04	---	MLINH
R017	Fraction of time spent indoors	3.000E+00	3.000E+00	---	LM
R017	Fraction of time spent outdoors (on site)	3.000E+01	3.000E+01	---	ED
R017	Shape factor, external gamma	4.000E-01	4.000E-01	---	SHF3
R017	Fractions of annular areas within AREA:	7.000E-01	7.000E-01	---	SHF1
R017	Outer annular radius (m) = $\sqrt{(1/\pi)}$	5.000E-01	5.000E-01	---	FIND
R017	Outer annular radius (m) = $\sqrt{(10/\pi)}$	2.500E-01	2.500E-01	---	FOTD
R017	Outer annular radius (m) = $\sqrt{(20/\pi)}$	8.900E-01	1.000E+00	---	FS1
R017	Outer annular radius (m) = $\sqrt{(50/\pi)}$	not used	1.000E+00	---	FRACA(1)
R017	Outer annular radius (m) = $\sqrt{(100/\pi)}$	not used	1.000E+00	---	FRACA(2)
R017	Outer annular radius (m) = $\sqrt{(200/\pi)}$	not used	1.000E+00	---	FRACA(3)
R017	Outer annular radius (m) = $\sqrt{(500/\pi)}$	not used	1.000E+00	---	FRACA(4)
R017	Outer annular radius (m) = $\sqrt{(1000/\pi)}$	not used	1.000E+00	---	FRACA(5)
R017	Outer annular radius (m) = $\sqrt{(5000/\pi)}$	not used	1.000E+00	---	FRACA(6)
R017	Outer annular radius (m) = $\sqrt{(1.E+04/\pi)}$	not used	1.000E+00	---	FRACA(7)
R017	Outer annular radius (m) = $\sqrt{(1.E+05/\pi)}$	not used	1.000E+00	---	FRACA(8)
R017	Outer annular radius (m) = $\sqrt{(1.E+06/\pi)}$	not used	1.000E+00	---	FRACA(9)
R017	Outer annular radius (m) = $\sqrt{(1.E+07/\pi)}$	not used	1.000E+00	---	FRACA(10)
R017	Outer annular radius (m) = $\sqrt{(1.E+08/\pi)}$	not used	1.000E+00	---	FRACA(11)
R017	Outer annular radius (m) = $\sqrt{(1.E+09/\pi)}$	not used	1.000E+00	---	FRACA(12)

Fruits, vegetables and grain consumption (kg/yr)

R018	Residual Radioactivity Program, Version 4.60	1.600E+02	1.600E+02	---	DIET(1)
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DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1, 4' COVER, NTC,BNI

File : WYNGRD16.DAT

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (if different from user input)	Parameter Name
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DWI
R018	Fraction of drinking water from site	1.000E+00	1.000E+00	---	FDW
R018	Fraction of aquatic food from site	5.000E-01	5.000E-01	---	FRQ

R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LF15
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LF16
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LM15
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LM16
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGDW
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	0.000E+00	1.000E+00	---	FGWIR
R021	Thickness of building foundation (m)	1.500E-01	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	2.400E+00	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	4.000E-01	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	1.000E-01	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	1.000E-01	1.000E-01	---	PH2OCV
R021	Volumetric water content of the foundation	5.000E-02	5.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec): in cover material	2.000E-06	2.000E-06	---	DIFCV
R021	in foundation material	2.000E-08	2.000E-08	---	DIFFL
R021	in contaminated zone soil	2.000E-06	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	2.000E+00	2.000E+00	---	HMX
R021	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R021	Average building air exchange rate (1/hr)	1.000E+00	1.000E+00	---	REXG
R021	Height of the building (room) (m)	2.500E+00	2.500E+00	---	HRM
R021	Building interior area factor	0.000E+00	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	1.000E+00	1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.000E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	1.000E-01	1.000E-01	---	EMANA(2)

code computed (time dependent)

Residual Radioactivity Program, Version 4.60 04/08/93 14:35 Page 7
 Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1,4' COVER, NIC,BNI
 File : WYMGRT16.DAT

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	active

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 Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1,4' COVER, NIC,BNI
 File : WYMGRT16.DAT

Contaminated Zone Dimensions

Area: 385.00 square meters
 Thickness: 0.60 meters

Initial Soil Concentrations, pCi/g

Ra-228 1.320E+02
 Th-228 1.320E+02

Cover Depth: 1.20 meters

Th-232 1.320E+02

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 100 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years): 0.000E+00 1.000E-01 3.000E-01 1.000E+00 3.000E+00 1.000E+01 3.000E+01 1.000E+02 3.000E+02 1.000E+03

TDOSE(t): 1.169E-02 1.170E-02 1.170E-02 1.164E-02 1.115E-02 9.358E-03 9.078E-03 2.170E-01 1.062E+00 2.250E+01

M(t): 1.169E-04 1.170E-04 1.170E-04 1.164E-04 1.115E-04 9.358E-05 9.078E-05 2.170E-03 1.062E-02 2.250E-01

Maximum TDOSE(t): 2.250E+01 mrem/yr at t = 1.000E+03 years

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1,4' COVER, NIC,BNI

File : WYMGRD16.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Independent Pathways

Radio- Nuclide	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	1.352E-04	0.0116	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	1.156E-02	0.9884	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.701E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.169E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.352E-04	0.0116
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.156E-02	0.9884
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.701E-20	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.169E-02	1.0000

*Sum of all water independent and dependent pathways.

Residual Radioactivity Program, Version 4.60 04/08/93 14:35 Page 10

Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1,4' COVER, NIC,BNI

File : WYMGRD16.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E-01 years

Water Independent Pathways

Radio- Nuclide	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	5.406E-04	0.0462	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	1.115E-02	0.9534	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	4.089E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.170E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E-01 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.406E-04	0.0462
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.115E-02	0.9534
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.089E-06	0.0003
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.170E-02	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1,4' COVER, NIC,BNI

File : WYMGRD16.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E-01 years

Radio- Nuclide	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	1.288E-03	0.1101	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	1.039E-02	0.8877	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.627E-05	0.0022	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.170E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E-01 years

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.288E-03	0.1101
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.039E-02	0.8877
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.627E-05	0.0022
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.170E-02	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1,4' COVER, NIC,BNI

File : WYMGRD16.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Radio- Nuclide	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	3.323E-03	0.2855	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	8.090E-03	0.6950	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.268E-04	0.0195	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.164E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

0*Sum of all water independent and dependent pathways.

0

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.323E-03	0.2855
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.090E-03	0.6950
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.268E-04	0.0195
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.164E-02	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1,4' COVER, NIC,BNI

File : WYMGRD16.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways

Radio- Nuclide	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	5.781E-03	0.5185	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	3.962E-03	0.3553	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.407E-03	0.1262	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.115E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.781E-03	0.5185
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.962E-03	0.3553
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.407E-03	0.1262
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.115E-02	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1,4' COVER, NIC,BNI

File : WYMGRD16.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Independent Pathways

Radio- Nuclide	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	3.314E-03	0.3542	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	3.258E-04	0.0348	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	5.718E-03	0.6110	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	9.358E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Dependent Pathways

	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.314E-03	0.3542
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.258E-04	0.0348
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.718E-03	0.6110
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.358E-03	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1,4' COVER, NIC,BNI

File : WYMGD16.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	1.128E-04	0.0124	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	2.588E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	8.965E-03	0.9875	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	9.078E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.128E-04	0.0124
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.588E-07	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.965E-03	0.9875
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.078E-03	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1,4' COVER, NIC,BNI

File : WYMGD16.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	4.446E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	3.655E-18	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.323E-02	0.0610	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.323E-02	0.0610	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

0 Water Independent Pathways

0	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Radio-														
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	2.432E-06	0.0000	7.634E-10	0.0000	4.064E-09	0.0000	0.000E+00	0.0000	1.446E-09	0.0000	3.378E-12	0.0000	2.439E-06	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.655E-18	0.0000
Th-232	2.036E-01	0.9385	5.212E-05	0.0002	1.187E-05	0.0001	0.000E+00	0.0000	2.736E-05	0.0001	2.185E-05	0.0001	2.170E-01	1.0000
Total	2.036E-01	0.9385	5.213E-05	0.0002	1.188E-05	0.0001	0.000E+00	0.0000	2.736E-05	0.0001	2.185E-05	0.0001	2.170E-01	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1,4' COVER, NIC,BNI

File : WYMGRD16.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways

0	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
Radio-														
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	1.589E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	3.934E-02	0.0370	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	3.934E-02	0.0370	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Dependent Pathways

0	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Radio-														
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	2.890E-22	0.0000	9.070E-26	0.0000	4.829E-25	0.0000	0.000E+00	0.0000	1.718E-25	0.0000	4.014E-28	0.0000	2.899E-22	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.022E+00	0.9625	2.595E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	1.203E-04	0.0001	1.136E-04	0.0001	1.062E+00	1.0000
Total	1.022E+00	0.9625	2.595E-04	0.0002	4.829E-25	0.0000	0.000E+00	0.0000	1.203E-04	0.0001	1.136E-04	0.0001	1.062E+00	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1,4' COVER, NIC,BNI

File : WYMGRD16.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways

0	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
Radio-														
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.850E+00	0.0822	0.000E+00	0.0000	0.070E+00	0.0000	2.041E+01	0.9072	2.364E-01	0.0105	1.015E-03	0.0000	0.000E+00	0.0000
Total	1.850E+00	0.0822	0.000E+00	0.0000	0.000E+00	0.0000	2.041E+01	0.9072	2.364E-01	0.0105	1.015E-03	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0500	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.250E+01	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.250E+01	1.0000

0*Sum of all water independent and dependent pathways.
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 Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 1,4' COVER, NIC,BNI
 File : WYMGDR16.DAT

Dose/Source Ratios Summed Over All Pathways													
Parent and Progeny Principal Radionuclide Contributions Indicated													
OParent	Product	Branch	DSR(j,t) (mrem/yr)/(pCi/g)										
(i)	(j)	Fraction	t = 0.000E+00	1.000E-01	3.000E-01	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
Ra-228	Ra-228	1.000E+00	1.024E-06	1.006E-06	9.714E-07	8.589E-07	6.042E-07	1.764E-07	5.236E-09	2.358E-14	1.250E-29	0.000E+00	
Ra-228	Th-228		0.000E+00	3.089E-06	8.786E-06	2.432E-05	4.319E-05	2.493E-05	8.496E-07	1.847E-08	2.196E-24	0.000E+00	
Ra-228	32SR(j)		1.024E-06	4.095E-06	9.757E-06	2.518E-05	4.380E-05	2.511E-05	8.548E-07	1.847E-08	2.196E-24	0.000E+00	
Th-228	Th-228	1.000E+00	8.757E-05	8.450E-05	7.068E-05	6.128E-05	3.002E-05	2.468E-06	1.960E-09	2.769E-20	0.000E+00	0.000E+00	
Th-232	Th-232	1.000E+00	2.046E-22	2.051E-22	2.059E-22	2.090E-22	2.180E-22	2.527E-22	3.856E-22	1.691E-21	1.154E-19	1.233E-01	
Th-232	Ra-228		0.000E+00	1.222E-08	3.605E-08	1.134E-07	2.908E-07	6.082E-07	8.362E-07	1.491E-03	7.754E-03	1.256E-02	
Th-232	Th-228		0.000E+00	1.876E-08	1.630E-07	1.605E-06	1.037E-05	4.271E-05	6.708E-05	1.528E-04	2.918E-04	3.460E-02	
Th-232	32SR(j)		2.046E-22	3.098E-08	1.990E-07	1.718E-06	1.066E-05	4.332E-05	6.792E-05	1.644E-03	8.046E-03	1.705E-01	

The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g													
Basic Radiation Dose Limit = 100 mrem/yr													
ONuclide	t = 0.000E+00	1.000E-01	3.000E-01	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03			
Ra-228	9.765E+07	2.442E+07	1.025E+07	3.972E+06	2.283E+06	3.983E+06	1.170E+08	5.413E+09	*2.721E+14	*2.721E+14			
Th-228	1.142E+06	1.183E+06	1.271E+06	1.632E+06	3.332E+06	4.052E+07	5.101E+10	*8.192E+14	*8.192E+14	*8.192E+14			
Th-232	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05			

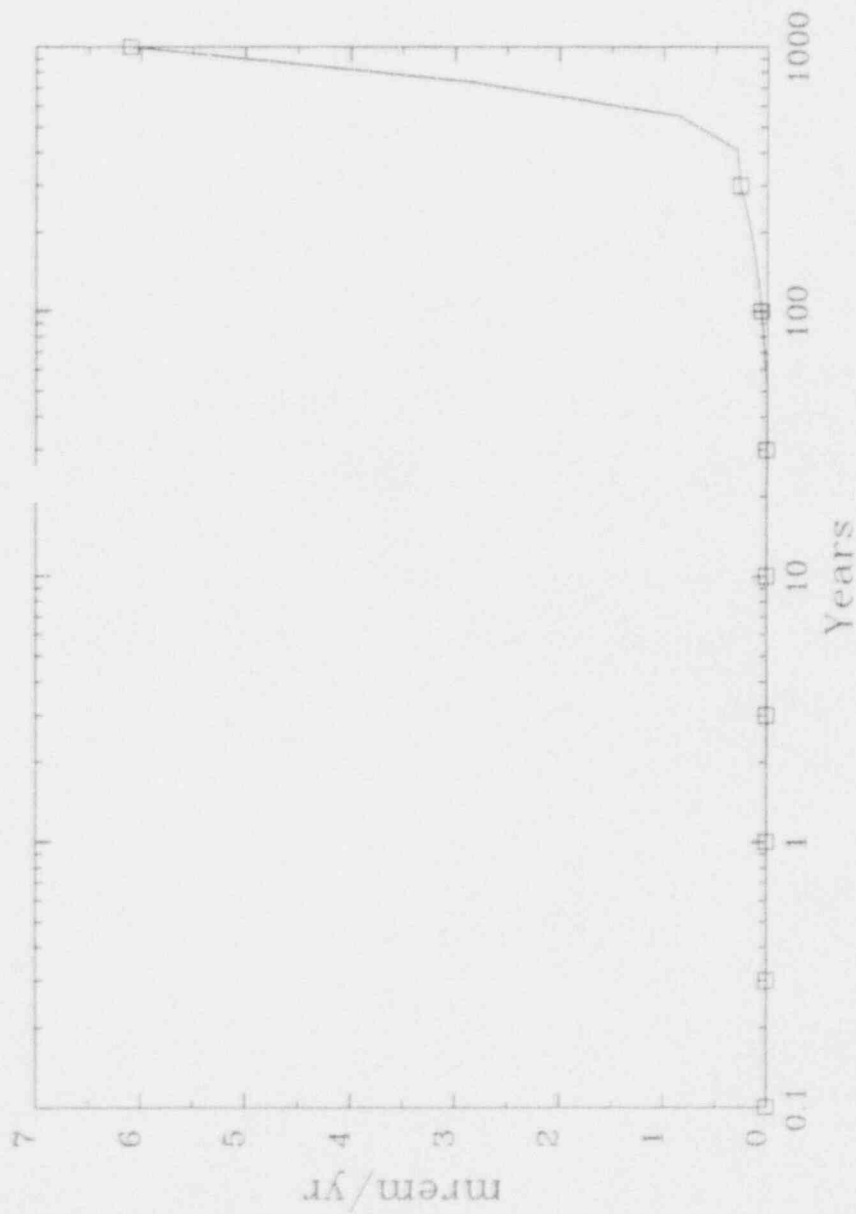
*At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)													
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g													
at tmin = time of minimum single radionuclide soil guideline													
and at tmax = time of maximum total dose = 1.000E+03 years													
ONuclide	Initial	tmin	DSR(i,tmin)	G(i,tmin)	DSR(i,tmax)	G(i,tmax)							
(i)	pCi/g	(years)		(pCi/g)		(pCi/g)							
Ra-228	1.320E+02	3.861 + 0.004	4.502E-05	2.221E+06	0.000E+00	*2.721E+14							
Th-228	1.320E+02	0.000E+00	8.757E-05	1.142E+06	0.000E+00	*8.192E+14							
Th-232	1.320E+02	1.000E+03	1.705E-01	5.867E+02	1.705E-01	5.867E+02							

*At specific activity limit

ATTACHMENT
AREA 2
RESRAD CODE RUN 5

TOTAL DOSE: All Isotopes and Pathways Summed



WYMGRD17 DAT

04/19/93 12:57

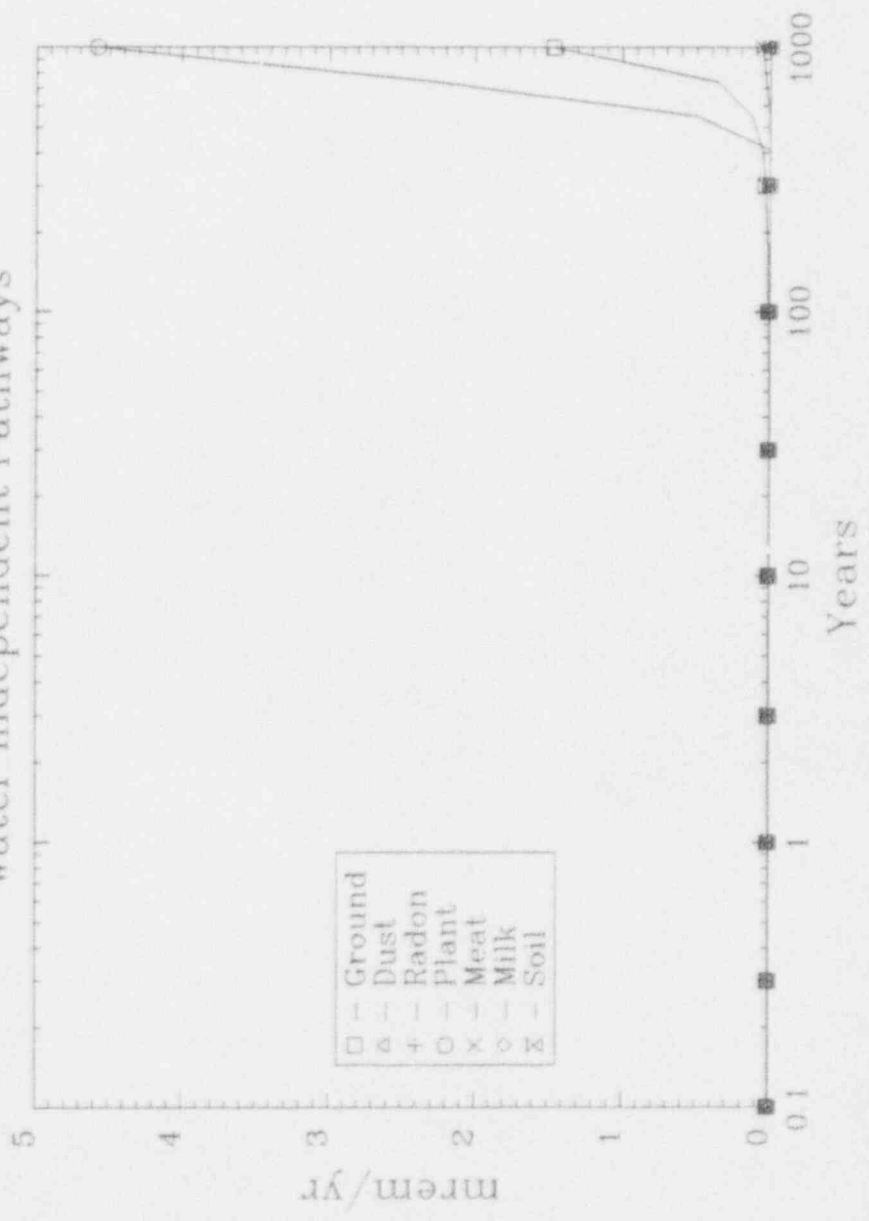
DOSE: All Isotopes Summed
Water Independent & Dependent Subtotals



WYMGRD17 DAT

04/19/93 12:57

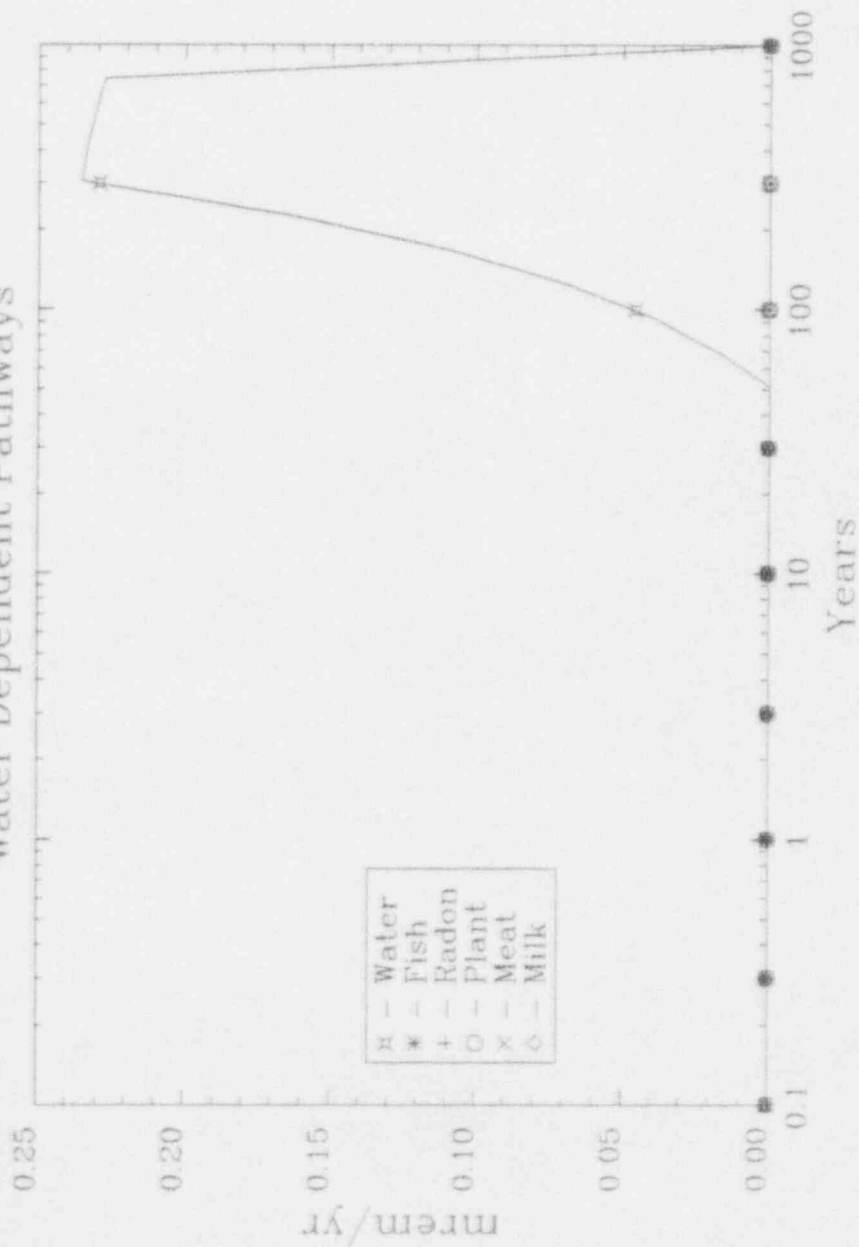
DOSE: All Isotopes Summed Water Independent Pathways



WYMGRD17 DAT

04/19/93 12:57

DOSE: All Isotopes Summed Water Dependent Pathways



WYMGRED17.DAT

04/19/93 12:57

Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4'CAP, BNI

File : WYMGRD17.CAT

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Time = 3.000E-01	11
Time = 1.000E+00	12
Time = 3.000E+00	13
Time = 1.000E+01	14
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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4'CAP, BNI

File : WYMGRD17.DAT

Dose Conversion Factor (and Related) Parameter Summary

Menu	Parameter	Current Value	Default	Parameter Name
A-1	Ground external gamma, volume DCF's, (mrem/yr)/(pCi/cm**3):			
A-1	Ra-228+D, soil density = 1.0 g/cm**3	8.180E+00	8.180E+00	DCF1(1,1)
A-1	Ra-228+D, soil density = 1.8 g/cm**3	4.510E+00	4.510E+00	DCF1(1,2)
A-1	Th-228+D, soil density = 1.0 g/cm**3	1.330E+01	1.330E+01	DCF1(2,1)
A-1	Th-228+D, soil density = 1.8 g/cm**3	7.360E+00	7.360E+00	DCF1(2,2)
A-1	Th-232 , soil density = 1.0 g/cm**3	1.350E-03	1.350E-03	DCF1(3,1)
A-1	Th-232 , soil density = 1.8 g/cm**3	6.040E-04	6.040E-04	DCF1(3,2)
A-3	Depth factors, ground external gamma, dimensionless:			
A-3	Ra-228+D, soil density = 1.0 g/cm**3, thickness = .15 m	6.800E-01	6.800E-01	FD(1,1,1)
A-3	Ra-228+D, soil density = 1.0 g/cm**3, thickness = 0.5 m	9.700E-01	9.700E-01	FD(1,2,1)
A-3	Ra-228+D, soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,1)
A-3	Ra-228+D, soil density = 1.8 g/cm**3, thickness = .15 m	8.500E-01	8.500E-01	FD(1,1,2)
A-3	Ra-228+D, soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(1,2,2)
A-3	Ra-228+D, soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,2)
A-3	Th-228+D, soil density = 1.0 g/cm**3, thickness = .15 m	6.100E-01	6.100E-01	FD(2,1,1)
A-3	Th-228+D, soil density = 1.0 g/cm**3, thickness = 0.5 m	9.400E-01	9.400E-01	FD(2,2,1)
A-3	Th-228+D, soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(2,3,1)
A-3	Th-228+D, soil density = 1.8 g/cm**3, thickness = .15 m	7.500E-01	7.500E-01	FD(2,1,2)
A-3	Th-228+D, soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(2,2,2)
A-3	Th-228+D, soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(2,3,2)
A-3	Th-232 , soil density = 1.0 g/cm**3, thickness = .15 m	9.500E-01	9.500E-01	FD(3,1,1)

A-3	Th-232 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(3,2,1)
A-3	Th-232 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(3,3,1)
A-3	Th-232 , soil density = 1.8 g/cm**3, thickness = .1 m	1.000E+00	1.000E+00	FD(3,1,2)
A-3	Th-232 , soil density = 1.8 g/cm**3, thickness = 0.1 m	1.000E+00	1.000E+00	FD(3,2,2)
A-3	Th-232 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(3,3,2)

B-1	Dose conversion factors for dust inhalation, mrem/pCi:			
B-1	Ra-228+D	4.500E-03	4.500E-03	DCF2(1)
B-1	Th-228+D	3.100E-01	3.100E-01	DCF2(2)
B-1	Th-232	1.600E+00	1.600E+00	DCF2(3)

D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ra-228+D	1.200E-03	1.200E-03	DCF3(1)
D-1	Th-228+D	7.500E-04	7.500E-04	DCF3(2)
D-1	Th-232	2.800E-03	2.800E-03	DCF3(3)

D-34	Food transfer factors:			
D-34	Ra-228+D, plant/soil concentration ratio, dimensionless	1.400E-03	1.400E-03	RTF(1,1)
D-34	Ra-228+D, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	9.900E-04	9.900E-04	RTF(1,2)
D-34	Ra-228+D, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-04	2.000E-04	RTF(1,3)
D-34	Th-228+D, plant/soil concentration ratio, dimensionless	4.200E-03	4.200E-03	RTF(2,1)
D-34	Th-228+D, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
D-34	Th-228+D, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.500E-06	2.500E-06	RTF(2,3)

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 File : WYMGRD17.DAT

Dose Conversion Factor (and Related) Parameter Summary (continued)

Menu	Parameter	Current Value	Default	Parameter Name
D-34	Th-232 , plant/soil concentration ratio, dimensionless	4.200E-03	4.200E-03	RTF(3,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(3,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.500E-06	2.500E-06	RTF(3,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ra-228+D, fish	5.000E+01	5.000E+01	BIOFAC(1,1)
D-5	Ra-228+D, crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(1,2)
D-5	Th-228+D, fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Th-228+D, crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(2,2)
D-5	Th-232 , fish	3.000E+01	3.000E+01	BIOFAC(3,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(3,2)

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 Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4'CAP, BNI
 File : WYMGRD17.DAT

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	8.640E+01	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	6.000E-01	1.000E+00	---	THICKO
R011	Length parallel to aquifer flow (m)	9.500E+00	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.000E+02	1.000E+02	---	BRLD
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI

R011	Times for calculations (yr)	1.000E-01	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E-01	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+00	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+00	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+01	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	3.000E+02	3.000E+03	---	T(9)
R011	Times for calculations (yr)	1.000E+03	1.000E+04	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ra-228	1.320E+02	0.000E+00	---	S(1)
R012	Initial principal radionuclide (pCi/g): Th-228	1.320E+02	0.000E+00	---	S(2)
R012	Initial principal radionuclide (pCi/g): Th-232	1.320E+02	0.000E+00	---	S(3)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W(1)
R012	Concentration in groundwater (pCi/L): Th-228	not used	0.000E+00	---	W(2)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W(3)
R013	Cover depth (m)	1.200E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.780E+00	1.600E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	6.000E-04	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.060E+00	1.600E+00	---	DENSEZ
R013	Contaminated zone erosion rate (m/yr)	0.000E+00	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	3.200E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	5.550E+03	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	4.050E+00	5.300E+00	---	BCZ
R013	Humidity in air (g/cm**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	6.800E-01	6.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.120E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	0.000E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IOITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.780E+00	1.600E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	3.200E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.550E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	5.000E-02	2.000E-02	---	HGMT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	6.000E-04	1.000E-03	---	VMT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBMT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	MB	ND	---	MODEL
R014	Individual's use of groundwater (m**3/yr)	1.500E+02	1.500E+02	---	UW
Residual Radioactivity Program, Version 4.60					
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file : WYMG017.DAT					
Site-Specific Parameter Summary (continued)					
0	Menu	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	1.500E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.780E+00	1.600E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	3.200E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	4.050E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	5.550E+03	1.000E+02	---	HCUZ(1)

R016	Distribution coefficients for Ra-228	7.000E+00	7.000E+01	---	DCACTC(1)
R016	Contaminated zone 1 (cm**3/g)	7.000E+00	7.000E+01	---	DCACTU(1,1)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+00	7.000E+01	---	DCACTS(1)
R016	Saturated zone (cm**3/g)	0.000E+00	0.000E+00	6.301E-02	REACH(1)
R016	Leach rate (/yr)				
R016	Distribution coefficients for Th-228	6.000E+03	6.000E+04	---	DCACTC(2)
R016	Contaminated zone 1 (cm**3/g)	6.000E+03	6.000E+04	---	DCACTU(2,1)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+03	6.000E+04	---	DCACTS(2)
R016	Saturated zone (cm**3/g)	0.000E+00	0.000E+00	7.513E-05	REACH(2)
R016	Leach rate (/yr)				
R016	Distribution coefficients for Th-232	6.000E+03	6.000E+04	---	DCACTC(3)
R016	Contaminated zone 1 (cm**3/g)	6.000E+03	6.000E+04	---	DCACTU(3,1)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+03	6.000E+04	---	DCACTS(3)
R016	Saturated zone (cm**3/g)	0.000E+00	0.000E+00	7.513E-05	REACH(3)
R016	Leach rate (/yr)				
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	2.000E-04	2.000E-04	---	MLINH
R017	Dilution length for airborne dust, inhalation (m)	3.000E+00	3.000E+00	---	LM
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor, external gamma	9.800E-01	1.000E+00	---	FS1
R017	Fractions of annular areas within AREA:				
R017	Outer annular radius (m) = $\sqrt{(1/\pi)}$	not used	1.000E+00	---	FRACA(1)
R017	Outer annular radius (m) = $\sqrt{(10/\pi)}$	not used	1.000E+00	---	FRACA(2)
R017	Outer annular radius (m) = $\sqrt{(20/\pi)}$	not used	1.000E+00	---	FRACA(3)
R017	Outer annular radius (m) = $\sqrt{(50/\pi)}$	not used	1.000E+00	---	FRACA(4)
R017	Outer annular radius (m) = $\sqrt{(100/\pi)}$	not used	1.000E+00	---	FRACA(5)
R017	Outer annular radius (m) = $\sqrt{(200/\pi)}$	not used	1.000E+00	---	FRACA(6)
R017	Outer annular radius (m) = $\sqrt{(500/\pi)}$	not used	1.000E+00	---	FRACA(7)
R017	Outer annular radius (m) = $\sqrt{(1000/\pi)}$	not used	1.000E+00	---	FRACA(8)
R017	Outer annular radius (m) = $\sqrt{(5000/\pi)}$	not used	1.000E+00	---	FRACA(9)
R017	Outer annular radius (m) = $\sqrt{(1.E+04/\pi)}$	not used	1.000E+00	---	FRACA(10)
R017	Outer annular radius (m) = $\sqrt{(1.E+05/\pi)}$	not used	0.000E+00	---	FRACA(11)
R017	Outer annular radius (m) = $\sqrt{(1.E+06/\pi)}$	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)

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 File : WYMGRO17.DAT

Site-Specific Parameter Summary (continued)				
Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)
0				
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---
R018	Fraction of drinking water from site	1.000E+00	1.000E+00	---
R018	Fraction of aquatic food from site	5.000E-01	5.000E-01	---

Parameter Name

DIET(2)
 DIET(3)
 DIET(4)
 DIET(5)
 DIET(6)
 SOIL
 DWI
 FDW
 FR9

R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LF15
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LF16
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LM15
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LM16
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGMDW
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGULW
R019	Irrigation fraction from ground water	0.000E+00	1.000E+00	---	FGMIR
R021	Thickness of building foundation (m)	1.500E-01	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	2.400E+00	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	4.000E-01	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	1.000E-01	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	1.000E-01	1.000E-01	---	PH2OCV
R021	Volumetric water content of the foundation	5.000E-02	5.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec): in cover material	2.000E-06	2.000E-06	---	DIFCV
R021	in foundation material	2.000E-08	2.000E-08	---	DIFFL
R021	in contaminated zone soil	2.000E-06	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	2.000E+00	2.000E+00	---	HMX
R021	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R021	Average building air exchange rate (1/hr)	1.000E+00	1.000E+00	---	REXG
R021	Height of the building (room) (m)	2.500E+00	2.500E+00	---	HRM
R021	Building interior area factor	0.000E+00	0.000E+00	---	FAT
R021	Building depth below ground surface (m)	1.000E+00	1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.000E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	1.000E-01	1.000E-01	---	EMANA(2)

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4'CAP, BNI

File : WYMGRO17.DAT

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	active

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4'CAP, BNI

File : WYMGRO17.DAT

Contaminated Zone Dimensions Initial Soil Concentrations, pCi/g

Area: 86.40 square meters Ra-228 1.320E+02
Thickness: 0.60 meters Th-228 1.320E+02

Cover Depth: 1.20 meters

Th-232 1.320E+02

0

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 100 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years): 0.000E+00 1.000E-01 3.000E-01 1.000E+00 3.000E+00 1.000E+01 3.000E+01 1.000E+02 3.000E+02 1.000E+03
 TDOSE(t): 9.246E-03 9.249E-03 9.250E-03 9.202E-03 8.816E-03 7.398E-03 7.177E-03 5.617E-02 2.606E-01 6.097E+00
 M(t): 9.246E-05 9.249E-05 9.250E-05 9.202E-05 8.816E-05 7.398E-05 7.177E-05 5.617E-04 2.606E-03 6.097E-02

0Maximum TDOSE(t): 6.097E+00 mrem/yr at t = 1.000E+03 years

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Summary: DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4'CAP, BNI

File: WYMGRG.7.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Independent Pathways

Radio- Nuclide	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	1.069E-04	0.0116	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	9.139E-03	0.9884	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.135E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	9.246E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.069E-04	0.0116
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.139E-03	0.9884
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.135E-20	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.246E-03	1.0000

0*Sum of all water independent and dependent pathways.

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Summary: DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4'CAP, BNI

File: WYMGRD17.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E-01 years

Water Independent Pathways

Radio- Nuclide	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	4.274E-04	0.0462	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	8.818E-03	0.9534	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	3.233E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	9.249E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E-01 years

Water Dependent Pathways

0

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.274E-04	0.0462
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.818E-03	0.9534
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.233E-06	0.0003
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.249E-03	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4'CAP, BNI

File : WYMGRD17.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E-01 years

Water Independent Pathways

Radio- Nuclide	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	1.018E-03	0.1101	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	8.211E-03	0.8877	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.077E-05	0.0022	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	9.250E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E-01 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.018E-03	0.1101
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.211E-03	0.8877
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.077E-05	0.0022
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.250E-03	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4'CAP, BNI

File : WYMGRD17.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Independent Pathways

Radio- Nuclide	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	2.627E-03	0.2855	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	6.396E-03	0.6950	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.793E-04	0.0195	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	9.202E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.627E-03	0.2855
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.396E-03	0.6950
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.793E-04	0.0195
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.202E-03	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4'CAP, BNI

File : WYMGRD17.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways

Radio- Nuclide	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	4.571E-03	0.5185	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	3.132E-03	0.3553	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.113E-03	0.1262	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	8.816E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.571E-03	0.5185
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.132E-03	0.3553
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.113E-03	0.1262
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.816E-03	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4'CAP, BNI

File : WYMGRD17.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Independent Pathways

Radio- Nuclide	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	2.620E-03	0.3542	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	2.576E-04	0.0348	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	4.520E-03	0.6110	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	7.398E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Dependent Pathways

	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.620E-03	0.3542
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.576E-04	0.0348
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.520E-03	0.6110
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.398E-03	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4'CAP, BNI

File : WYMGRD17.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Independent Pathways

	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	8.921E-05	0.0124	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	2.046E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	7.088E-03	0.9875	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	7.177E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Dependent Pathways

	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.921E-05	0.0124
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.046E-07	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.088E-03	0.9875
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.177E-03	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4'CAP, BNI

File : WYMGRD17.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways

	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	3.515E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	2.890E-18	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.046E-02	0.1862	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.046E-02	0.1862	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Dependent Pathways

	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	5.458E-07	0.0000	1.713E-10	0.0000	9.121E-10	0.0000	0.000E+00	0.0000	7.281E-11	0.0000	1.701E-13	0.0000	5.473E-07	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.890E-18	0.0000
Th-232	4.570E-02	0.8135	1.170E-05	0.0002	2.665E-06	0.0000	0.000E+00	0.0000	1.378E-06	0.0000	1.100E-06	0.0000	5.617E-02	1.0000
Total	4.570E-02	0.8135	1.170E-05	0.0002	2.666E-06	0.0000	0.000E+00	0.0000	1.378E-06	0.0000	1.100E-06	0.0000	5.617E-02	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4'CAP, BNI

File : WYMGRD17.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways

	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	1.256E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	3.110E-02	0.1194	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	3.110E-02	0.1194	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Dependent Pathways

	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	6.485E-23	0.0000	2.036E-26	0.0000	1.084E-25	0.0000	0.000E+00	0.0000	8.651E-27	0.0000	0.000E+00	0.0000	6.511E-23	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.294E-01	0.8804	5.824E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	6.060E-06	0.0000	5.721E-06	0.0000	2.606E-01	1.0000
Total	2.294E-01	0.8804	5.824E-05	0.0002	1.084E-25	0.0000	0.000E+00	0.0000	6.060E-06	0.0000	5.721E-06	0.0000	2.606E-01	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4'CAP, BNI

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways

	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.463E+00	0.2399	0.000E+00	0.0000	0.000E+00	0.0000	4.581E+00	0.7513	5.305E-02	0.0087	2.277E-04	0.0000	0.000E+00	0.0000
Total	1.463E+00	0.2399	0.000E+00	0.0000	0.000E+00	0.0000	4.581E+00	0.7513	5.305E-02	0.0087	2.277E-04	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 2, 4'CAP, BN1

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Dose/Source Ratios Summed Over All Pathways

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction	DSR(i,j,t) (mrem/yr)/(pCi/g)											
t = 0.000E+00			1.000E-01	3.000E-01	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03			
Ra-228	Ra-228	1.000E+00	8.096E-07	7.955E-07	7.680E-07	6.791E-07	4.777E-07	1.395E-07	4.139E-09	1.864E-14	9.880E-30	0.000E+00		
Ra-228	Th-228		0.000E+00	2.442E-06	6.946E-06	1.922E-05	3.415E-05	1.971E-05	6.717E-07	4.146E-09	4.933E-25	0.000E+00		
Ra-228	Th-232		8.096E-07	3.239E-06	7.714E-06	1.990E-05	3.463E-05	1.985E-05	6.758E-07	4.146E-09	4.933E-25	0.000E+00		
Th-228	Th-228	1.000E+00	6.923E-05	6.681E-05	6.220E-05	4.845E-05	2.373E-05	1.951E-06	1.550E-09	2.189E-20	0.000E+00	0.000E+00		
Th-232	Th-232	1.000E+00	1.618E-22	1.621E-22	1.628E-22	1.652E-22	1.724E-22	1.998E-22	3.048E-22	1.337E-21	9.128E-20	2.767E-02		
Th-232	Ra-228		0.000E+00	9.661E-09	2.850E-08	8.969E-08	2.299E-07	4.809E-07	6.611E-07	3.353E-04	1.743E-03	3.443E-03		
Th-232	Th-228		0.000E+00	1.483E-08	1.289E-07	1.269E-06	8.200E-06	3.376E-05	5.304E-05	9.023E-05	2.307E-04	1.508E-02		
Th-232	Th-232		1.618E-22	2.449E-08	1.574E-07	1.358E-06	8.430E-06	3.425E-05	5.370E-05	4.256E-04	1.974E-03	4.619E-02		

The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

0

Single Radionuclide Soil Guidelines G(i,t) in pCi/g

Basic Radiation Dose Limit = 100 mrem/yr

Nuclide (i)	Single Radionuclide Soil Guidelines G(i,t) in pCi/g												
	Basic Radiation Dose Limit = 100 mrem/yr												
	t = 0.000E+00												
Ra-228	1.235E+08	3.088E+07	1.296E+07	5.024E+06	2.888E+06	5.037E+06	1.480E+06	2.412E+10	*2.721E+14	*2.721E+14	*2.721E+14	*2.721E+14	
Th-228	1.444E+06	1.497E+06	1.608E+06	2.064E+06	4.214E+06	5.125E+07	6.452E+10	*8.192E+14	*8.192E+14	*8.192E+14	*8.192E+14	*8.192E+14	
Th-232	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	*1.092E+05	

*At specific activity limit

0

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)

and Single Radionuclide Soil Guidelines G(i,t) in pCi/g

at tmin = time of minimum single radionuclide soil guideline

and at tmax = time of maximum total dose = 1.000E+03 years

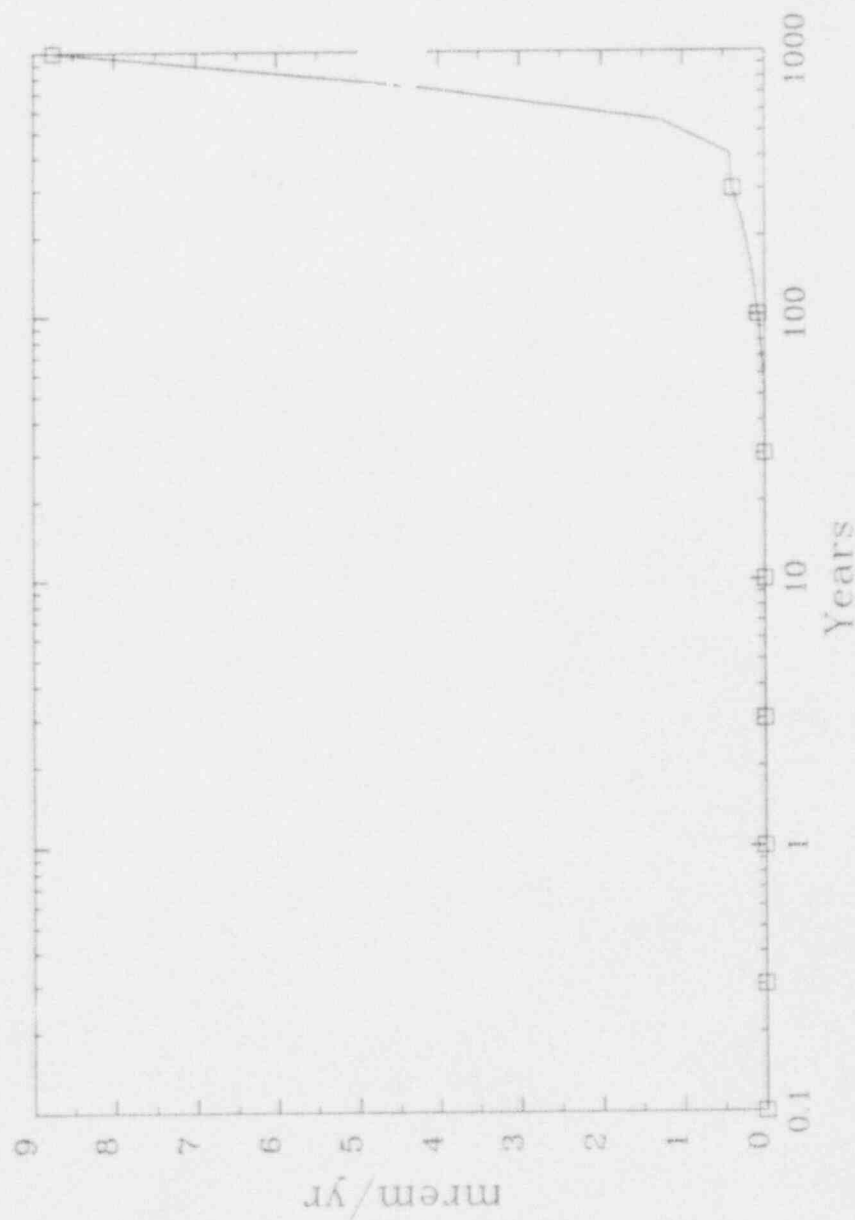
Nuclide (i)	DSR(i,tmin) G(i,tmin) DSR(i,tmax) G(i,tmax)			DSR(i,tmin) G(i,tmin) DSR(i,tmax) G(i,tmax)		
	Initial (pCi/g)	tmin (years)	(pCi/g)	Initial (pCi/g)	tmin (years)	(pCi/g)

Ra-228	1.320E+02	3.857 ± 0.004	3.560E-05	2.809E+06	0.000E+00	*2.721E+14
Th-228	1.320E+02	0.000E+00	6.923E-05	1.444E+06	0.000E+00	*8.192E+14
Th-232	1.320E+02	1.000E+03	4.619E-02	2.165E+03	4.619E-02	2.165E+03

*At specific activity limit

ATTACHMENT
AREA 3
RESRAD CODE RUN 6

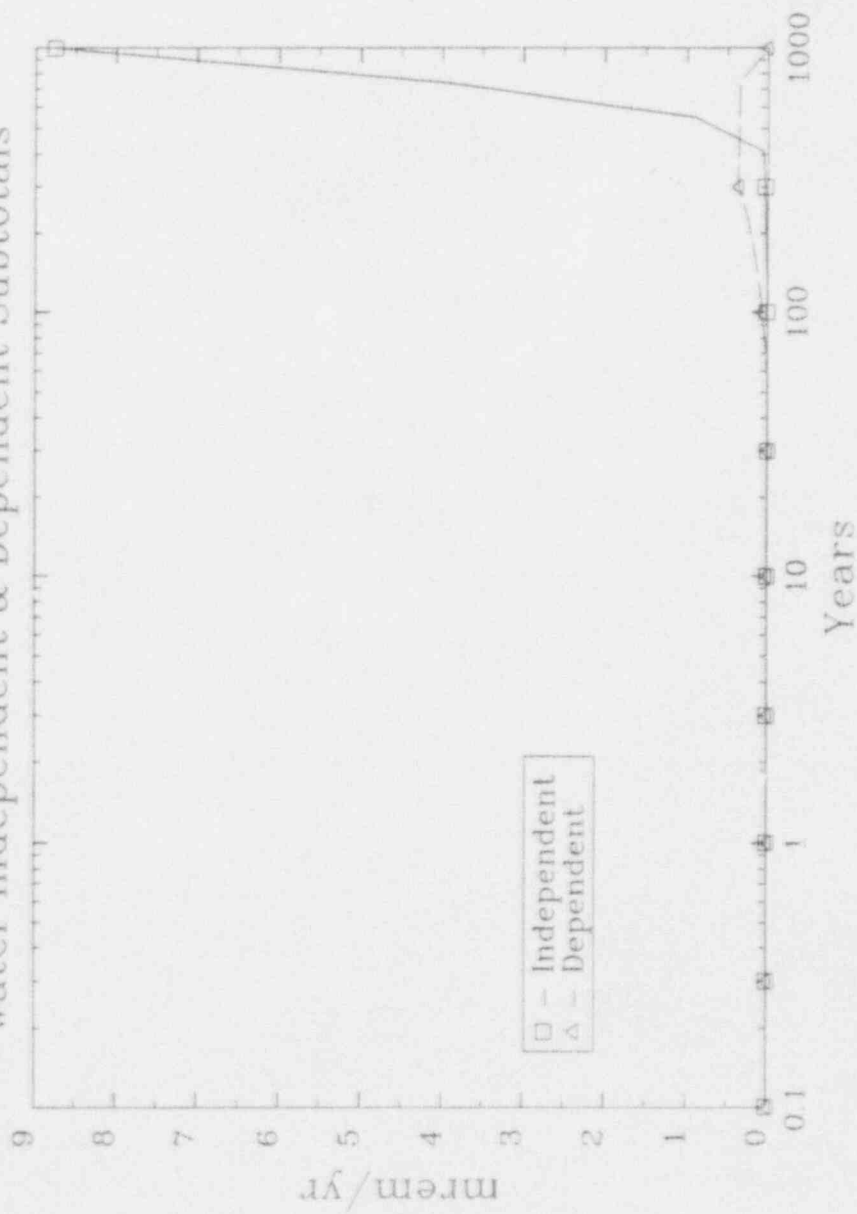
TOTAL DOSE: All Isotopes and Pathways Summed



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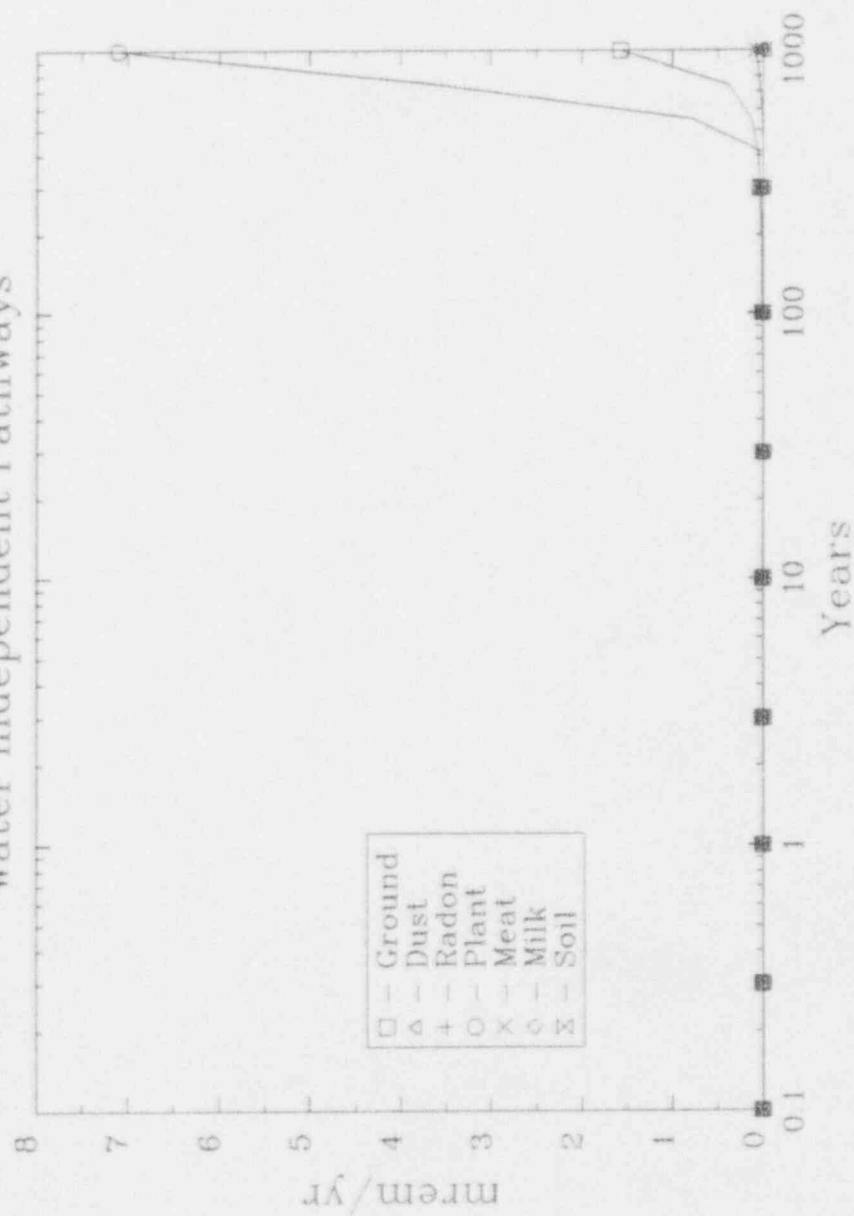
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Water Independent & Dependent Subtotals



WYMGRD18.DAT

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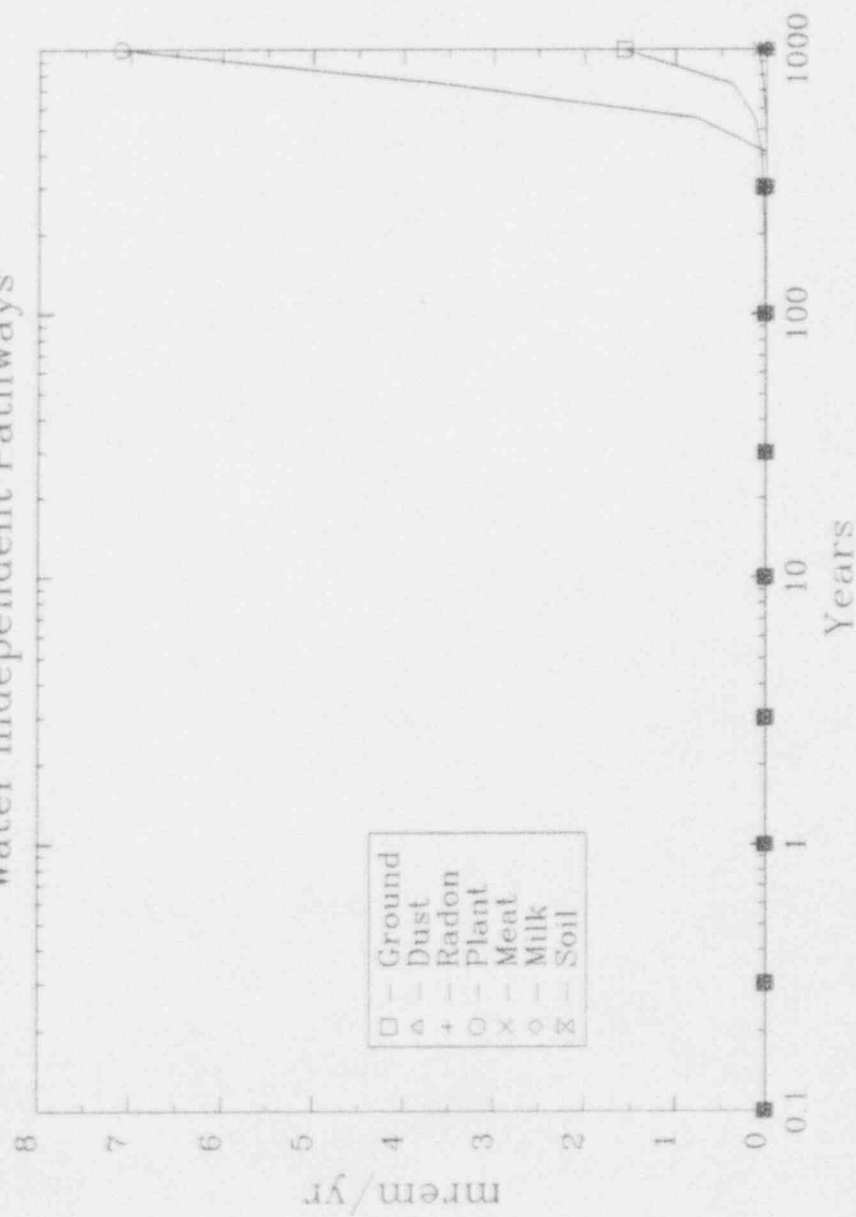
DOSE: All Isotopes Summed Water Independent Pathways



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DOSE: All Isotopes Summed Water Independent Pathways



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Time = 3.000E-01	11
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Time = 3.000E+00	13
Time = 1.000E+01	14
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 Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 3, 4'CAP, BNI
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Dose Conversion Factor (and Related) Parameter Summary

Menu	Parameter	Current Value	Default	Parameter Name
A-1	Ground external gamma, volume DCF's, (mrem/yr)/(pCi/cm**3):			
A-1	Ra-228+D, soil density = 1.0 g/cm**3	8.180E+00	8.180E+00	DCF1(1,1)
A-1	Ra-228+D, soil density = 1.8 g/cm**3	4.510E+00	4.510E+00	DCF1(1,2)
A-1	Th-228+D, soil density = 1.0 g/cm**3	1.330E+01	1.330E+01	DCF1(2,1)
A-1	Th-228+D, soil density = 1.8 g/cm**3	7.360E+00	7.360E+00	DCF1(2,2)
A-1	Th-232 , soil density = 1.0 g/cm**3	1.350E-03	1.350E-03	DCF1(3,1)
A-1	Th-232 , soil density = 1.8 g/cm**3	6.040E-04	6.040E-04	DCF1(3,2)
A-3	Depth factors, ground external gamma, dimensionless:			
A-3	Ra-228+D, soil density = 1.0 g/cm**3, thickness = .15 m	6.800E-01	6.800E-01	FD(1,1,1)
A-3	Ra-228+D, soil density = 1.0 g/cm**3, thickness = 0.5 m	9.700E-01	9.700E-01	FD(1,2,1)
A-3	Ra-228+D, soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,1)
A-3	Ra-228+D, soil density = 1.8 g/cm**3, thickness = .15 m	8.500E-01	8.500E-01	FD(1,1,2)
A-3	Ra-228+D, soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(1,2,2)
A-3	Ra-228+D, soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,2)
A-3	Th-228+D, soil density = 1.0 g/cm**3, thickness = .15 m	6.100E-01	6.100E-01	FD(2,1,1)
A-3	Th-228+D, soil density = 1.0 g/cm**3, thickness = 0.5 m	9.400E-01	9.400E-01	FD(2,2,1)
A-3	Th-228+D, soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(2,3,1)
A-3	Th-228+D, soil density = 1.8 g/cm**3, thickness = .15 m	7.500E-01	7.500E-01	FD(2,1,2)
A-3	Th-228+D, soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(2,2,2)
A-3	Th-228+D, soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(2,3,2)
A-3	Th-232 , soil density = 1.0 g/cm**3, thickness = .15 m	9.500E-01	9.500E-01	FD(3,1,1)

A-3	Th-232 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(3,2,1)
A-3	Th-232 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(3,3,1)
A-3	Th-232 , soil density = 1.8 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(3,1,2)
A-3	Th-232 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(3,2,2)
A-3	Th-232 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(3,3,2)
B-1	Dose conversion factors for dust inhalation, mrem/pCi:			
B-1	Ra-228+D	4.500E-03	4.500E-03	DCF2(1)
B-1	Th-228+D	3.100E-01	3.100E-01	DCF2(2)
B-1	Th-232	1.600E+00	1.600E+00	DCF2(3)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ra-228+D	1.200E-03	1.200E-03	DCF3(1)
D-1	Th-228+D	7.500E-04	7.500E-04	DCF3(2)
D-1	Th-232	2.800E-03	2.800E-03	DCF3(3)
D-34	Food transfer factors:			
D-34	Ra-228+D, plant/soil concentration ratio, dimensionless	1.400E-03	1.400E-03	RTF(1,1)
D-34	Ra-228+D, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	9.900E-04	9.900E-04	RTF(1,2)
D-34	Ra-228+D, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-04	2.000E-04	RTF(1,3)
D-34	Th-228+D, plant/soil concentration ratio, dimensionless	4.200E-03	4.200E-03	RTF(2,1)
D-34	Th-228+D, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
D-34	Th-228+D, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.500E-06	2.500E-06	RTF(2,3)
D-34				

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 3, 4'CAP, BNI

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Dose Conversion Factor (and Related) Parameter Summary (continued)

Menu	Parameter	Current Value	Default	Parameter Name
D-34	Th-232 , plant/soil concentration ratio, dimensionless	4.200E-03	4.200E-03	RTF(3,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(3,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.500E-06	2.500E-06	RTF(3,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ra-228+D, fish	5.000E+01	5.000E+01	BIOFAC(1,1)
D-5	Ra-228+D, crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(1,2)
D-5	Th-228+D, fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Th-228+D, crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(2,2)
D-5	Th-232 , fish	3.000E+01	3.000E+01	BIOFAC(3,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(3,2)

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 3, 4'CAP, BNI

File : WYMGRD18.DAT

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	1.340E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	6.000E-01	1.000E+00	---	THICKO
R011	Length parallel to aquifer flow (m)	1.460E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.000E+02	1.000E+02	---	BRLO
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI

R011	Times for calculations (yr)	1.000E-01	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E-01	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+00	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+00	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+01	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	3.000E+02	3.000E+03	---	T(9)
R011	Times for calculations (yr)	1.000E+03	1.000E+04	---	T(10)
R012	Initial principal radionuclide (pci/g): Ra-228	1.320E+02	0.000E+00	---	SC(1)
R012	Initial principal radionuclide (pci/g): Th-228	1.320E+02	0.000E+00	---	SC(2)
R012	Initial principal radionuclide (pci/g): Th-232	1.320E+02	0.000E+00	---	SC(3)
R012	Concentration in groundwater (pci/L): Ra-228	not used	0.000E+00	---	WC(1)
R012	Concentration in groundwater (pci/L): Th-228	not used	0.000E+00	---	WC(2)
R012	Concentration in groundwater (pci/L): Th-232	not used	0.000E+00	---	WC(3)
R013	Cover depth (m)	1.200E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.780E+00	1.600E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	6.000E-04	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.060E+00	1.600E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	0.000E+00	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	3.200E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	5.550E+03	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	4.050E+00	5.300E+00	---	BCZ
R013	Humidity in air (g/cm**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	6.800E-01	6.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.120E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	0.000E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.780E+00	1.600E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	3.200E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.550E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	5.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	6.000E-04	1.000E-03	---	WMT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	MB	ND	---	MODEL
R014	Individual's use of groundwater (m**3/yr)	1.500E+02	1.500E+02	---	UM
R014	Residual Radioactivity Program, Version 4.60	04/19/93 13:46	Page 5		

Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 3, 4'CAP, BNI
File : NYMGRD18.DAT

Site-Specific Parameter Summary (continued)				
Menu	Parameter	User Input	Default	Used by RESPAD (If different from user input)
0				
R015	Number of unsaturated zone strata	1	1	---
R015	Unsat. zone 1, thickness (m)	1.500E+00	4.000E+00	---
R015	Unsat. zone 1, soil density (g/cm**3)	1.780E+00	1.600E+00	---
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---
R015	Unsat. zone 1, effective porosity	3.200E-01	2.000E-01	---
R015	Unsat. zone 1, soil-specific b parameter	4.050E+00	5.300E+00	---
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	5.550E+03	1.000E+02	---

Parameter Name
NS
H(1)
DENSUZ(1)
TPUZ(1)
EPUZ(1)
BUZ(1)
HCUZ(1)

Distribution coefficients for Ra-228		7.000E+01	7.000E+01	---	DCACT(1)
R016	Contaminated zone 1 (cm**3/g)	7.000E+00	7.000E+01	---	DCACT(1,1)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+00	7.000E+01	---	DCACTS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.301E-02	REACH(1)
Distribution coefficients for Th-228		6.000E+03	6.000E+04	---	DCACT(2)
R016	Contaminated zone 1 (cm**3/g)	6.000E+03	6.000E+04	---	DCACT(2,1)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+03	6.000E+04	---	DCACTS(2)
R016	Saturated zone 1 (cm**3/g)	6.000E+03	6.000E+04	---	DCACTS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.513E-05	REACH(2)
Distribution coefficients for Th-232		6.000E+03	6.000E+04	---	DCACT(3)
R016	Contaminated zone 1 (cm**3/g)	6.000E+03	6.000E+04	---	DCACT(3,1)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+03	6.000E+04	---	DCACTS(3)
R016	Saturated zone 1 (cm**3/g)	6.000E+03	6.000E+04	---	DCACTS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.513E-05	REACH(3)
Inhalation rate (m**3/yr)		8.400E+03	8.400E+03	---	INHAL
R017	Mass loading for inhalation (g/m**3)	2.000E-04	2.000E-04	---	MLINH
R017	Dilution length for airborne dust, inhalation (m)	3.000E+00	3.000E+00	---	LM
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FTND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor, external gamma	9.600E-01	1.000E+00	---	FS1
Fractions of annular areas within AREA:		not used	1.000E+00	---	FRACA(1)
R017	Outer annular radius (m) = $\sqrt{(1/\pi)}$	not used	1.000E+00	---	FRACA(2)
R017	Outer annular radius (m) = $\sqrt{(10/\pi)}$	not used	1.000E+00	---	FRACA(3)
R017	Outer annular radius (m) = $\sqrt{(20/\pi)}$	not used	1.000E+00	---	FRACA(4)
R017	Outer annular radius (m) = $\sqrt{(50/\pi)}$	not used	1.000E+00	---	FRACA(5)
R017	Outer annular radius (m) = $\sqrt{(100/\pi)}$	not used	1.000E+00	---	FRACA(6)
R017	Outer annular radius (m) = $\sqrt{(200/\pi)}$	not used	1.000E+00	---	FRACA(7)
R017	Outer annular radius (m) = $\sqrt{(500/\pi)}$	not used	1.000E+00	---	FRACA(8)
R017	Outer annular radius (m) = $\sqrt{(1000/\pi)}$	not used	1.000E+00	---	FRACA(9)
R017	Outer annular radius (m) = $\sqrt{(1.E+04/\pi)}$	not used	1.000E+00	---	FRACA(10)
R017	Outer annular radius (m) = $\sqrt{(1.E+05/\pi)}$	not used	0.000E+00	---	FRACA(11)
R017	Outer annular radius (m) = $\sqrt{(1.E+06/\pi)}$	not used	0.000E+00	---	FRACA(12)
R017	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Residual Radioactivity Program, Version 4.60	04/19/93	13:46	Page 6	
Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 3, 4,CAP, BNI					
File : WYMGDR18.DAT					
Site-Specific Parameter Summary (continued)					
Menu	Parameter	User Input	Default	Used by RESRAD (if different from user input)	Parameter Name
R015	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R015	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	DIET(3)
R015	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	DIET(4)
R015	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R015	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R015	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R015	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DWI
R015	Fraction of drinking water from site	1.000E+00	1.000E+00	---	FDW
R015	Fraction of aquatic food from site	5.000E-01	5.000E-01	---	FRQ

R019	Livestock fodder intake for meat (kg/day)	6.800E+01	---	LF15
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	---	LF16
R019	Livestock water intake for meat (L/day)	5.000E+01	---	LM15
R019	Livestock water intake for milk (L/day)	1.600E+02	---	LM16
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	---	DR00T
R019	Drinking water fraction from ground water	1.000E+00	---	FGMDW
R019	Livestock water fraction from ground water	1.000E+00	---	FGMLW
R019	Irrigation fraction from ground water	1.000E+00	---	FGMIR
R021	Thickness of building foundation (m)	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	2.400E+00	---	DENSEFL
R021	Total porosity of the cover material	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	1.000E-01	---	PH2OCV
R021	Volumetric water content of the foundation	5.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):			
R021	in cover material	2.000E-06	---	DIFCV
R021	in foundation material	2.000E-08	---	DIFFL
R021	in contaminated zone soil	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	2.000E+00	---	HMX
R021	Average annual wind speed (m/sec)	2.000E+00	---	WIND
R021	Average building air exchange rate (1/hr)	1.000E+00	---	REXG
R021	Height of the building (room) (m)	2.500E+00	---	HRM
R021	Building interior area factor	0.000E+00	---	FAT
R021	Building depth below ground surface (m)	1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	---	EMANA(1)
R021	Emanating power of Rn-220 gas	1.000E-01	---	EMANA(2)

code computed (time dependent)

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 Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 3, 4*CAP, BNI
 File : WYMGRO18.DAT

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	active

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 Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 3, 4*CAP, BNI
 File : WYMGRO18.DAT

Contaminated Zone Dimensions	Initial Soil Concentrations, pci/g
Area: 134.00 square meters	Ra-228 1.320E+02
Thickness: 0.60 meters	Th-228 1.320E+02

Cover Depth: 1.20 meters

Th-232 1.320E+02

0

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 100 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years): 0.000E+00 1.000E-01 3.000E-01 1.000E+00 3.000E+00 1.000E+01 3.000E+01 1.000E+02 3.000E+02 1.000E+03
 TDOSE(t): 9.896E-03 9.900E-03 9.901E-03 9.850E-03 9.436E-03 7.919E-03 7.683E-03 8.210E-02 3.892E-01 8.753E+00
 M(t): 9.896E-05 9.900E-05 9.901E-05 9.850E-05 9.436E-05 7.919E-05 7.683E-05 8.210E-04 3.892E-03 8.753E-02

0 Maximum TDOSE(t): 8.753E+00 mrem/yr at t = 1.000E+03 years

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 3, 4'CAP, BNI

File : WYMGRO18.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Independent Pathways

Radio- Nuclide	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	1.144E-04	0.0116	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	9.782E-03	0.9884	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.286E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	9.896E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.144E-04	0.0116
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.782E-03	0.9884
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.286E-20	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.896E-03	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 3, 4'CAP, BNI

File : WYMGRO18.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E-01 years

Water Independent Pathways

Radio- Nuclide	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	4.575E-04	0.0462	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	9.439E-03	0.9534	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	3.460E-06	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	9.900E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E-01 years

Water Dependent Pathways

0

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.575E-04	0.0462
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.439E-03	0.9534
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.460E-06	0.0003
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.900E-03	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 3, 4'CAP, BNI

File : WYMG018.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E-01 years

Radio- Nuclide	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	1.090E-03	0.1101	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	8.789E-03	0.8877	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.223E-05	0.0022	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	9.901E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E-01 years

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.090E-03	0.1101
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.789E-03	0.8877
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.223E-05	0.0022
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.901E-03	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 3, 4'CAP, BNI

File : WYMG018.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Radio- Nuclide	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	2.812E-03	0.2855	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	6.846E-03	0.6950	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.919E-04	0.0195	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	9.850E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.812E-03	0.2855
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.846E-03	0.6950
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.919E-04	0.0195
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.850E-03	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : DOSE ASSESSMENT FOR WAYMAN-GORDON TRENCH AREA 3, 4'CAP, BNI

File : WYMGRD18.DAT

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways

Radio- Nuclide	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	4.892E-03	0.5185	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	3.353E-03	0.3553	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.191E-03	0.1262	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	9.436E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.892E-03	0.5185
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.353E-03	0.3553
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.191E-03	0.1262
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.436E-03	1.0000

0*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Independent Pathways

Radio- Nuclide	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	2.805E-03	0.3542	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	2.757E-04	0.0348	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	4.839E-03	0.6110	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	7.919E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Dependent Pathways

	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.805E-03	0.3542
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.757E-04	0.0348
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.839E-03	0.6110
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.919E-03	1.0000

0*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Independent Pathways

	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	9.549E-05	0.0124	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	2.190E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	7.587E-03	0.9875	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	7.683E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Dependent Pathways

	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.549E-05	0.0124
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.190E-07	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.587E-03	0.9875
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.683E-03	1.0000

0*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways

	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	3.762E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	3.093E-18	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.120E-02	0.1364	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.120E-02	0.1364	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Dependent Pathways

	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	8.464E-07	0.0000	2.657E-10	0.0000	1.415E-09	0.0000	0.000E+00	0.0000	1.751E-10	0.0000	4.092E-13	0.0000	8.487E-07	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.093E-18	0.0000
Th-232	7.087E-02	0.8633	1.814E-05	0.0002	4.133E-06	0.0001	0.000E+00	0.0000	3.314E-06	0.0000	2.647E-06	0.0000	8.210E-02	1.0000
Total	7.087E-02	0.8633	1.814E-05	0.0002	4.134E-06	0.0001	0.000E+00	0.0000	3.314E-06	0.0000	2.647E-06	0.0000	8.210E-02	1.0000

0*Sum of all water independent and dependent pathways.
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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	1.345E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	3.329E-02	0.0855	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	3.329E-02	0.0855	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	1.006E-22	0.0000	3.157E-26	0.0000	1.681E-25	0.0000	0.000E+00	0.0000	2.081E-26	0.0000	0.000E+00	0.0000	1.009E-22	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	3.558E-01	0.9142	9.033E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	1.458E-05	0.0000	1.376E-05	0.0000	3.892E-01	1.0000
Total	3.558E-01	0.9142	9.033E-05	0.0002	1.681E-25	0.0000	0.000E+00	0.0000	1.458E-05	0.0000	1.376E-05	0.0000	3.892E-01	1.0000

0*Sum of all water independent and dependent pathways.
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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

	Ground		Dust		Radon		Plant		Meat		Milk		Soil	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.566E+00	0.1789	0.000E+00	0.0000	0.000E+00	0.0000	7.105E+00	0.8117	8.228E-02	0.0094	3.531E-04	0.0000	0.000E+00	0.0000
Total	1.566E+00	0.1789	0.000E+00	0.0000	0.000E+00	0.0000	7.105E+00	0.8117	8.228E-02	0.0094	3.531E-04	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
 Water Dependent Pathways

Radio- Nuclide	Water	Fish	Radon	Plant	Meat	Milk	All Pathways*
	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.	mrem/yr fract.
Ra-228	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-228	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Th-232	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000
Total	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000	0.000E+00 0.0000

0*Sum of all water independent and dependent pathways.
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Dose/Source Ratios Summed Over All Pathways				
Parent and Progeny Principal Radionuclide Contributions Indicated				
	Parent	Progeny	Principal Radionuclide	DSR(j,t) (mrem/yr)/(pCi/g)
Offent (i)	Product (j)	Branch Fraction	t=	0.000E+00 1.000E-01 3.000E-01 1.000E+00 3.000E+01 1.000E+02 3.000E+03 1.000E+04
Ra-228	Ra-228	1.000E+00	8.666E-07 8.515E-07 8.221E-07 7.269E-07 5.113E-07 1.493E-07 4.431E-09 1.995E-14 1.057E-29 0.000E+00	
Ra-228	Th-228		0.000E+00 2.614E-06 7.435E-06 2.058E-05 3.655E-05 2.110E-05 7.190E-07 6.429E-09 7.646E-25 0.000E+00	
Ra-228	Th-232		8.666E-07 3.466E-06 8.257E-06 2.130E-05 3.706E-05 2.125E-05 7.234E-07 6.429E-09 7.646E-25 0.000E+00	
Th-228	Th-228	1.000E+00	7.411E-05 7.151E-05 6.658E-05 5.186E-05 2.540E-05 2.089E-06 1.659E-09 2.343E-20 0.000E+00 0.000E+00	
Th-232	Th-232	1.000E+00	1.732E-22 1.735E-22 1.743E-22 1.769E-22 1.845E-22 2.139E-22 3.263E-22 1.431E-21 9.770E-20 4.291E-02	
Th-232	Ra-228		0.000E+00 1.034E-08 3.051E-08 9.600E-08 2.461E-07 5.147E-07 7.076E-07 5.195E-04 2.701E-03 4.921E-03	
Th-232	Th-228		0.000E+00 1.587E-08 1.379E-07 1.358E-06 8.777E-06 3.614E-05 5.677E-05 1.024E-04 2.469E-04 1.848E-02	
Th-232	Th-232		1.732E-22 2.621E-08 1.684E-07 1.454E-06 9.023E-06 3.666E-05 5.748E-05 6.219E-04 2.948E-03 6.631E-02	

0 The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g			
Basic Radiation Dose Limit = 100 mrem/yr			
Radionuclide (i)	t = 0.000E+00	1.000E-01	1.000E+00
Ra-228	1.154E+08	2.885E+07	1.211E+07
Th-228	1.349E+06	1.398E+06	1.502E+06
Th-232	*1.092E+05	*1.092E+05	*1.092E+05

*At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)			
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g			
at tmin = time of minimum single radionuclide soil guideline			
and at tmax = time of maximum total dose = 1.000E+03 years			
Radionuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin) G(i,tmin) DSR(i,tmax) G(i,tmax) (pCi/g)
Ra-228	1.320E+02	3.861 ± 0.004	3.810E-05 2.625E+06 0.000E+00 *2.721E+14
Th-228	1.320E+02	0.000E+00	7.411E-05 1.349E+06 0.000E+00 *8.192E+14
Th-232	1.320E+02	1.000E+03	6.631E-02 1.508E+03 6.631E-02 1.508E+03

*At specific activity limit