TA-00

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U.S. Department of Energy
Office of Los Alamos Site Operations, MS A316
Environmental Restoration Program
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Date: January 16, 2003
Refer to: ER2003-0039

RECEIVED JAN 2003 NMED Hazardous Waste Bureau

Mr. John Young, Corrective Action Project Leader
Permits Management Program
NMED – Hazardous Waste Bureau
2905 Rodeo Park Drive East
Building 1
Santa Fe, NM 87505-6303

SUBJECT: SUBMITTAL OF SUPPLEMENT TO THE RESPONSE TO REQUEST FOR SUPPLEMENTAL INFORMATION (RSI) FOR THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) FACILITY INVESTIGATION REPORT (RFI) FOR SOLID WASTE MANAGEMENT UNIT (SWMU) 00-030(g), LOS ALAMOS NATIONAL LABORATORY, NM0890010515, HWB-LANL-01-00

Dear Mr. Young:

Enclosed are two copies of the Los Alamos National Laboratory (LANL) Environmental Restoration (ER) Project's Supplement to the Response to the RSI for the RFI Report for SWMU 00-030(g).

If you have any questions, please contact Terry Rust at (505) 665-8843 or David Gregory at (505) 667-5808.

Sincerely,

David McInroy, Acting Program Manager
Remediation Program
Los Alamos National Laboratory

Sincerely,

Everett Trollinger, Project Manager
Department of Energy
Office of Los Alamos Site Operations

DM/ET/NR/dv

Enclosure: Supplement to Response to RSI (ER2002-0774)

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IM-5, MS A150
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Note: *This document serves as a supplement to the original response to the "Request for Supplemental Information for the RFI Report for SWMU 00-030(g), Los Alamos National Laboratory, NM0890010515; HWB-LANL-01-003" (the original response was ER2002-0518), which was sent to NMED on 8/7/2002 under cover letter ER2002-0519. The original response is reproduced below; any supplemental text is indicated by a red font and by a change bar in the margin. Four attachments are also included with this supplement.*

Supplement to the Response to
"Request for Supplemental Information for the RFI Report for SWMU 00-030(g)
Los Alamos National Laboratory, NM0890010515; HWB-LANL-01-003"

INTRODUCTION

To facilitate review of this response, the comments of the New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB) are included verbatim. The comments are divided into general and specific categories as presented in the letter. Los Alamos National Laboratory (LANL) responses follow each NMED comment.

GENERAL COMMENTS

HWB Comment

1. *Although the County of Los Alamos has designated the canyon portion of the solid waste management unit (SWMU) 00-030(g), as a "Scenic Open Lands District', at present, New Mexico Environment Department (NMED) has no means to ensure that the current designation will be maintained in the future and should therefore not be relied upon to ensure land use.*

LANL Response

1. LANL recognizes that any land-use designation such as recreational is, by nature, subject to political shifts. This is true throughout northern New Mexico and is not unique to Los Alamos. However, in this case the land in question is legally zoned as a Scenic Open Lands District. This formal zoning, coupled with the ongoing and steady shift away from development in community standards in Los Alamos County makes it highly unlikely that this designation could successfully be removed without the objection of the numerous, very vocal, and litigious special interest groups that have thus far resisted any change in any county open space designation. However, as unlikely as a change in designation may be, LANL agrees that such a zoning designation cannot be solely relied upon to ensure future land use in perpetuity, but rather this information is presented as an indicator of reasonably expected land use in the foreseeable future. This future land-use designation is further reinforced by the physical properties of the site in question: (1) it is a narrow canyon bottom with steep walls; (2) it is the major drainage for most of the developed area of the townsite to the south; and (3) it is heavily used by hikers, walkers, joggers, and bicyclists for recreational purposes. In its risk assessment guidance, the U.S. Environmental Protection Agency (EPA) states that an assumption of future residential land use may not be justifiable if the probability that the area will become residential in the future is minute and is presently unanticipated. Therefore, the continuation of the area as a recreational resource is reasonable, and the belief that this use will continue is justified.

HWB Comment

2. *Los Alamos National Laboratory (LANL) should revise the human health risk assessment for the child recreational scenario. To be consistent, LANL should conduct an 'Extended Backyard' scenario risk assessment for this SWMU, using the child exposure parameters (such as time spent outdoors, dust ingestion, etc.) that were utilized for the Extended Backyard scenario in the risk assessment conducted for the south fork of the Acid Canyon. Parameters related to site and contamination characteristics can remain equal to the values currently given in the Report.*

LANL Response

2. At the time this report was prepared and submitted, the "extended backyard" scenario had not been fully developed or approved by NMED for use in conducting risk assessments. However, the exposure parameters for the child recreational scenario for SWMU 00-030(g) were compared to the exposure parameters used for the "extended backyard" scenario for the South Fork of Acid Canyon. There were two parameters by which the input values differed: fraction of time spent on site and soil ingestion rate. The fraction of time spent on site for the child recreational scenario was 0.0114; for the "extended backyard" scenario, the fraction was 0.0228. The soil ingestion rate for the child recreational scenario was 1752 g/yr; for the "extended backyard" scenario, the soil ingestion rate was 626 g/yr. The "extended backyard" exposure parameters of Acid Canyon, used in conjunction with site contamination characteristics [i.e., the maximum concentration of each contaminant of potential concern (COPC)], yielded a maximum dose of 5.2 mrem/yr. The original child recreational scenario yielded a maximum dose of 6.9 mrem/yr. The residual radioactive material (RESRAD) calculations are included as Attachment 1.

LANL Supplemental Response

2s. The radiation doses received by a potential "extended backyard" child or an adult recreational user were calculated using the RESRAD computer code, version 6.21. The input parameters (i.e., time spent outdoors, dust ingestion, etc.) were the same as those used in the risk assessment conducted for the south fork of Acid Canyon. The radionuclide concentrations are bootstrapped 95% upper confidence limits (UCLs). The maximum dose is at time equals zero (i.e., the present). The maximum dose for the "extended backyard" child is 1.1 mrem/yr. The maximum dose for the recreational adult is 1.5 mrem/yr. The total dose levels are well below the 15 mrem/yr dose level used to determine if exposure is potentially unacceptable to the public (EPA 1997, 58693.1; DOE 2000, 67489.1). Therefore, the radionuclide chemicals of potential concern (COPCs) do not present an unacceptable dose to the "extended backyard" child or the recreational user.

Revised RESRAD evaluations are included with this document as Supplemental Attachment 1. Within the attachment is first an "extended backyard" child scenario which uses the south fork of Acid Canyon parameters as well as the revised UCL values; second is a revised adult recreational scenario which uses the revised UCL of the mean values.

HWB Comment

3. *The ecological risk assessment for this SWMU should be revised using upper confidence limits (UCLs) calculated with the correct statistical approach. For contaminants, which continue to generate hazard quotients (HQs) substantially above one, area use factors may be incorporated in the exposure calculations for those receptors with home ranges larger than the contaminated area.*

LANL Response

3. The 95% UCL of the mean will be recalculated using nonparametric methods (i.e., "bootstrapping"). The calculation will also be performed using one-half of the detection limit rather than the full detection limit as outlined by the EPA. The recalculated values will then be assessed using the same screening levels used in the Resouce Conservation and Recovery Act (RCRA) RCRA Facility Investigation (RFI) Report to determine if the risk, hazard, and/or dose have changed. The ecological screening assessment will also be evaluated using calculated 95% UCLs and other factors (e.g., area use) where appropriate as requested in the Request for Supplemental Information (RSI). This information will be provided to the NMED under separate cover.

LANL Supplemental Response

3s. The revised ecological screening assessment is included with this response as Supplemental Attachment 2 and was performed using the revised UCLs.

SPECIFIC COMMENTS

HWB Comment

4. *Table 2.3-6, SWMU 0-030(g), Frequency of Detected Inorganic Chemicals in Samples Collected by the Laboratory from the Mesa Top and Drainage Channel, page 36:*

   Correct the Table: The type of environmental media reported for mesa top samples is incorrect, out of 23 samples analyzed for mesa top, 21 were tuff and 2 were soil/fill samples (see Table 3, page 9, of SWMU 00-030(g) Revised Status Report, December 1998, EM/ER:98-484). Detection limits for antimony were above background values for 16 samples not 7 samples. Additionally, according to Table 3, page 10, of SWMU 00-030(g) Revised Status Report (December 1998), mercury was analyzed for 31 tuff and 2 soil/tuff samples but the Table 2.3-6 reports only 23 mesa top samples for mercury.

LANL Response

4. There was some uncertainty regarding the media code (soil or tuff) for two samples (AAA4375 and RE00-98-0031) at location ID 00-3670. Therefore, the location was inspected and the field sampling team was interviewed. From this newly gathered information, it was determined that the media of both samples in question were crushed tuff. Table 3, page 9 of SWMU 00-030(g) Revised Status Report, December 1998, EM/ER:98-484 was in error, and the table in the RFI Report for SWMU 00-030(g) correctly reports the media as tuff (Qbt).

   The mercury data are under re-evaluation and, if necessary, a revised table will be submitted under separate cover upon completion of this data review.

LANL Supplemental Response

4s. Table 3, page 10, of the SWMU 00-030(g) revised status report (December 1998) indicates that mercury was analyzed for 31 tuff and 2 soil/tuff samples for the mesa top. Tables 1 and 2 indicate that a number of these samples were collected in areas where subsequent excavation occurred (e.g., "septic tank"). The RFI report for SWMU 00-030(g) (February 2001) evaluated only those sample locations that still remain at the site.

HWB Comment

5. *Table 2.3-20, SWMU 0-030(g), Frequency of Detected Organic Chemicals in Samples Collected by the Laboratory from the Mesa Top and Drainage Channel, page 65:*

   Provide the rationale for using a range of values for estimated quantitation limits and their significance to data evaluation of organic chemicals.

LANL Response

5. The range of estimated quantitation limits (EQLs) comes from different laboratories using different equipment at different times because of multiple sampling events that occurred over several years. There is no significant data evaluation effect because all detections are reported regardless of whether or not the value was less than, equal to, or greater than the reported EQL. Revised Table 2.3-20 has been included as Attachment 2 showing only the highest reported EQL and not the range of reported EQLs.

HWB Comment

6. *Table 2.3-22, SWMU 0-030(g), Frequency of Detected Organic Chemicals in Sediment Samples Collected by the Laboratory and NMED/DOE OB from the Stream Channel in Acid Canyon, page 66:*

See comment 4.

LANL Response

6. See response to comment 4.

HWB Comment

7. *Section 2.3.5.1, Nature and Extent of Contamination, page 75:*

   LANL Statement: "The source of 4,4'-DDT and its metabolites may be the result of aerial spraying by the U.S. Forest Service in 1963 for the purpose of controlling spruce budworms."

   Note that 4,4'-DDT, 4,4'-DDD, 4,4'-DDE were detected in the samples taken from the septic tank (e.g. AAA 1904, AAA 1907), hence, the septic tank cannot be discounted as the source of contamination in the drainage channel.

LANL Response

7. LANL agrees that the septic tank cannot be ruled out entirely as a potential contamination source; however, the intent of the referenced statement was to illustrate that sources other than the septic tank inputs may also be significant contributors. 4,4'-DDT and its metabolites were detected in the streambed upgradient from SWMU 00-030(g). Therefore, the presence of 4,4'-DDT and its metabolites as a result of aerial spraying by the U.S. Forest Service in 1963 cannot be discounted as a source. One might also argue that since the original septic tank was opened, was backfilled with soil, and was without an impermeable cover, it is possible that DDT and its metabolites entered the septic tank during the time of widespread aerial spraying. Regardless of the original source(s) of the contamination, the residual levels are such that no unacceptable risk remains.

HWB Comment

8. *Section 2.3.5.1, Nature and Extent of Contamination, page 76:*

   LANL Statement: "All of the Acid Canyon data will be presented and discussed in the evaluation of sediment and surface water in Acid Canyon in a report to be prepared by the Canyons Focus Area."

   Data from the RFI investigation indicates that there is contamination up gradient and down gradient of SWMU 00-030(g) in the Acid Canyon. It is likely that over the years, some of the contamination from SWMU 00-030(g) has migrated and contributed to the contamination found in Acid Canyon. NMED will need to review the report that will be prepared by Canyons Focus Area for Acid Canyon before concurring with any no further action recommendation for SWMU 00-030(g).

LANL Response

8. As discussed with and agreed to by NMED at the Environmental Restoration (ER) Monthly meeting on July 17, 2002, data from Acid Canyon Reach 1 and Acid Canyon Reach 2 will be used in a revised nature and extent discussion to further define the extent of any contamination unique to SWMU 00-030(g). This information will be provided to the NMED under separate cover.

LANL Supplemental Response

8s. Evaluation of the Acid Canyon Reach 1 (AC-1) data and the Acid Canyon Reach 2 (AC-2) data relative to the data collected at the point where the 00-030(g)-affected drainage intersects Acid Canyon presented no clear evidence of any extent trend attributable to 00-030(g). The data, coupled with the physical barriers present at the confluence, suggest that 00-030(g) is not, and has not historically been, a significant contributor to Acid Canyon. A summary of the reach evaluations is presented below.

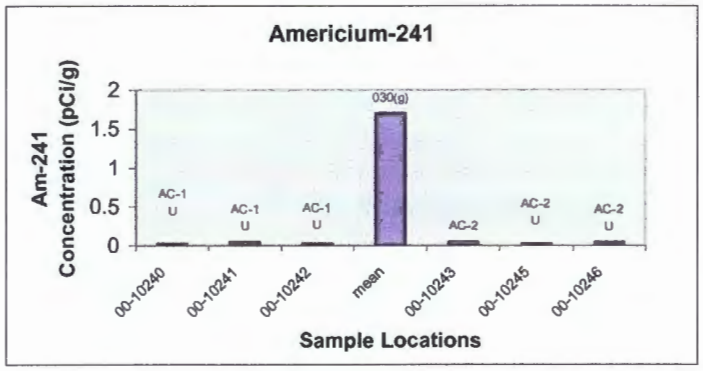
The drainage channel from SWMU 00-030(g) extends approximately 600 ft to the bottom of Acid Canyon where it joins with an ephemeral stream channel. This stream channel originates upcanyon from the SWMU 0-030(g) drainage and receives runoff from the New Catholic Church, Los Alamos High School parking lots and athletic fields, and local streets and parking lots. The 00-030(g) drainage channel is currently interrupted by an unmaintained dirt service road that prevents runoff from reaching the main Acid Canyon stream channel unless there is extremely heavy runoff. However, historically the 00-030(g) drainage channel likely did connect with the Acid Canyon stream channel and contribute sediment and contaminants to the stream channel. Acid Canyon stream channel data have reported concentrations of metals, radionuclides, pesticides, and polychlorinated biphenyls in the sediment above the point at which the 00-030(g) drainage channel converges with the Acid Canyon stream channel as well as below the confluence. The chemicals detected in the Acid Canyon stream channel include COPCs detected in the 00-030(g) drainage channel sediment. In addition, the Acid Canyon stream channel data reported concentrations of metals, radionuclides, and organic chemicals—particularly polycyclic aromatic hydrocarbons (PAHs)—in the sediment above and below the 00-030(g) drainage channel confluence that were not detected in the drainage channel sediments.

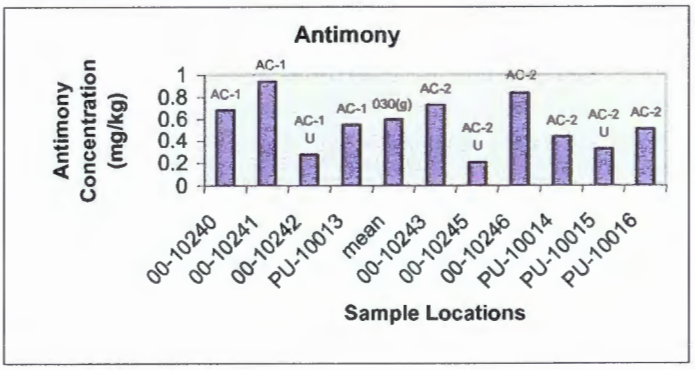
To determine the extent of contamination from the SWMU 00-030(g) drainage channel, it was necessary to look at the concentrations of chemicals and radionuclides in the reaches above and below the confluence with the Acid Canyon stream channel. AC-1 extends approximately 200 yd above the 00-030(g) confluence and ends just upstream of the confluence; AC-2 starts just below the confluence and extends approximately 200 yd to just above the confluence with the south fork of Acid

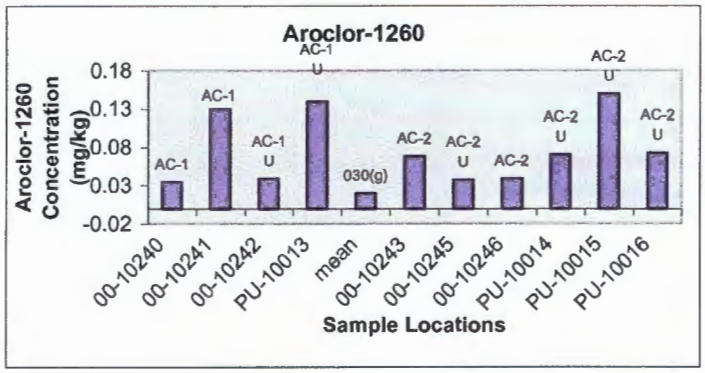
Canyon and the start of AC-3. AC-3 has been influenced by runoff from the south fork such that concentrations of COPCs and other chemicals and radionuclides are higher in this reach than AC-1 and AC-2. The determination of extent of contamination from the 00-030(g) drainage is therefore dependent upon whether concentrations of COPCs markedly increase, decrease, or remain unchanged in AC-2 relative to AC-1.

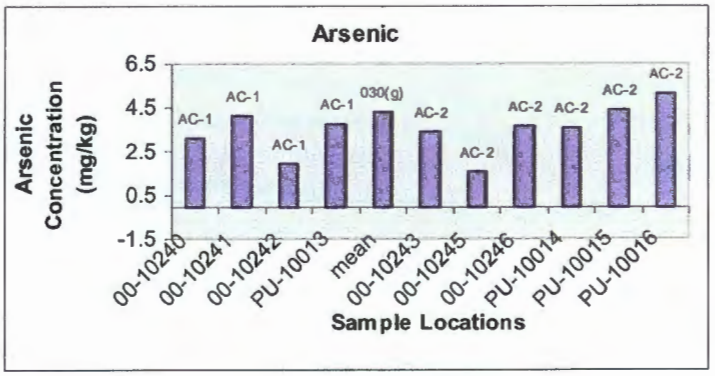
COPC concentrations are related to the particle size and percent silt/clay content of the sediment. The finer the particles and the higher the percent silt/clay, the higher the concentrations tend to be. For example, samples RE00-99-0175 and RE00-99-0178 at locations 00-10242 (AC-1) and 00-10245 (AC-2) had the largest particle size (coarse sand) and the lowest percent silt/clay content (9.7% and 5.6%, respectively) of all the sediment packages sampled, and generally they had the lowest concentrations of COPCs, particularly for metals and radionuclides (see the bar graphs in Figure 1). Sample RE00-99-0174 at location 00-10246 had the smallest particle size (very fine sand) and the highest percent clay/silt content (73.1%), and generally it had the highest COPC concentrations. The other sample locations had fairly similar-sized particles (coarse silt, fine sand, and very fine sand) and fairly similar percent silt/clay content (28.5% to 54.2%). Because the sampling of the Acid Canyon stream channel sediments was designed to sample those sediments containing contamination, the sample data show fluctuations in concentrations along the length of each reach and do not necessarily show the lowest concentrations at the end of a reach. In addition, the geometry of the Acid Canyon stream channel plays a role in the accumulation of sediments. Deposition areas were preferred during the Acid Canyon stream channel sampling, resulting in potentially elevated concentrations of COPCs relative to other sample locations unrelated to contaminant sources. This is demonstrated in the bar graphs for locations 00-10246, PU-10014, and PU-10015 in AC-2. Although these locations are at a distance from the confluence, they generally have concentrations of COPCs and non-related chemicals, such as manganese, cesium-137, and several PAHs, that are higher relative to upstream AC-2 concentrations.

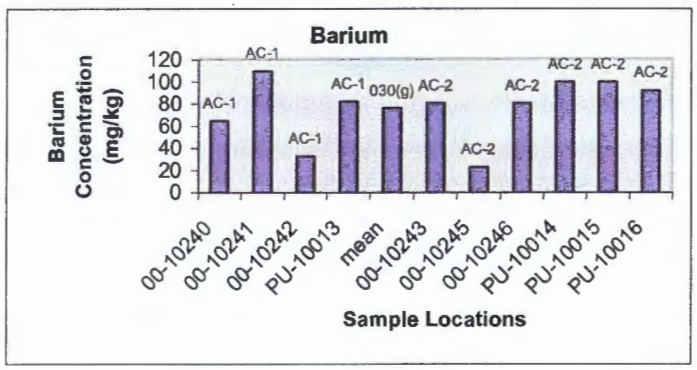
The bar graphs constructed for each COPC illustrate that the mean 00-030(g) drainage concentration does not result in a substantial change in concentrations in AC-2, especially relative to concentrations in AC-1. Most of the COPCs show a general decreasing trend in concentrations from AC-1 to AC-2 (i.e., lower concentrations at location PU-10016 relative to either other AC-2 concentrations or AC-1 concentrations, or overall). The exceptions to this are arsenic, cobalt, plutonium-239, and thallium, which were reported at concentrations higher than any concentration at sample location PU-10016 (the last sample location in AC-2). However, maximum concentrations of arsenic and cobalt are not that different from sediment background (i.e., within 1 mg/kg and 4 mg/kg, respectively) and the maximum thallium concentration is similar to sediment background (0.69 mg/kg versus 0.73 mg/kg), and none are different from soil background (LANL 1998, 59730). The arsenic and thallium concentrations decrease in the sediment packages immediately downstream from the 00-030(g) drainage confluence, while the mean cobalt concentration in the 00-030(g) drainage is less than all but one AC-1 and AC-2 concentrations (those with the lowest percent silt/clay content). The plutonium-239 concentration in sample location PU-10016 is likely influenced by runoff from the south fork since this location is approximately 15 to 20 ft upstream from the south fork confluence within the overbank sediment. As a result, these overbank sediment likely receive deposits from the south fork which had plutonium-239 concentrations several orders of magnitude higher than AC-1, AC-2, or 00-030(g), during periods of runoff. The plutonium-239 concentrations in sample locations PU-10014 and PU-10015 are also slightly elevated over the upstream concentrations and the sediment background concentrations (0.2 to 0.3 pCi/g) (LANL 1998, 59730). In addition, despite a high mean plutonium-239 concentration in the 0-030(g) drainage channel, the three closest downstream sample locations did not have plutonium-239 concentrations higher than AC-1 concentrations.


Americium-241
Am-241 Concentration (pCi/g)
2
1.5
1
0.5
0
AC-1 U
AC-1 U
AC-1 U
030(g)
AC-2
AC-2 U
AC-2 U
00-10240
00-10241
00-10242
mean
00-10243
00-10245
00-10246
Sample Locations


Antimony
Antimony Concentration (mg/kg)
1
0.8
0.6
0.4
0.2
0
AC-1
AC-1
AC-1 U
AC-1
030(g)
AC-2
AC-2 U
AC-2
AC-2
AC-2
AC-2 U
AC-2
00-10240
00-10241
00-10242
PU-10013
mean
00-10243
00-10245
00-10246
PU-10014
PU-10015
PU-10016
Sample Locations


Aroclor-1260
Aroclor-1260 Concentration (mg/kg)
0.18
0.13
0.08
0.03
-0.02
AC-1
AC-1
AC-1 U
AC-1 U
030(g)
AC-2
AC-2 U
AC-2
AC-2 U
AC-2 U
AC-2 U
00-10240
00-10241
00-10242
PU-10013
mean
00-10243
00-10245
00-10246
PU-10014
PU-10015
PU-10016
Sample Locations


Arsenic
Arsenic Concentration (mg/kg)
6.5
4.5
2.5
0.5
-1.5
AC-1
AC-1
AC-1
AC-1
030(g)
AC-2
AC-2
AC-2
AC-2
AC-2
AC-2
00-10240
00-10241
00-10242
PU-10013
mean
00-10243
00-10245
00-10246
PU-10014
PU-10015
PU-10016
Sample Locations


Barium
Barium Concentration (mg/kg)
120
100
80
60
40
20
0
AC-1
AC-1
AC-1
AC-1
030(g)
AC-2
AC-2
AC-2
AC-2
AC-2
AC-2
00-10240
00-10241
00-10242
PU-10013
mean
00-10243
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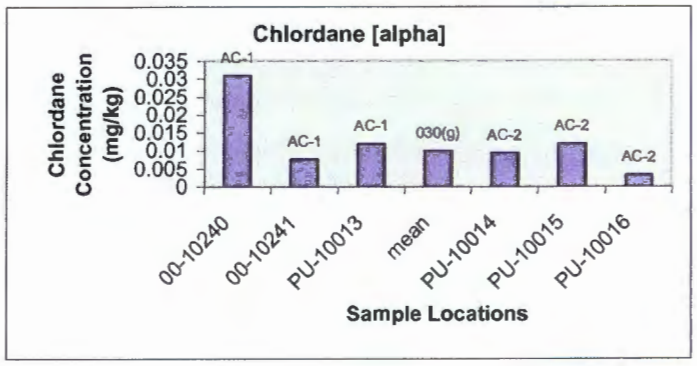
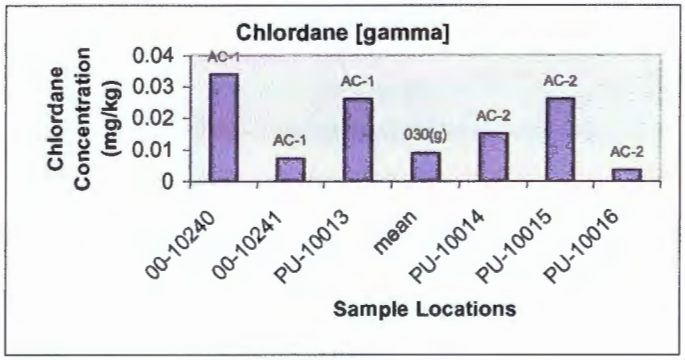
00-10246
PU-10014
PU-10015
PU-10016
Sample Locations


Chlordane [alpha]
Chlordane Concentration (mg/kg)
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
AC-1
AC-1
AC-1
030(g)
AC-2
AC-2
AC-2
00-10240
00-10241
PU-10013
mean
PU-10014
PU-10015
PU-10016
Sample Locations


Chlordane [gamma]
Chlordane Concentration (mg/kg)
0.04
0.03
0.02
0.01
0
AC-1
AC-1
AC-1
030(g)
AC-2
AC-2
AC-2
00-10240
00-10241
PU-10013
mean
PU-10014
PU-10015
PU-10016
Sample Locations

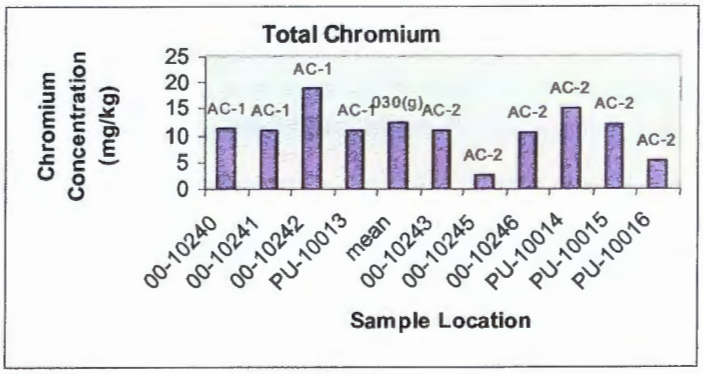
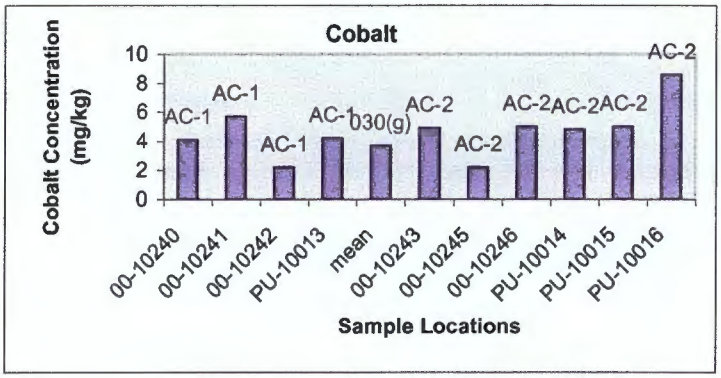
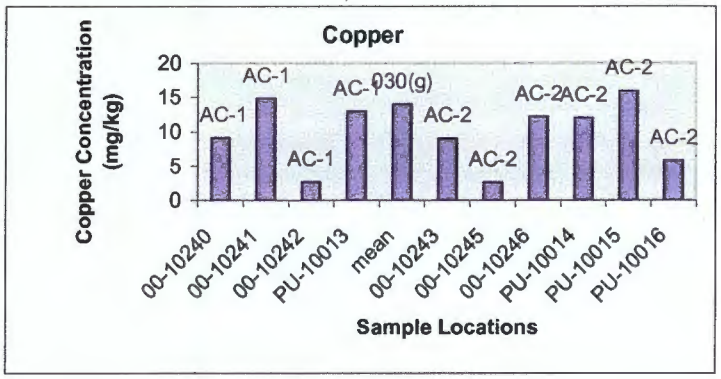
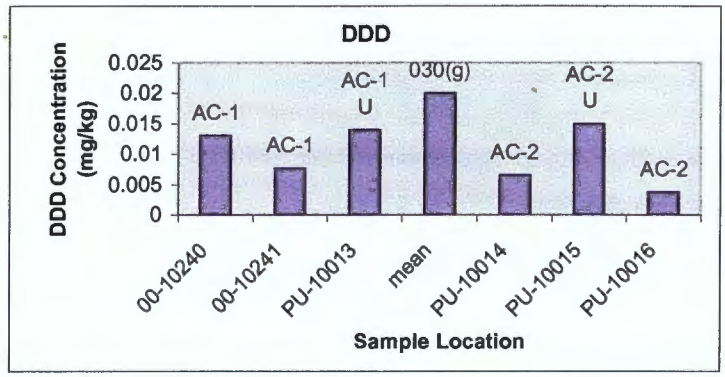
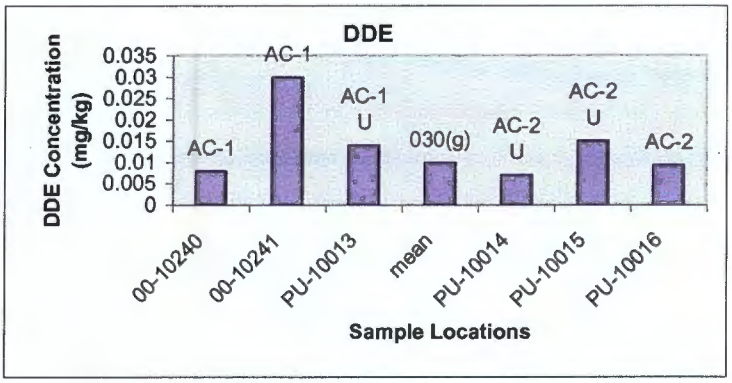

Total Chromium
Chromium Concentration (mg/kg)
25
20
15
10
5
0
AC-1
AC-1
AC-1
AC-1
030(g)
AC-2
AC-2
AC-2
AC-2
AC-2
AC-2
00-10240
00-10241
00-10242
PU-10013
mean
00-10243
00-10245
00-10246
PU-10014
PU-10015
PU-10016
Sample Location

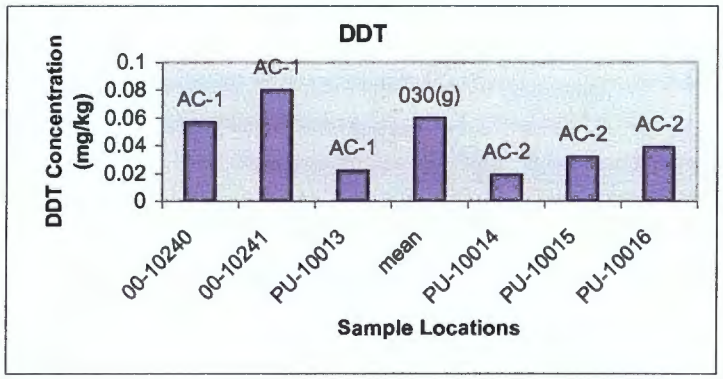
Figure 1

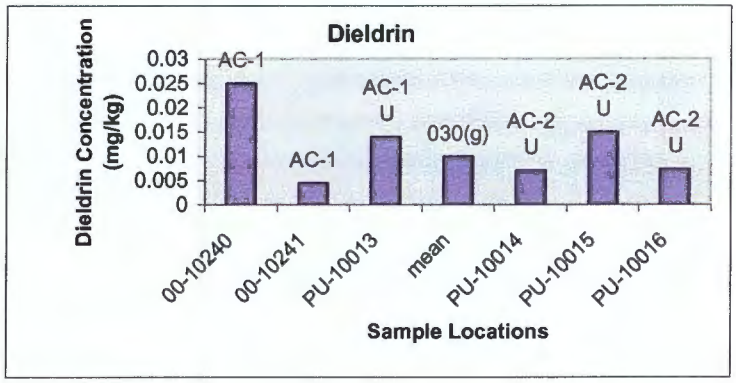


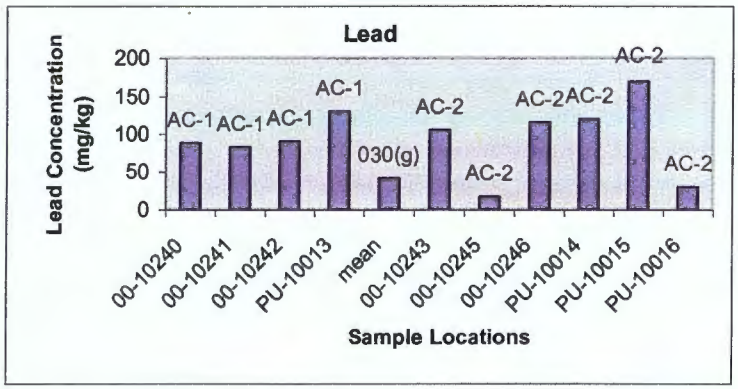


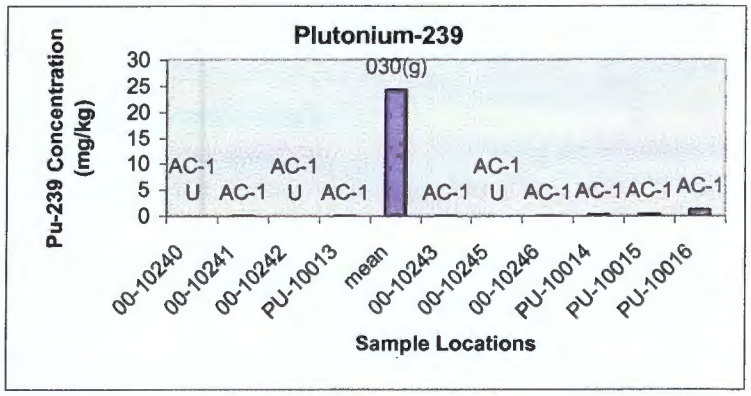












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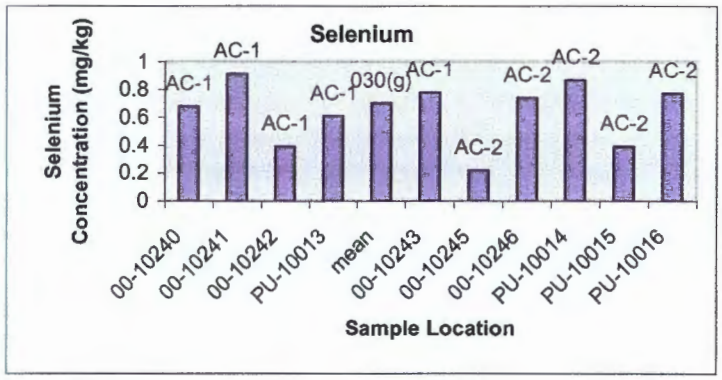

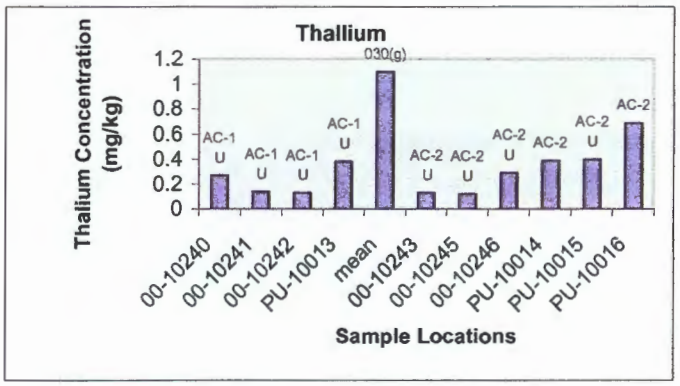

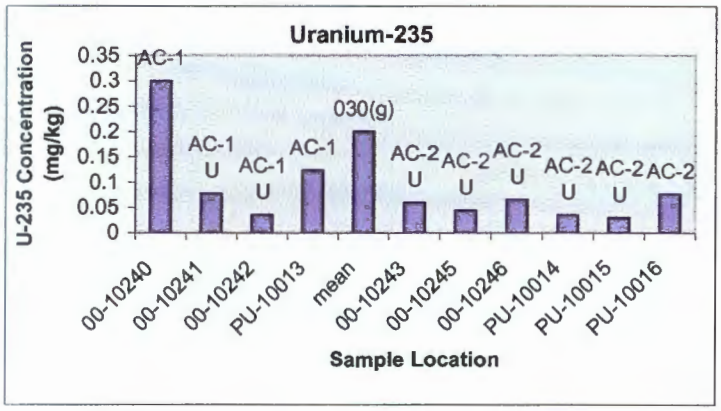

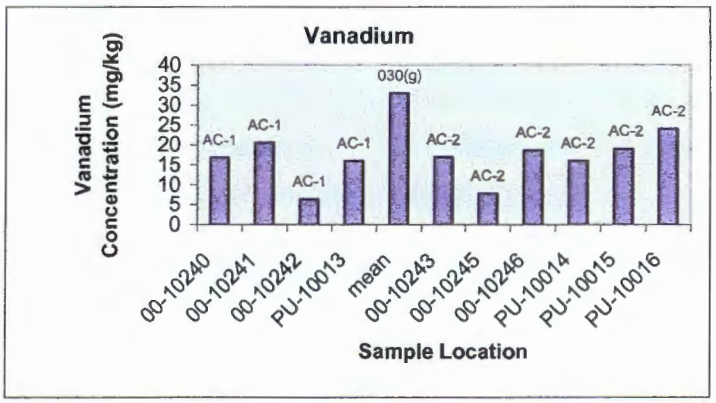

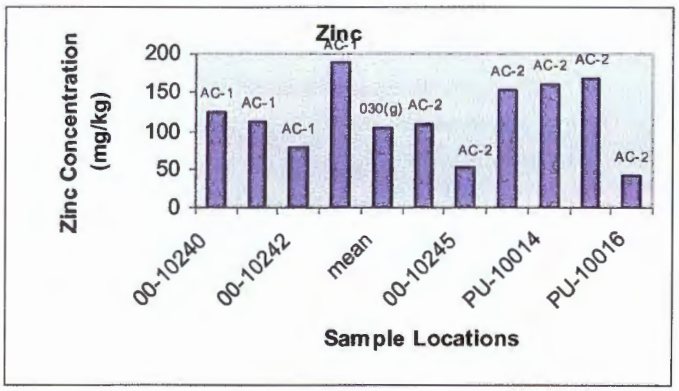

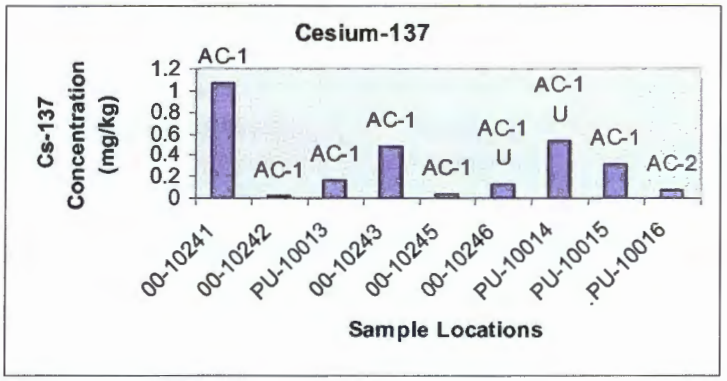

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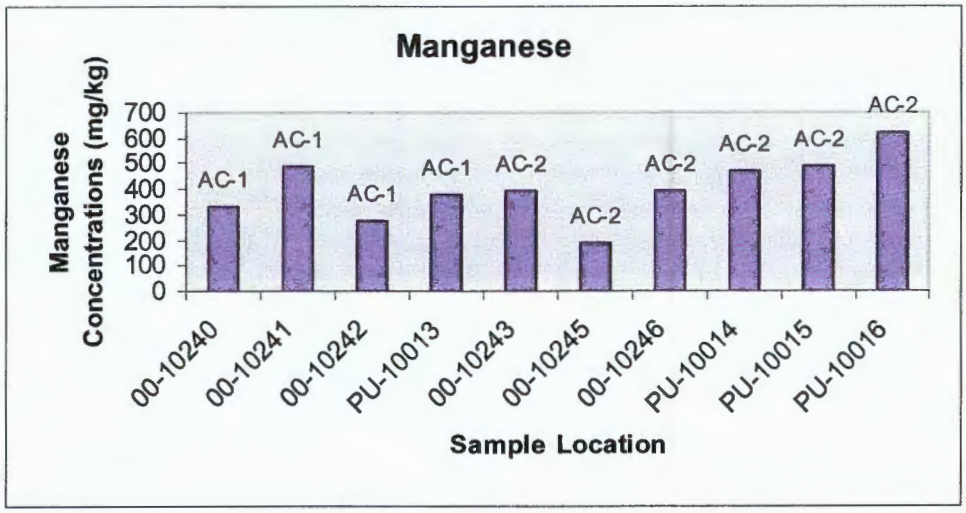


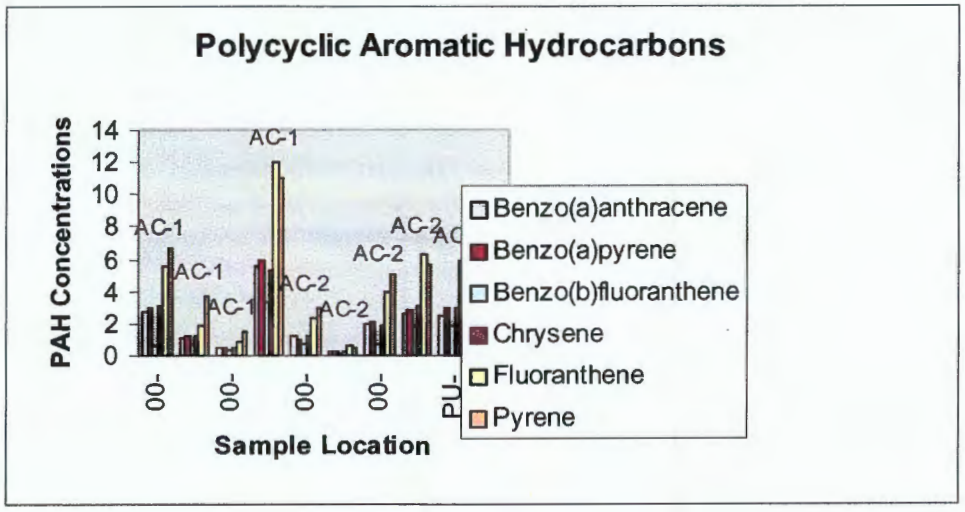


Figure 1 (concluded)

The bar graphs in Figure 1 also show that only americium-241, 4,4'-DDD, plutonium-239, thallium, and vanadium had mean drainage concentrations greater than any Acid Canyon stream channel concentrations. Americium-241, 4,4'-DDD, thallium, and vanadium concentrations in AC-2 were not greatly increased (if at all) despite the potentially high input from 00-030(g); americium-241 was not detected in AC-2 locations furthest downstream from the 00-030(g) confluence, thallium was not greater than sediment background, vanadium was 4 mg/kg above sediment background and 3 mg/kg above the next highest concentration in AC-1, and 4,4'-DDD was less than AC-1 concentrations. Plutonium-239 concentrations did increase in the furthest downstream sample locations in AC-2 but, except for location PU-10016, which is influenced by the south fork, only by 0.2 to 0.3 pCi/g in the next furthest downstream locations (0.1 pCi/g AC-1 versus 0.3 to 0.4 pCi/g AC-2). These comparisons indicate that the 00-030(g) drainage channel contributions of COPCs do not result in substantial changes in concentrations in AC-2, and the extent of these COPCs is defined.

Because of the factors (described above) that influence the concentrations within a sediment package and the variability found at each sample location, the influence of the 00-030(g) drainage channel on contaminant concentrations in the Acid Canyon stream channel is illustrated by looking at means

versus individual location concentrations (i.e., net change over the length of the reach). Most COPC concentrations either show a slight overall decrease (ranging from 0.002 mg/kg or pCi/g to 1.9 mg/kg or pCi/g), a slight overall increase (ranging from 0.001 mg/kg or pCi/g to 0.6 mg/kg or pCi/g), or were not detected in the Acid Canyon stream channel sediment (see Table 1). Overall, approximately 27% (9 of 33) of COPCs detected in the Acid Canyon stream channel showed an overall increase, while 73% (24 of 33) showed an overall decrease, in concentrations. Three COPCs had higher changes in concentration than listed above: barium, which had a 6.8 mg/kg decrease; lead, which had a 8.2 mg/kg increase; and zinc, which had a 6.1 mg/kg increase. All three COPCs had lower mean concentrations in the 00-030(g) drainage then in reach AC-1, so it is unlikely that the drainage channel would have caused an increase in overall AC-2 concentrations of lead and zinc. Based on these comparisons, the 00-030(g) drainage channel does not influence overall chemical and radionuclide concentrations in AC-2 and, therefore, extent for the COPCs from 00-030(g) is defined.

Table 1
Mean Concentrations[a] in Acid Canyon Reaches (AC-1 and AC-2) and SWMU 00-030(g)

Chemical	AC-1 Mean	SWMU 0-030(g) Mean	AC-2 Mean
Amercium-241	0.036	1.7	0.037
Antimony	0.54	0.57	0.55
Arsenic	3.5	4.25	3.6
Aroclor-1254	ND[b]	0.3	ND
Aroclor-1260	0.12	0.024	0.073
Barium	85.4	76.4	78.6
Cadmium	0.06	0.15	0.049
Chlordane(alpha-)	0.017	0.012	0.008
Chlordane(gamma-)	0.022	0.0086	0.015
Cobalt	4.6	3.7	5.0
Copper	10.6	14.0	9.5
Chromium	11.2	12.5	9.3
DDD(4,4')	0.012	0.017	0.008
DDE(4,4'-)	0.017	0.011	0.01
DDT(4,4')	0.053	0.061	0.03
Dieldrin	0.015	0.011	0.01
Endosulfan I	ND	0.0044	ND
Endosulfan II	ND	0.0084	ND
Endrin aldehyde	ND	0.0071	ND
Endrin ketone	ND	0.011	ND
Lead	86.7	42	94.9
Mercury	0.038	0.35	0.035
Plutonium-238	ND	0.14	ND
Plutonium-239	0.062	15.8	0.37 (0.19)[c]
Selenium	0.64	0.66	0.58
Silver	ND	0.53	ND
Thallium	0.32	1.1	0.33
Toxaphene	ND	0.41	ND
Uranium-234	0.99	5.1	0.91

Table 1 (concluded)

Chemical	AC-1 Mean	SWMU 0-030(g) Mean	AC-2 Mean
Uranium-235	0.11	0.25	0.048
Uranium-238	1.0	3.1	0.85
Vanadium	16.6	33	17.2
Zinc	106.9	104.4	113

[a] Units for concentrations are mg/kg for inorganic and organic chemicals and pCi/g for radionuclides.

[b] ND = not detected.

[c] Concentration in parentheses is the mean without sample location PU-10016, which is influenced by the south fork.

Another indication that 00-030(g) does not influence chemical concentrations in the Acid Canyon stream channel, and that extent of the COPCs from 00-030(g) is defined, is represented by the concentrations of chemicals not detected in the drainage channel. These concentrations show a trend similar to that of the COPCs in that concentrations show either a slight overall decrease (ranging from 0.06 mg/kg to 1.0 mg/kg), a slight overall increase (ranging from 0.21 mg/kg to 1.4 mg/kg), or no change (see Table 2). In addition, the bar graphs in Figure 1 show similar variability in concentrations in both reaches depending upon sample location, indicating that other factors are influencing whether concentrations are higher or lower at any given location.

Manganese had an overall increase of 15.8 mg/kg in AC-2 (a mean of 403.5 mg/kg AC-1 versus a mean of 419.3 mg/kg AC-2) (see Table 2). Manganese also had its maximum concentration at location PU-10016, similar to results found for arsenic, cobalt, thallium, and plutonium-239. Cesium-137 and PAHs concentrations were variable but decreased from AC-1 to AC-2 and had their lowest concentrations at location PU-10016. Overall, approximately 36% (8 of 22) of chemicals not detected in the 00-030(g) drainage channel showed an increase, while 64% (14 of 22) showed a decrease in concentrations. The similarity in the trends of chemical concentrations, regardless of whether they were detected in the 00-030(g) drainage channel, indicates that the concentrations are not influenced to any great extent (if at all) by the releases from 00-030(g), and that extent is defined.

Table 2
Mean Concentrations[a] in Acid Canyon Reaches (AC-1 and AC-2) for Chemicals Not Detected in SWMU 00-030(g) Drainage

Chemical	AC-1 Mean	AC-2 Mean
Acenaphthene	0.64	0.87
Anthracene	0.95	0.75
Benzo(a)anthracene	1.8	1.5
Benzo(a)pyrene	1.97	1.6
Benzo(b)fluoranthene	2.7	2.7
Benzo(g,h,I)perylene	0.5	0.41
Benzo(k)fluoranthene	0.98	0.92
Benzoic Acid	2.9	4.3
Bis(2-ethylhexyl)phthalate	0.66	0.87
Carbazole	0.55	0.84
Cesium-137	0.39	0.27
Chrysene	1.9	1.6
Dibenz(a,h)anthracene	0.54	0.89

Table 2 (concluded)

Chemical	AC-1 Mean	AC-2 Mean
Dibenzofuran	0.51	0.89
Fluoranthene	3.7	3.3
Fluorene	1.8	0.86
Indeno(1,2,3-cd)pyrene	0.85	0.76
Manganese	403.5	419.3
2-Methylnaphthalene	0.42	0.89
Naphthalene	0.8	0.7
Phenanthrene	3.5	2.7
Pyrene	4.4	3.4

[a] Units for concentrations are mg/kg for inorganic and organic chemicals and pCi/g for radionuclides.

HWB Comment

9. *Section 2.4.2.1(b), Screening Evaluation, page 80:*

   LANL Statement: "The maximum concentration of each COPC was compared with the SAL for radionuclides; the SALs for Class A, B1, and B2 carcinogens; 10 times the SAL for Class C carcinogens; or one-tenth of SAL for noncarcinogens when there are more than two noncarcinogenic COPCs."

   All carcinogens should be compared to the NMED soil screening action levels (SALs), Class C carcinogens should not be singled out for an arbitrary comparison to ten times the SAL. Revise the statement.

LANL Response

9. The RFI Report for SWMU 00-030(g) was written when NMED's 1998 position paper and risk-based decision tree instructed that Class C carcinogens be compared to 10 times SAL and noncarcinogens be compared to 0.1 SAL. When the March 2000 NMED position paper came out advising to compare all carcinogens to 10-6 risk levels, the RFI Report had been written and was in review. Because no Class C carcinogens were part of the screening assessment, it was decided that the text and tables did not need revision. When the NMED soil screening levels (SSLs) were available in December 2000, the RFI Report had already been reviewed, all comments incorporated, and the report was in final editing. A re-evaluation using NMED SSLs at that stage would have delayed submission of the report and would not have affected the conclusions of the report. Therefore, no changes to the text or tables are necessary.

HWB Comment

10. *Table 2.4-3, SWMU 0-030(g), Comparison of Noncarcinogenic Mesa Top COPCs to SALs, page 82:*

    Lead should not have been included in the table. The screening action level (SAL) for lead is not calculated in the same manner as other non-carcinogens. It is not appropriate to use 40 ppm as the 0.1 SAL since the SAL of 400 ppm for lead is based on blood lead levels. Lead should be evaluated separately as done on page 85. Revise the table.

LANL Response

10. Table 2.4-3 fulfills the intent of the first sentence in (b) Screening Evaluation: "The COPCs identified by the data review were compared with SALs to determine if the chemicals were detected at concentrations of potential concern to human health." LANL agrees that the SAL for lead is not calculated in the same manner as other noncarcinogens; however, neither are the noncarcinogens with "max" values (e.g., Chromium III) and "sat" values (e.g., 1,2-dichlorobenzene). The 0.1 SAL comparison is intended to identify chemicals that require further evaluation and is not dependent on how the SAL is calculated. Table 2.4-3 compares COPC sample values to SALs and 0.1 SAL, regardless of how they are calculated, for a first cut indication of whether or not further evaluation is warranted. Using this approach LANL identified lead for further evaluation; a separate evaluation based on blood lead levels is presented on page 85 of the RFI Report.

HWB Comment

11. Table 2.4-4, SWMU 0-030(g), Comparison of Noncarcinogenic Drainage Channel COPCs to SALs, page 82:

See comment number 7.

LANL Response

11. This comment refers back to Specific Comment 7 regarding 4,4'-DDT and its metabolites. 4,4'-DDT and its metabolites are carcinogens and are compared to their respective SALs in Tables 2.4-1 and 2.4-2. It is not appropriate to include a carcinogen in Table 2.4-4, "Comparison of Noncarcinogenic Drainage Channel COPCs to SALs."

HWB Comment

12. Table 2.4-5, SWMU 0-030(g), Comparison of Mesa Top radionuclide COPCs to SALs, page 83:

Correct the table, the depth reported for sample AAA1909 is incorrect, it should be 3-8 ft not 36-96 ft.

LANL Response

12. LANL agrees that "36-96" in the depth column of Table 2.4-5, which is the depth in inches, should be replaced with "3 to 8 ft," which is the depth in feet.

HWB Comment

13. Section 2.4.2.2(b), Ecological Screening-Screening Evaluation, page 93:

LANL Statement: " The chemicals that appear in bold in Table 2.4-8 were identified as COPECs at SWMU 00-030(g) because their HQs were greater than 0.3."

Modify the Table, none of the chemicals with hazard quotients (HQs) greater than 0.3 appear in bold in Table 2.4-8.

LANL Response

13. LANL agrees that none of the chemicals with hazard quotients (HQs) greater than 0.3 appear in bold text in Table 2.4-8. Text preceding Table 2.4-8 should be changed to indicate the chemicals with HQs greater than 0.3 instead of using bold text in the table. The revised text should read, "The chemicals identified in Table 2.4-8 as chemicals of potential ecological concern (COPECs) at SWMU 00-030(g) because their HQs were greater than 0.3 are antimony, arsenic, barium, hexavalent chromium, cobalt, copper, lead, mercury, selenium, silver, thallium, zinc, aroclor-1254, aroclor-1260, 4,4'-DDE, 4,4'-DDT, dieldrin, endrin aldehyde, endrin ketone, and plutonium-239."

HWB Comment

14. *Section 2.4.2.2(c), Ecological Screening-Uncertainty Analysis, page 95:*

    The HQs generated during initial screening are greater than one for most of the chemicals of potential ecological concern (COPECs), but are dismissed based on the assumption that the HQs were developed conservatively. The screening level ecological risk assessment does use conservative assumptions that result in conservative HQs, but COPECs cannot be discounted based on this assumption. If the initial screening evaluation results in HQs of greater than one, then HQs should be developed using site- specific parameters such as area use factors and bioavailability. Bioavailablity should only be considered when information is available on the speciation and bioavailablity of the contaminants found at the site. NMED disagrees with LANL that arsenic with HQ of 13.2 for vagrant shrew and 6.8 for deer mouse is not a COPEC. Although HQs for cobalt, silver, thallium, and zinc were greater than one, they were also dismissed as potential COPECs. Additionally, Aroclor-1260, 4,4-DDE, 4,4-DDT, endrin ketone with respective HQs of 3.8, 10, 24.3 and 6.7 were not retained as COPECs. LANL should perform a site-specific ecological risk assessment.

LANL Response

14. The COPECs in question are not dismissed based solely on the assumption of conservatively developed HQs. Although this rationale is appropriate since the screening assessment process is specifically designed to overestimate potential risk to receptors, additional reasons were also presented as to why the COPECs in the drainage channel do not pose an unacceptable risk to ecological receptors. The individual COPECs in question are discussed relative to their frequency of detection, background (where applicable) and extent of contamination within the drainage channel. Based on this holistic evaluation, the following rationales were presented regarding why there remain no potential adverse impacts to ecological receptors: (1) the abundant and ecologically healthy habitat found along the drainage channel, (2) the infrequent and low level of detection of the COPECs, (3) the broad distribution of receptor populations in relation to the area of contamination, (4) the similarity of exposure concentrations to background concentrations of inorganics, and (5) the relatively low hazard quotient/hazard index is given the very conservative assumptions of bioavailability, area use, dietary composition, and ingestion rates, etc. LANL will reassess the ecological risk once the 95% UCLs of the mean for each COPEC are recalculated as requested in General Comment 3 and Specific Comment 15. As a part of the recalculation, one half the detection limit for nondetected values will be used rather than the full detection limit. The use of one half the detection limit is in keeping with EPA guidance and is also more representative of actual exposure levels. In addition, the COPECs will be reassessed using individual area use, population area use, and other factors as appropriate to more clearly explain why there is not a potential for adverse ecological risk at SWMU 00-030(g). This information will be provided to the NMED under separate cover.

LANL Supplemental Response

14s. The revised ecological screening assessment is included as Supplemental Attachment 2 to this response and was performed using the revised UCLs.

LANL will not perform a site-specific ecological risk assessment for SWMU 00-030(g). The scale of the SWMU is less than one acre and, therefore, is too small an area to conduct an effect and exposure characterization. The COPECs will be re-evaluated as stated above and provided under separate cover.

HWB Comment

15. Appendix E, page E-21

LANL Statement: "In most cases, the assumption of both normality and lognormality was rejected at a 95% level of statistical confidence, which is likely the result of a significant number of non detected values in each data set. Rather than using a nonparametric approach that employs the median value to determine 95% UCLs, normal (SW-846 Chapter Nine 1986) and lognormal (Land H method, Gilbert 1987, 55619) 95% UCLs were calculated for each constituent of concern."

Mean values using the 95% UCL of the mean were calculated based on both lognormal and normal distributions even though the data sets did not pass the test for either distribution. LANL utilized the higher of the two estimates of the mean, unless they both exceeded the max value; then the max value was used. If the data do not fit either a normal or lognormal distribution then those distributions are not appropriate for calculating a statistical estimate of the mean for these contaminants. LANL should use either a nonparametric method such as a bootstrap method or the maximum value.

LANL Response

15. The 95% UCLs of the mean will be recalculated using nonparametric methods (i.e., "bootstrapping"). The calculation will also be performed using one-half of the detection limit rather than the full detection limit as outlined by EPA. The recalculated values will then be assessed using the same screening levels used in the RFI Report to determine if risk, hazard, and/or dose have changed. This information will be provided to the NMED under separate cover.

LANL Supplemental Response

15s. The revised UCLs are provided in the associated revised assessments (see Supplemental Attachments 1 and 2) as well as in a comparison with the respective SALs (see Supplemental Attachment 3).

HWB Comment

16. Appendix F, RESRAD Parameters, page F-12

For both radionuclides (using RESRAD) and chemicals (using ingestion, inhalation etc. risk model equations), the total grams of soil ingested over the six-year scenario was 120 grams. In the Acid Canyon Extended Backyard scenario the total soil ingested over the six year scenario is 85.68 grams. The radionuclide analysis is presented as annual risk under both the adult and child scenario; risk from exposure over the time frame of the scenario (6 years for child; 30 years for adult) is not presented. Therefore the risk associated with maximum level of each radionuclides should be calculated for the adult and required extended backyard scenarios.

LANL Response

16. The risk associated with maximum levels of each radionuclide was not presented because the U.S. Department of Energy (DOE) regulates radionuclides according to dose, not according to risk. As presented in Table F-3.0-1, (page F-12), the time frame for the child trail user is 6 yrs. As presented in Table F-3.0-2, the time frame for the adult trail user is 30 yrs (page F-14). The dose for each of those scenarios was calculated using the time frame appropriate to the respective scenario.

    The supplemental submittal to this RSI will include all data necessary for the conversion from dose to risk evaluation.

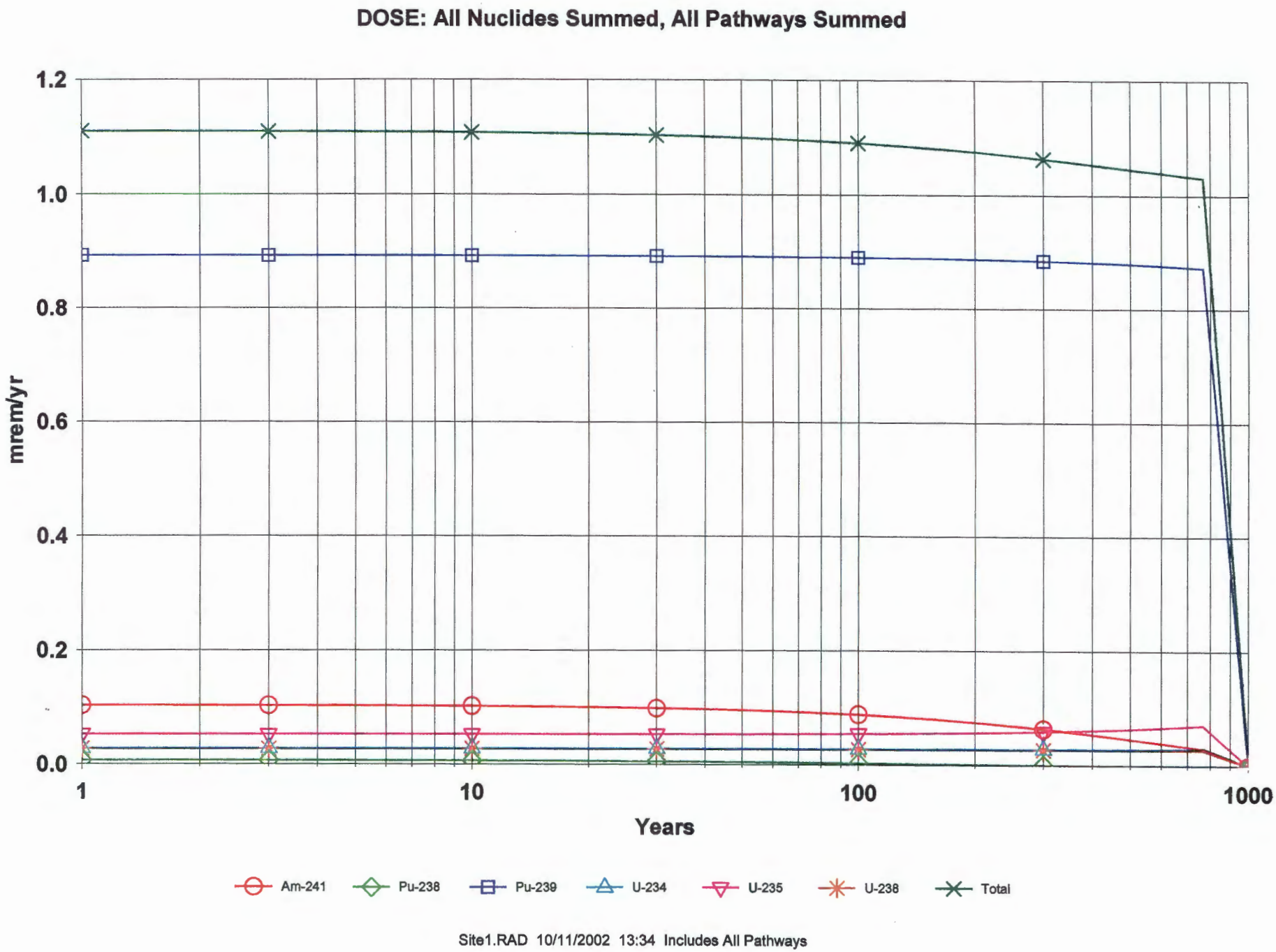
Supplemental References

DOE (US Department of Energy), June 13, 2000. "Procedure for the Release of Real Property Containing Residual Radioactive Material," procedure issued by DOE Albuquerque Operations Office, Albuquerque, New Mexico. (DOE 2000, 67489.1)

EPA (US Environmental Protection Agency), August 22, 1997. "Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination," OSWER Directive 9200.4-18, Washington, D.C. (EPA 1997, 58693.1)

Supplemental Attachment 1

Revised RESRAD Evaluations


DOSE: All Nuclides Summed, All Pathways Summed
1.2
1.0
0.8
0.6
0.4
0.2
0.0
mrem/yr
1
10
100
1000
Years
Am-241
Pu-238
Pu-239
U-234
U-235
U-238
Total
Site1.RAD 10/11/2002 13:34 Includes All Pathways

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Dose Conversion Factor (and Related) Parameter Summary
File: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.720E+00	6.720E+00	DCF2(1)
B-1	Am-241	4.440E-01	4.440E-01	DCF2(2)
B-1	Np-237+D	5.400E-01	5.400E-01	DCF2(3)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2(4)
B-1	Pb-210+D	2.320E-02	2.320E-02	DCF2(5)
B-1	Pu-238	3.920E-01	3.920E-01	DCF2(6)
B-1	Pu-239	4.290E-01	4.290E-01	DCF2(7)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2(8)
B-1	Th-229+D	2.160E+00	2.160E+00	DCF2(9)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(10)
B-1	U-233	1.350E-01	1.350E-01	DCF2(11)
B-1	U-234	1.320E-01	1.320E-01	DCF2(12)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2(13)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(14)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3(1)
D-1	Am-241	3.640E-03	3.640E-03	DCF3(2)
D-1	Np-237+D	4.440E-03	4.440E-03	DCF3(3)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3(4)
D-1	Pb-210+D	7.270E-03	7.270E-03	DCF3(5)
D-1	Pu-238	3.200E-03	3.200E-03	DCF3(6)
D-1	Pu-239	3.540E-03	3.540E-03	DCF3(7)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3(8)
D-1	Th-229+D	4.030E-03	4.030E-03	DCF3(9)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(10)
D-1	U-233	2.890E-04	2.890E-04	DCF3(11)
D-1	U-234	2.830E-04	2.830E-04	DCF3(12)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3(13)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3(14)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Am-241 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(2,1)
D-34	Am-241 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-05	5.000E-05	RTF(2,2)
D-34	Am-241 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-06	2.000E-06	RTF(2,3)
D-34				
D-34	Np-237+D , plant/soil concentration ratio, dimensionless	2.000E-02	2.000E-02	RTF(3,1)
D-34	Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,2)
D-34	Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(3,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(4,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(4,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(4,3)
D-34				

Dose Conversion Factor (and Related) Parameter Summary (continued)
File: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(5,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(5,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(5,3)
D-34				
D-34	Pu-238 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(6,2)
D-34	Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(6,3)
D-34				
D-34	Pu-239 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(7,1)
D-34	Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(7,2)
D-34	Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(7,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(8,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(8,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(8,3)
D-34				
D-34	Th-229+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(9,1)
D-34	Th-229+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(9,2)
D-34	Th-229+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(9,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(10,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(10,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(10,3)
D-34				
D-34	U-233 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(11,1)
D-34	U-233 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(11,2)
D-34	U-233 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(11,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(12,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(12,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(12,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(13,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(13,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(13,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(14,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(14,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(14,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Am-241 , fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Am-241 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(2,2)
D-5				
D-5	Np-237+D , fish	3.000E+01	3.000E+01	BIOFAC(3,1)
D-5	Np-237+D , crustacea and mollusks	4.000E+02	4.000E+02	BIOFAC(3,2)
D-5				

Dose Conversion Factor (and Related) Parameter Summary (continued)
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Menu	Parameter	Current Value	Default	Parameter Name
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(4,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(4,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(5,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(5,2)
D-5				
D-5	Pu-238 , fish	3.000E+01	3.000E+01	BIOFAC(6,1)
D-5	Pu-238 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(6,2)
D-5				
D-5	Pu-239 , fish	3.000E+01	3.000E+01	BIOFAC(7,1)
D-5	Pu-239 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(7,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(8,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(8,2)
D-5				
D-5	Th-229+D , fish	1.000E+02	1.000E+02	BIOFAC(9,1)
D-5	Th-229+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(9,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(10,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(10,2)
D-5				
D-5	U-233 , fish	1.000E+01	1.000E+01	BIOFAC(11,1)
D-5	U-233 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(11,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(12,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(12,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(13,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(13,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(14,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(14,2)

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)	1.000E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	2.500E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Am-241	1.900E+00	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Pu-238	1.550E-01	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): Pu-239	1.720E+01	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): U-234	6.260E+00	0.000E+00	---	S1(12)
R012	Initial principal radionuclide (pCi/g): U-235	2.546E+00	0.000E+00	---	S1(13)
R012	Initial principal radionuclide (pCi/g): U-238	3.630E+00	0.000E+00	---	S1(14)
R012	Concentration in groundwater (pCi/L): Am-241	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Pu-238	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): Pu-239	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(12)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(13)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(14)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	4.400E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	3.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.990E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	3.500E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	0.000E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	5.200E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Am-241				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.217E-06	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Pu-238				
R016	Contaminated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+03	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+03	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.250E-08	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for Pu-239				
R016	Contaminated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+03	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+03	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.250E-08	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(12)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(12,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.095E-06	ALEACH(12)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(12)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(13)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(13,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(13)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.095E-06	ALEACH(13)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(13)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(14)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(14,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(14)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.095E-06	ALEACH(14)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(14)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.217E-06	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Np-237				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.574E+02	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	not used	-1.000E+00	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	not used	-1.000E+00	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.077E-07	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.095E-06	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+02	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+02	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.049E-06	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	not used	7.000E+01	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.497E-06	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for daughter Th-229				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(9,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.750E-09	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(10)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(10,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(10)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.750E-09	ALEACH(10)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(10)
R016	Distribution coefficients for daughter U-233				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(11)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(11,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.095E-06	ALEACH(11)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(11)
R017	Inhalation rate (m**3/yr)	1.050E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	9.000E-05	1.000E-04	---	MLINH
R017	Exposure duration	6.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.280E-02	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)

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)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	6.260E+02	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
C14	DCF correction factor for gaseous forms of C14	not used	8.894E+01	---	CO2F
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	257	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions	
Area:	10000.00 square meters
Thickness:	1.00 meters
Cover Depth:	0.00 meters

Initial Soil Concentrations, pCi/g	
Am-241	1.900E+00
Pu-238	1.550E-01
Pu-239	1.720E+01
U-234	6.260E+00
U-235	2.546E+00
U-238	3.630E+00

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	1.111E+00	1.110E+00	1.110E+00	1.108E+00	1.104E+00	1.091E+00	1.064E+00	0.000E+00
M(t):	4.442E-02	4.441E-02	4.440E-02	4.433E-02	4.415E-02	4.363E-02	4.255E-02	0.000E+00

Maximum TDOSE(t): 1.111E+00 mrem/yr at t = 0.000E+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 = 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.836E-03	0.0017	2.674E-03	0.0024	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.863E-02	0.0888
Pu-238	5.264E-07	0.0000	1.920E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.051E-03	0.0063
Pu-239	1.111E-04	0.0001	2.341E-02	0.0211	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.690E-01	0.7825
U-234	5.562E-05	0.0001	2.622E-03	0.0024	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.529E-02	0.0228
U-235	4.184E-02	0.0377	9.936E-04	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.707E-03	0.0087
U-238	1.186E-02	0.0107	1.359E-03	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.394E-02	0.0125
Total	5.570E-02	0.0502	3.125E-02	0.0281	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.024E+00	0.9217

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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.031E-01	0.0929
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.244E-03	0.0065
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.926E-01	0.8037
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.796E-02	0.0252
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.254E-02	0.0473
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.716E-02	0.0245
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	1.111E+00	1.0000

*Sum of all water independent and dependent pathways.

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 (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.833E-03	0.0017	2.670E-03	0.0024	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.847E-02	0.0887
Pu-238	5.222E-07	0.0000	1.905E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.996E-03	0.0063
Pu-239	1.111E-04	0.0001	2.341E-02	0.0211	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.690E-01	0.7826
U-234	5.562E-05	0.0001	2.622E-03	0.0024	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.529E-02	0.0228
U-235	4.184E-02	0.0377	9.939E-04	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.715E-03	0.0087
U-238	1.186E-02	0.0107	1.359E-03	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.394E-02	0.0126
Total	5.570E-02	0.0502	3.124E-02	0.0281	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.023E+00	0.9217

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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.030E-01	0.0927
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.187E-03	0.0065
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.925E-01	0.8038
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.796E-02	0.0252
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.254E-02	0.0473
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.716E-02	0.0245
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	1.110E+00	1.0000

*Sum of all water independent and dependent pathways.

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 (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.827E-03	0.0016	2.661E-03	0.0024	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.816E-02	0.0884
Pu-238	5.141E-07	0.0000	1.875E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.886E-03	0.0062
Pu-239	1.111E-04	0.0001	2.341E-02	0.0211	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.690E-01	0.7829
U-234	5.566E-05	0.0001	2.622E-03	0.0024	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.529E-02	0.0228
U-235	4.184E-02	0.0377	9.945E-04	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.733E-03	0.0088
U-238	1.186E-02	0.0107	1.359E-03	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.394E-02	0.0126
Total	5.569E-02	0.0502	3.123E-02	0.0281	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.023E+00	0.9217

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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.026E-01	0.0925
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.074E-03	0.0064
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.925E-01	0.8041
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.796E-02	0.0252
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.256E-02	0.0474
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.716E-02	0.0245
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	1.110E+00	1.0000

*Sum of all water independent and dependent pathways.

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 (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.806E-03	0.0016	2.632E-03	0.0024	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.706E-02	0.0876
Pu-238	4.864E-07	0.0000	1.774E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.516E-03	0.0059
Pu-239	1.111E-04	0.0001	2.340E-02	0.0211	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.688E-01	0.7839
U-234	5.595E-05	0.0001	2.622E-03	0.0024	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.529E-02	0.0228
U-235	4.184E-02	0.0378	9.976E-04	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.806E-03	0.0088
U-238	1.186E-02	0.0107	1.359E-03	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.394E-02	0.0126
Total	5.568E-02	0.0502	3.119E-02	0.0281	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.021E+00	0.9216

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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.015E-01	0.0916
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.694E-03	0.0060
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.923E-01	0.8051
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.797E-02	0.0252
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.264E-02	0.0475
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.716E-02	0.0245
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	1.108E+00	1.0000

*Sum of all water independent and dependent pathways.

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 (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.750E-03	0.0016	2.548E-03	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.398E-02	0.0851
Pu-238	4.154E-07	0.0000	1.515E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.564E-03	0.0050
Pu-239	1.110E-04	0.0001	2.339E-02	0.0212	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.683E-01	0.7866
U-234	5.837E-05	0.0001	2.623E-03	0.0024	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.530E-02	0.0229
U-235	4.187E-02	0.0379	1.013E-03	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.008E-02	0.0091
U-238	1.186E-02	0.0107	1.359E-03	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.394E-02	0.0126
Total	5.565E-02	0.0504	3.108E-02	0.0282	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.017E+00	0.9214

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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.828E-02	0.0890
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.715E-03	0.0052
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.918E-01	0.8079
U-234	0.000E+00	0.0000	0.000E+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-02	0.0253
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.295E-02	0.0480
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.716E-02	0.0246
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	1.104E+00	1.0000

*Sum of all water independent and dependent pathways.

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 (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.564E-03	0.0014	2.277E-03	0.0021	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.398E-02	0.0770
Pu-238	2.392E-07	0.0000	8.715E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.200E-03	0.0029
Pu-239	1.108E-04	0.0001	2.334E-02	0.0214	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.665E-01	0.7945
U-234	8.495E-05	0.0001	2.626E-03	0.0024	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.533E-02	0.0232
U-235	4.201E-02	0.0385	1.096E-03	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.132E-02	0.0104
U-238	1.186E-02	0.0109	1.359E-03	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.394E-02	0.0128
Total	5.564E-02	0.0510	3.079E-02	0.0282	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.004E+00	0.9208

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

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.782E-02	0.0805
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.288E-03	0.0030
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.900E-01	0.8160
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.804E-02	0.0257
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.443E-02	0.0499
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.716E-02	0.0249
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	1.091E+00	1.0000

*Sum of all water independent and dependent pathways.

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 (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.136E-03	0.0011	1.651E-03	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.088E-02	0.0572
Pu-238	5.074E-08	0.0000	1.797E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.594E-04	0.0006
Pu-239	1.102E-04	0.0001	2.321E-02	0.0218	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.615E-01	0.8098
U-234	3.096E-04	0.0003	2.635E-03	0.0025	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.549E-02	0.0240
U-235	4.250E-02	0.0400	1.366E-03	0.0013	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.519E-02	0.0143
U-238	1.186E-02	0.0111	1.359E-03	0.0013	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.394E-02	0.0131
Total	5.592E-02	0.0526	3.024E-02	0.0284	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.777E-01	0.9190

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

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.366E-02	0.0598
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.774E-04	0.0006
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.849E-01	0.8318
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.843E-02	0.0267
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.906E-02	0.0555
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.716E-02	0.0255
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	1.064E+00	1.0000

*Sum of all water independent and dependent pathways.

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 (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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

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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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.

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

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	5.428E-02	5.420E-02	5.402E-02	5.342E-02	5.173E-02	4.622E-02	3.350E-02	0.000E+00
Am-241	Np-237	1.000E+00	1.438E-08	4.311E-08	1.004E-07	2.996E-07	8.565E-07	2.670E-06	6.856E-06	0.000E+00
Am-241	U-233	1.000E+00	1.082E-15	7.568E-15	3.996E-14	3.561E-13	2.971E-12	3.108E-11	2.509E-10	0.000E+00
Am-241	Th-229	1.000E+00	5.510E-19	8.262E-18	9.631E-17	2.547E-15	6.176E-14	2.145E-12	5.283E-11	0.000E+00
Am-241	∑DSR(j)		5.428E-02	5.420E-02	5.402E-02	5.342E-02	5.173E-02	4.622E-02	3.351E-02	0.000E+00
Pu-238	Pu-238	1.000E+00	4.674E-02	4.637E-02	4.564E-02	4.319E-02	3.687E-02	2.121E-02	4.369E-03	0.000E+00
Pu-238	U-234	1.000E+00	6.315E-09	1.888E-08	4.371E-08	1.276E-07	3.432E-07	8.781E-07	1.452E-06	0.000E+00
Pu-238	Th-230	1.000E+00	3.770E-14	2.633E-13	1.385E-12	1.217E-11	9.744E-11	8.931E-10	5.320E-09	0.000E+00
Pu-238	Ra-226	1.000E+00	1.193E-16	1.787E-15	2.076E-14	5.428E-13	1.275E-11	3.978E-10	7.576E-09	0.000E+00
Pu-238	Pb-210	1.000E+00	2.958E-19	9.109E-18	2.261E-16	1.675E-14	1.024E-12	7.631E-11	2.332E-09	0.000E+00
Pu-238	∑DSR(j)		4.674E-02	4.637E-02	4.564E-02	4.319E-02	3.687E-02	2.121E-02	4.370E-03	0.000E+00
Pu-239	Pu-239	1.000E+00	5.189E-02	5.189E-02	5.189E-02	5.188E-02	5.185E-02	5.174E-02	5.145E-02	0.000E+00
Pu-239	U-235	1.000E+00	1.016E-11	3.048E-11	7.112E-11	2.133E-10	6.195E-10	2.039E-09	6.078E-09	0.000E+00
Pu-239	Pa-231	1.000E+00	5.539E-16	3.877E-15	2.049E-14	1.833E-13	1.545E-12	1.675E-11	1.492E-10	0.000E+00
Pu-239	Ac-227	1.000E+00	7.579E-18	1.129E-16	1.298E-15	3.262E-14	6.904E-13	1.630E-11	2.099E-10	0.000E+00
Pu-239	∑DSR(j)		5.189E-02	5.189E-02	5.189E-02	5.188E-02	5.185E-02	5.174E-02	5.145E-02	0.000E+00
U-234	U-234	1.000E+00	4.467E-03	4.467E-03	4.467E-03	4.467E-03	4.466E-03	4.465E-03	4.460E-03	0.000E+00
U-234	Th-230	1.000E+00	3.998E-08	1.199E-07	2.798E-07	8.395E-07	2.438E-06	8.030E-06	2.398E-05	0.000E+00
U-234	Ra-226	1.000E+00	1.686E-10	1.180E-09	6.237E-09	5.574E-08	4.686E-07	5.034E-06	4.370E-05	0.000E+00
U-234	Pb-210	1.000E+00	5.218E-13	7.775E-12	8.937E-11	2.248E-09	4.762E-08	1.124E-06	1.422E-05	0.000E+00
U-234	∑DSR(j)		4.467E-03	4.467E-03	4.467E-03	4.468E-03	4.469E-03	4.479E-03	4.542E-03	0.000E+00
U-235	U-235	1.000E+00	2.063E-02	2.063E-02	2.063E-02	2.063E-02	2.063E-02	2.063E-02	2.062E-02	0.000E+00
U-235	Pa-231	1.000E+00	1.687E-06	5.062E-06	1.181E-05	3.543E-05	1.029E-04	3.387E-04	1.010E-03	0.000E+00
U-235	Ac-227	1.000E+00	3.073E-08	2.132E-07	1.104E-06	9.199E-06	6.412E-05	4.104E-04	1.566E-03	0.000E+00
U-235	∑DSR(j)		2.063E-02	2.064E-02	2.065E-02	2.068E-02	2.080E-02	2.138E-02	2.320E-02	0.000E+00
U-238	U-238	1.000E+00	7.482E-03	7.482E-03	7.482E-03	7.482E-03	7.482E-03	7.480E-03	7.477E-03	0.000E+00
U-238	U-234	1.000E+00	6.332E-09	1.899E-08	4.432E-08	1.330E-07	3.862E-07	1.272E-06	3.801E-06	0.000E+00
U-238	Th-230	1.000E+00	3.778E-14	2.645E-13	1.398E-12	1.250E-11	1.054E-10	1.144E-09	1.022E-08	0.000E+00
U-238	Ra-226	1.000E+00	1.195E-16	1.793E-15	2.091E-14	5.541E-13	1.352E-11	4.799E-10	1.255E-08	0.000E+00
U-238	Pb-210	1.000E+00	2.962E-19	9.133E-18	2.274E-16	1.703E-14	1.075E-12	8.981E-11	3.731E-09	0.000E+00
U-238	∑DSR(j)		7.482E-03	7.482E-03	7.482E-03	7.482E-03	7.482E-03	7.482E-03	7.481E-03	0.000E+00

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
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 = 2.500E+01 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	4.605E+02	4.613E+02	4.628E+02	4.680E+02	4.833E+02	5.409E+02	7.461E+02	*3.430E+12
Pu-238	5.349E+02	5.392E+02	5.478E+02	5.789E+02	6.780E+02	1.179E+03	5.721E+03	*1.711E+13
Pu-239	4.818E+02	4.818E+02	4.818E+02	4.819E+02	4.822E+02	4.832E+02	4.860E+02	*6.212E+10
U-234	5.597E+03	5.597E+03	5.597E+03	5.596E+03	5.594E+03	5.582E+03	5.504E+03	*6.245E+09
U-235	1.212E+03	1.211E+03	1.211E+03	1.209E+03	1.202E+03	1.169E+03	1.078E+03	*2.160E+06
U-238	3.341E+03	3.341E+03	3.341E+03	3.341E+03	3.341E+03	3.341E+03	3.342E+03	*3.360E+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 = 0.000E+00 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Am-241	1.900E+00	0.000E+00	5.428E-02	4.605E+02	5.428E-02	4.605E+02
Pu-238	1.550E-01	0.000E+00	4.674E-02	5.349E+02	4.674E-02	5.349E+02
Pu-239	1.720E+01	0.000E+00	5.189E-02	4.818E+02	5.189E-02	4.818E+02
U-234	6.260E+00	849 ± 2	4.931E-03	5.070E+03	4.467E-03	5.597E+03
U-235	2.546E+00	837 ± 2	2.799E-02	8.932E+02	2.063E-02	1.212E+03
U-238	3.630E+00	669 ± 1	7.513E-03	3.327E+03	7.482E-03	3.341E+03

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	1.031E-01	1.030E-01	1.026E-01	1.015E-01	9.828E-02	8.781E-02	6.365E-02	0.000E+00
Np-237	Am-241	1.000E+00	2.732E-08	8.191E-08	1.908E-07	5.693E-07	1.627E-06	5.073E-06	1.303E-05	0.000E+00
U-233	Am-241	1.000E+00	2.055E-15	1.438E-14	7.593E-14	6.767E-13	5.645E-12	5.906E-11	4.767E-10	0.000E+00
Th-229	Am-241	1.000E+00	1.047E-18	1.570E-17	1.830E-16	4.839E-15	1.174E-13	4.075E-12	1.004E-10	0.000E+00
Pu-238	Pu-238	1.000E+00	7.244E-03	7.187E-03	7.074E-03	6.694E-03	5.715E-03	3.288E-03	6.772E-04	0.000E+00
U-234	Pu-238	1.000E+00	9.788E-10	2.926E-09	6.775E-09	1.978E-08	5.319E-08	1.361E-07	2.251E-07	0.000E+00
U-234	U-234	1.000E+00	2.796E-02	2.796E-02	2.796E-02	2.796E-02	2.796E-02	2.795E-02	2.792E-02	0.000E+00
U-234	U-238	1.000E+00	2.298E-08	6.895E-08	1.609E-07	4.826E-07	1.402E-06	4.618E-06	1.380E-05	0.000E+00
U-234	∑DOSE(j)		2.796E-02	2.796E-02	2.796E-02	2.796E-02	2.796E-02	2.795E-02	2.794E-02	0.000E+00
Th-230	Pu-238	1.000E+00	5.844E-15	4.082E-14	2.147E-13	1.886E-12	1.510E-11	1.384E-10	8.246E-10	0.000E+00
Th-230	U-234	1.000E+00	2.503E-07	7.508E-07	1.752E-06	5.255E-06	1.526E-05	5.027E-05	1.501E-04	0.000E+00
Th-230	U-238	1.000E+00	1.371E-13	9.600E-13	5.074E-12	4.539E-11	3.827E-10	4.153E-09	3.709E-08	0.000E+00
Th-230	∑DOSE(j)		2.503E-07	7.508E-07	1.752E-06	5.255E-06	1.526E-05	5.027E-05	1.501E-04	0.000E+00
Ra-226	Pu-238	1.000E+00	1.850E-17	2.770E-16	3.218E-15	8.413E-14	1.976E-12	6.166E-11	1.174E-09	0.000E+00
Ra-226	U-234	1.000E+00	1.056E-09	7.389E-09	3.904E-08	3.489E-07	2.933E-06	3.152E-05	2.735E-04	0.000E+00
Ra-226	U-238	1.000E+00	4.339E-16	6.507E-15	7.590E-14	2.011E-12	4.909E-11	1.742E-09	4.554E-08	0.000E+00
Ra-226	∑DOSE(j)		1.056E-09	7.389E-09	3.904E-08	3.489E-07	2.933E-06	3.152E-05	2.736E-04	0.000E+00
Pb-210	Pu-238	1.000E+00	4.586E-20	1.412E-18	3.504E-17	2.596E-15	1.587E-13	1.183E-11	3.615E-10	0.000E+00
Pb-210	U-234	1.000E+00	3.267E-12	4.867E-11	5.595E-10	1.407E-08	2.981E-07	7.034E-06	8.899E-05	0.000E+00
Pb-210	U-238	1.000E+00	1.075E-18	3.315E-17	8.254E-16	6.183E-14	3.904E-12	3.260E-10	1.354E-08	0.000E+00
Pb-210	∑DOSE(j)		3.267E-12	4.867E-11	5.595E-10	1.407E-08	2.981E-07	7.035E-06	8.900E-05	0.000E+00
Pu-239	Pu-239	1.000E+00	8.926E-01	8.925E-01	8.925E-01	8.923E-01	8.918E-01	8.900E-01	8.849E-01	0.000E+00
U-235	Pu-239	1.000E+00	1.748E-10	5.243E-10	1.223E-09	3.669E-09	1.066E-08	3.507E-08	1.045E-07	0.000E+00
U-235	U-235	1.000E+00	5.253E-02	5.253E-02	5.253E-02	5.253E-02	5.253E-02	5.252E-02	5.250E-02	0.000E+00
U-235	∑DOSE(j)		5.253E-02	5.253E-02	5.253E-02	5.253E-02	5.253E-02	5.252E-02	5.250E-02	0.000E+00
Pa-231	Pu-239	1.000E+00	9.527E-15	6.669E-14	3.525E-13	3.153E-12	2.658E-11	2.882E-10	2.567E-09	0.000E+00
Pa-231	U-235	1.000E+00	4.296E-06	1.289E-05	3.007E-05	9.020E-05	2.619E-04	8.624E-04	2.572E-03	0.000E+00
Pa-231	∑DOSE(j)		4.296E-06	1.289E-05	3.007E-05	9.020E-05	2.619E-04	8.624E-04	2.572E-03	0.000E+00
Ac-227	Pu-239	1.000E+00	1.304E-16	1.942E-15	2.232E-14	5.610E-13	1.187E-11	2.804E-10	3.611E-09	0.000E+00
Ac-227	U-235	1.000E+00	7.825E-08	5.428E-07	2.811E-06	2.342E-05	1.632E-04	1.045E-03	3.986E-03	0.000E+00
Ac-227	∑DOSE(j)		7.825E-08	5.428E-07	2.811E-06	2.342E-05	1.632E-04	1.045E-03	3.986E-03	0.000E+00
U-238	U-238	1.000E+00	2.716E-02	2.716E-02	2.716E-02	2.716E-02	2.716E-02	2.715E-02	2.714E-02	0.000E+00

BRF(i) is the branch fraction of the parent nuclide.

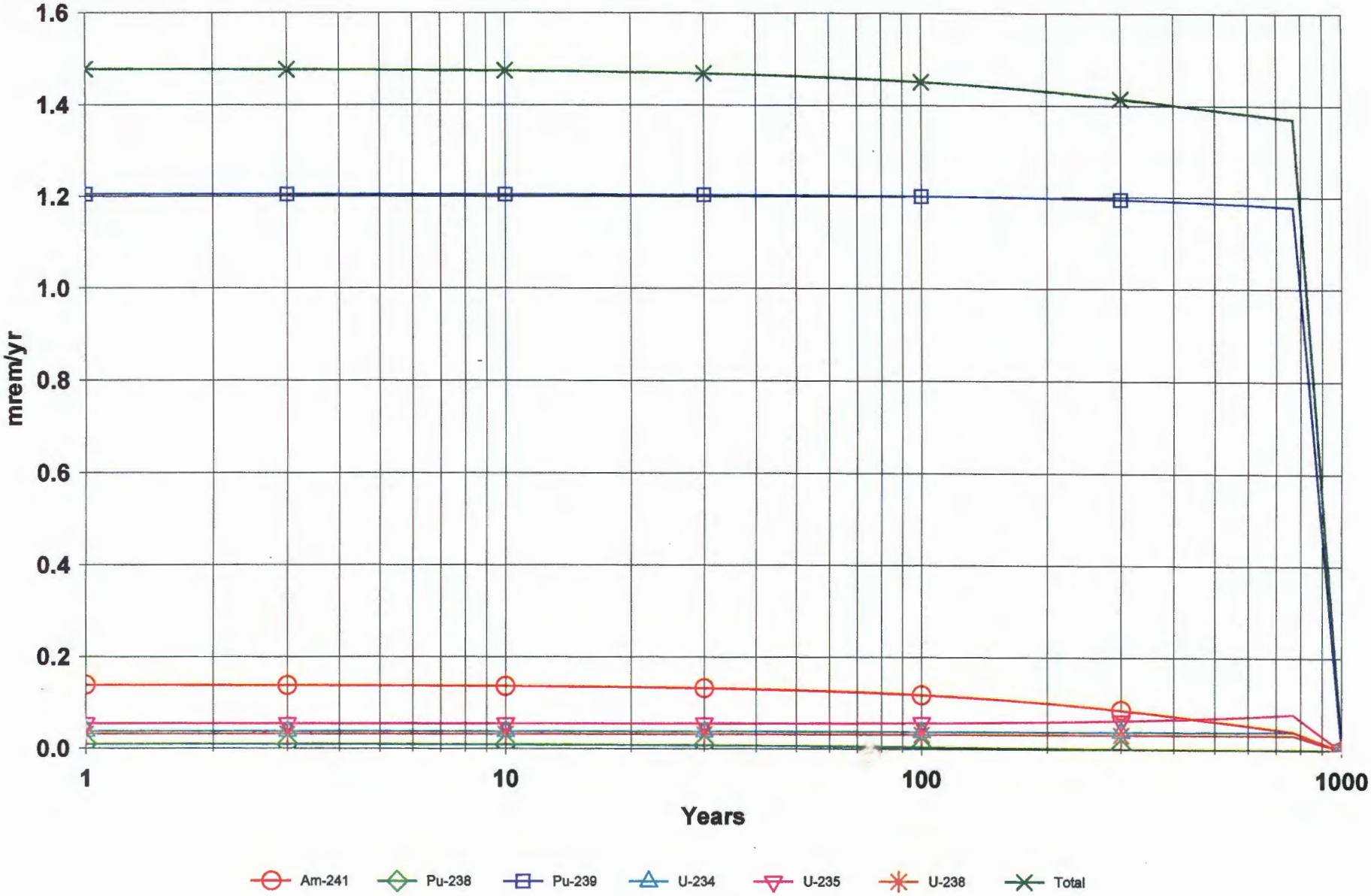
Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	1.900E+00	1.897E+00	1.891E+00	1.870E+00	1.810E+00	1.618E+00	1.173E+00	3.802E-01
Np-237	Am-241	1.000E+00	0.000E+00	6.149E-07	1.842E-06	6.105E-06	1.802E-05	5.684E-05	1.464E-04	3.058E-04
U-233	Am-241	1.000E+00	0.000E+00	1.345E-12	1.209E-11	1.338E-10	1.192E-09	1.276E-08	1.037E-07	8.388E-07
Th-229	Am-241	1.000E+00	0.000E+00	4.234E-17	1.142E-15	4.218E-14	1.129E-12	4.060E-11	1.010E-09	2.882E-08
Pu-238	Pu-238	1.000E+00	1.550E-01	1.538E-01	1.514E-01	1.432E-01	1.223E-01	7.035E-02	1.449E-02	5.746E-05
U-234	Pu-238	1.000E+00	0.000E+00	4.377E-07	1.303E-06	4.225E-06	1.174E-05	3.037E-05	5.037E-05	5.536E-05
U-234	U-234	1.000E+00	6.260E+00	6.260E+00	6.260E+00	6.260E+00	6.259E+00	6.257E+00	6.251E+00	6.229E+00
U-234	U-238	1.000E+00	0.000E+00	1.029E-05	3.087E-05	1.029E-04	3.087E-04	1.029E-03	3.084E-03	1.025E-02
U-234	∑S(j):		6.260E+00	6.260E+00	6.260E+00	6.260E+00	6.259E+00	6.258E+00	6.254E+00	6.240E+00
Th-230	Pu-238	1.000E+00	0.000E+00	1.973E-12	1.766E-11	1.927E-10	1.647E-09	1.545E-08	9.261E-08	4.346E-07
Th-230	U-234	1.000E+00	0.000E+00	5.635E-05	1.691E-04	5.635E-04	1.690E-03	5.631E-03	1.687E-02	5.596E-02
Th-230	U-238	1.000E+00	0.000E+00	4.632E-11	4.169E-10	4.632E-09	4.168E-08	4.629E-07	4.162E-06	4.607E-05
Th-230	∑S(j):		0.000E+00	5.635E-05	1.691E-04	5.635E-04	1.690E-03	5.632E-03	1.687E-02	5.601E-02
Ra-226	Pu-238	1.000E+00	0.000E+00	2.850E-16	7.663E-15	2.797E-13	7.251E-12	2.343E-10	4.507E-09	7.410E-08
Ra-226	U-234	1.000E+00	0.000E+00	1.220E-08	1.098E-07	1.219E-06	1.094E-05	1.203E-04	1.051E-03	1.056E-02
Ra-226	U-238	1.000E+00	0.000E+00	6.688E-15	1.805E-13	6.681E-12	1.800E-10	6.614E-09	1.746E-07	5.996E-06
Ra-226	∑S(j):		0.000E+00	1.220E-08	1.098E-07	1.219E-06	1.094E-05	1.203E-04	1.051E-03	1.057E-02
Pb-210	Pu-238	1.000E+00	0.000E+00	2.202E-18	1.756E-16	2.053E-14	1.434E-12	1.118E-10	3.460E-09	6.923E-08
Pb-210	U-234	1.000E+00	0.000E+00	1.255E-10	3.335E-09	1.171E-07	2.737E-06	6.682E-05	8.528E-04	9.947E-03
Pb-210	U-238	1.000E+00	0.000E+00	5.165E-17	4.132E-15	4.886E-13	3.523E-11	3.080E-09	1.295E-07	5.470E-06
Pb-210	∑S(j):		0.000E+00	1.255E-10	3.335E-09	1.171E-07	2.737E-06	6.682E-05	8.529E-04	9.953E-03
Pu-239	Pu-239	1.000E+00	1.720E+01	1.720E+01	1.720E+01	1.720E+01	1.719E+01	1.715E+01	1.705E+01	1.671E+01
U-235	Pu-239	1.000E+00	0.000E+00	1.694E-08	5.082E-08	1.694E-07	5.080E-07	1.691E-06	5.058E-06	1.668E-05
U-235	U-235	1.000E+00	2.546E+00	2.546E+00	2.546E+00	2.546E+00	2.546E+00	2.545E+00	2.544E+00	2.541E+00
U-235	∑S(j):		2.546E+00	2.546E+00	2.546E+00	2.546E+00	2.546E+00	2.545E+00	2.544E+00	2.541E+00
Pa-231	Pu-239	1.000E+00	0.000E+00	1.792E-13	1.613E-12	1.792E-11	1.612E-10	1.789E-09	1.604E-08	1.760E-07
Pa-231	U-235	1.000E+00	0.000E+00	5.387E-05	1.616E-04	5.386E-04	1.615E-03	5.380E-03	1.610E-02	5.319E-02
Pa-231	∑S(j):		0.000E+00	5.387E-05	1.616E-04	5.386E-04	1.615E-03	5.380E-03	1.610E-02	5.319E-02
Ac-227	Pu-239	1.000E+00	0.000E+00	1.887E-15	5.014E-14	1.759E-12	4.108E-11	1.004E-09	1.304E-08	1.654E-07
Ac-227	U-235	1.000E+00	0.000E+00	8.484E-07	7.477E-06	7.732E-05	5.749E-04	3.761E-03	1.442E-02	5.153E-02
Ac-227	∑S(j):		0.000E+00	8.484E-07	7.477E-06	7.732E-05	5.749E-04	3.761E-03	1.442E-02	5.153E-02
U-238	U-238	1.000E+00	3.630E+00	3.630E+00	3.630E+00	3.630E+00	3.630E+00	3.629E+00	3.628E+00	3.622E+00

BRF(i) is the branch fraction of the parent nuclide.

RESCALC.EXE execution time = 1.78 seconds

DOSE: All Nuclides Summed, All Pathways Summed



Site2.RAD 10/11/2002 14:31 Includes All Pathways

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Dose Conversion Factor (and Related) Parameter Summary
File: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.720E+00	6.720E+00	DCF2(1)
B-1	Am-241	4.440E-01	4.440E-01	DCF2(2)
B-1	Np-237+D	5.400E-01	5.400E-01	DCF2(3)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2(4)
B-1	Pb-210+D	2.320E-02	2.320E-02	DCF2(5)
B-1	Pu-238	3.920E-01	3.920E-01	DCF2(6)
B-1	Pu-239	4.290E-01	4.290E-01	DCF2(7)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2(8)
B-1	Th-229+D	2.160E+00	2.160E+00	DCF2(9)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(10)
B-1	U-233	1.350E-01	1.350E-01	DCF2(11)
B-1	U-234	1.320E-01	1.320E-01	DCF2(12)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2(13)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(14)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3(1)
D-1	Am-241	3.640E-03	3.640E-03	DCF3(2)
D-1	Np-237+D	4.440E-03	4.440E-03	DCF3(3)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3(4)
D-1	Pb-210+D	7.270E-03	7.270E-03	DCF3(5)
D-1	Pu-238	3.200E-03	3.200E-03	DCF3(6)
D-1	Pu-239	3.540E-03	3.540E-03	DCF3(7)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3(8)
D-1	Th-229+D	4.030E-03	4.030E-03	DCF3(9)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(10)
D-1	U-233	2.890E-04	2.890E-04	DCF3(11)
D-1	U-234	2.830E-04	2.830E-04	DCF3(12)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3(13)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3(14)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Am-241 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(2,1)
D-34	Am-241 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-05	5.000E-05	RTF(2,2)
D-34	Am-241 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-06	2.000E-06	RTF(2,3)
D-34				
D-34	Np-237+D , plant/soil concentration ratio, dimensionless	2.000E-02	2.000E-02	RTF(3,1)
D-34	Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,2)
D-34	Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(3,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(4,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(4,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(4,3)
D-34				

Dose Conversion Factor (and Related) Parameter Summary (continued)
File: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(5,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(5,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(5,3)
D-34				
D-34	Pu-238 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(6,2)
D-34	Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(6,3)
D-34				
D-34	Pu-239 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(7,1)
D-34	Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(7,2)
D-34	Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(7,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(8,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(8,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(8,3)
D-34				
D-34	Th-229+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(9,1)
D-34	Th-229+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(9,2)
D-34	Th-229+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(9,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(10,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(10,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(10,3)
D-34				
D-34	U-233 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(11,1)
D-34	U-233 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(11,2)
D-34	U-233 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(11,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(12,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(12,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(12,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(13,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(13,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(13,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(14,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(14,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(14,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Am-241 , fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Am-241 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(2,2)
D-5				
D-5	Np-237+D , fish	3.000E+01	3.000E+01	BIOFAC(3,1)
D-5	Np-237+D , crustacea and mollusks	4.000E+02	4.000E+02	BIOFAC(3,2)
D-5				

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

File: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(4,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(4,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(5,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(5,2)
D-5				
D-5	Pu-238 , fish	3.000E+01	3.000E+01	BIOFAC(6,1)
D-5	Pu-238 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(6,2)
D-5				
D-5	Pu-239 , fish	3.000E+01	3.000E+01	BIOFAC(7,1)
D-5	Pu-239 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(7,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(8,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(8,2)
D-5				
D-5	Th-229+D , fish	1.000E+02	1.000E+02	BIOFAC(9,1)
D-5	Th-229+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(9,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(10,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(10,2)
D-5				
D-5	U-233 , fish	1.000E+01	1.000E+01	BIOFAC(11,1)
D-5	U-233 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(11,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(12,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(12,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(13,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(13,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(14,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(14,2)

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)	1.000E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	2.500E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Am-241	1.900E+00	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Pu-238	1.550E-01	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): Pu-239	1.720E+01	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): U-234	6.260E+00	0.000E+00	---	S1(12)
R012	Initial principal radionuclide (pCi/g): U-235	2.546E+00	0.000E+00	---	S1(13)
R012	Initial principal radionuclide (pCi/g): U-238	3.630E+00	0.000E+00	---	S1(14)
R012	Concentration in groundwater (pCi/L): Am-241	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Pu-238	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): Pu-239	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(12)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(13)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(14)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.600E+01	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	4.400E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	3.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.990E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	5.200E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	not used	2.000E-01	---	FCSZ

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Am-241				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.124E-06	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Pu-238				
R016	Contaminated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+03	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+03	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.125E-08	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for Pu-239				
R016	Contaminated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+03	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+03	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.125E-08	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(12)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(12,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.498E-07	ALEACH(12)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(12)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(13)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(13,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(13)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.498E-07	ALEACH(13)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(13)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(14)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(14,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(14)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.498E-07	ALEACH(14)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(14)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.124E-06	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Np-237				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.574E+02	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	not used	-1.000E+00	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	not used	-1.000E+00	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.651E-07	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.498E-07	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+02	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+02	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.249E-07	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	not used	7.000E+01	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.070E-07	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for daughter Th-229				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(9,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.083E-10	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(10)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(10,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(10)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.083E-10	ALEACH(10)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(10)
R016	Distribution coefficients for daughter U-233				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(11)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(11,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.498E-07	ALEACH(11)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(11)
R017	Inhalation rate (m**3/yr)	1.400E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	9.000E-05	1.000E-04	---	MLINH
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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.200E-02	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)

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)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	8.772E+02	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
C14	DCF correction factor for gaseous forms of C14	not used	8.894E+01	---	CO2F
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	257	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions	
Area:	10000.00 square meters
Thickness:	1.00 meters
Cover Depth:	0.00 meters

Initial Soil Concentrations, pCi/g	
Am-241	1.900E+00
Pu-238	1.550E-01
Pu-239	1.720E+01
U-234	6.260E+00
U-235	2.546E+00
U-238	3.630E+00

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	1.478E+00	1.478E+00	1.477E+00	1.475E+00	1.469E+00	1.451E+00	1.415E+00	0.000E+00
M(t):	5.912E-02	5.911E-02	5.908E-02	5.900E-02	5.876E-02	5.805E-02	5.660E-02	0.000E+00

Maximum TDOSE(t): 1.478E+00 mrem/yr at t = 0.000E+00 years

Summary : 0-030(g) Adult Recreational Scenario File: Site2.RAD

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 (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.771E-03	0.0012	3.441E-03	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.334E-01	0.0902
Pu-238	5.079E-07	0.0000	2.470E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.534E-03	0.0065
Pu-239	1.072E-04	0.0001	3.012E-02	0.0204	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.175E+00	0.7950
U-234	5.367E-05	0.0000	3.373E-03	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.419E-02	0.0231
U-235	4.037E-02	0.0273	1.278E-03	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.312E-02	0.0089
U-238	1.145E-02	0.0077	1.748E-03	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.884E-02	0.0127
Total	5.375E-02	0.0364	4.020E-02	0.0272	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.384E+00	0.9364

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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.386E-01	0.093
Pu-238	0.000E+00	0.0000	0.000E+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	0.006
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.205E+00	0.815
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.762E-02	0.025
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.477E-02	0.037
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.204E-02	0.021
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	1.478E+00	1.000

*Sum of all water independent and dependent pathways.

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 (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.768E-03	0.0012	3.435E-03	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.331E-01	0.0901
Pu-238	5.039E-07	0.0000	2.451E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.459E-03	0.0064
Pu-239	1.072E-04	0.0001	3.012E-02	0.0204	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.175E+00	0.7951
U-234	5.367E-05	0.0000	3.373E-03	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.419E-02	0.0231
U-235	4.037E-02	0.0273	1.279E-03	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.314E-02	0.0089
U-238	1.145E-02	0.0077	1.748E-03	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.884E-02	0.0128
Total	5.375E-02	0.0364	4.020E-02	0.0272	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.384E+00	0.9364

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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.384E-01	0.0936
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.705E-03	0.0066
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.205E+00	0.8156
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.762E-02	0.0255
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.478E-02	0.0371
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.204E-02	0.0217
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	1.478E+00	1.0000

*Sum of all water independent and dependent pathways.

Summary : 0-030(g) Adult Recreational Scenario File: Site2.RAD

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 (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.763E-03	0.0012	3.424E-03	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.327E-01	0.0899
Pu-238	4.960E-07	0.0000	2.412E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.311E-03	0.0063
Pu-239	1.072E-04	0.0001	3.011E-02	0.0204	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.175E+00	0.7954
U-234	5.370E-05	0.0000	3.373E-03	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.419E-02	0.0231
U-235	4.037E-02	0.0273	1.279E-03	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.316E-02	0.0089
U-238	1.145E-02	0.0078	1.748E-03	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.884E-02	0.0128
Total	5.374E-02	0.0364	4.018E-02	0.0272	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.383E+00	0.9364

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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.379E-01	0.093
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.553E-03	0.006
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.205E+00	0.815
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.762E-02	0.025
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.481E-02	0.037
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.204E-02	0.021
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	1.477E+00	1.000

*Sum of all water independent and dependent pathways.

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 (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.743E-03	0.0012	3.386E-03	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.312E-01	0.0890
Pu-238	4.694E-07	0.0000	2.283E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.810E-03	0.0060
Pu-239	1.072E-04	0.0001	3.011E-02	0.0204	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.175E+00	0.7965
U-234	5.399E-05	0.0000	3.373E-03	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.419E-02	0.0232
U-235	4.037E-02	0.0274	1.283E-03	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.326E-02	0.0090
U-238	1.145E-02	0.0078	1.748E-03	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.884E-02	0.0128
Total	5.373E-02	0.0364	4.013E-02	0.0272	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.381E+00	0.9364

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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.364E-01	0.0925
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.039E-03	0.0061
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.205E+00	0.8169
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.762E-02	0.0255
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.492E-02	0.0372
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.204E-02	0.0217
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	1.475E+00	1.0000

*Sum of all water independent and dependent pathways.

Summary : 0-030(g) Adult Recreational Scenario File: Site2.RAD

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 (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.688E-03	0.0011	3.279E-03	0.0022	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.271E-01	0.0865
Pu-238	4.008E-07	0.0000	1.949E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.523E-03	0.0051
Pu-239	1.071E-04	0.0001	3.009E-02	0.0205	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.174E+00	0.7992
U-234	5.632E-05	0.0000	3.375E-03	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.420E-02	0.0233
U-235	4.040E-02	0.0275	1.303E-03	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.362E-02	0.0093
U-238	1.145E-02	0.0078	1.748E-03	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.885E-02	0.0128
Total	5.370E-02	0.0366	3.999E-02	0.0272	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.375E+00	0.9362

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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.321E-01	0.089
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.718E-03	0.005
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.204E+00	0.819
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.763E-02	0.025
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.532E-02	0.037
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.204E-02	0.021
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	1.469E+00	1.000

*Sum of all water independent and dependent pathways.

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 (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.510E-03	0.0010	2.930E-03	0.0020	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.136E-01	0.0783
Pu-238	2.308E-07	0.0000	1.121E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.327E-03	0.0030
Pu-239	1.069E-04	0.0001	3.003E-02	0.0207	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.172E+00	0.8073
U-234	8.198E-05	0.0001	3.379E-03	0.0023	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.425E-02	0.0236
U-235	4.054E-02	0.0279	1.410E-03	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.531E-02	0.0105
U-238	1.145E-02	0.0079	1.749E-03	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.885E-02	0.0130
Total	5.369E-02	0.0370	3.961E-02	0.0273	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.358E+00	0.9357

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

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.180E-01	0.0813
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.440E-03	0.0031
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.202E+00	0.8281
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.771E-02	0.0260
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.726E-02	0.0395
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.204E-02	0.0221
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	1.451E+00	1.0000

*Sum of all water independent and dependent pathways.

Summary : 0-030(g) Adult Recreational Scenario File: Site2.RAD

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 (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.097E-03	0.0008	2.125E-03	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.239E-02	0.0582
Pu-238	4.897E-08	0.0000	2.312E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.915E-04	0.0006
Pu-239	1.063E-04	0.0001	2.986E-02	0.0211	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.165E+00	0.8233
U-234	2.988E-04	0.0002	3.392E-03	0.0024	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.448E-02	0.0244
U-235	4.103E-02	0.0290	1.758E-03	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.054E-02	0.0145
U-238	1.144E-02	0.0081	1.750E-03	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.886E-02	0.0133
Total	5.397E-02	0.0381	3.891E-02	0.0275	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.322E+00	0.934

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

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.561E-02	0.060
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.147E-04	0.000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.195E+00	0.844
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.817E-02	0.027
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.333E-02	0.044
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.205E-02	0.022
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	1.415E+00	1.00

*Sum of all water independent and dependent pathways.

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 (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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

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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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.

Summary : 0-030(g) Adult Recreational Scenario File: Site2.RAD

Dose/Source Ratios Summed Over All Pathways

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	7.293E-02	7.282E-02	7.258E-02	7.177E-02	6.950E-02	6.211E-02	4.505E-02	0.000E+00
Am-241	Np-237	1.000E+00	1.794E-08	5.377E-08	1.253E-07	3.737E-07	1.068E-06	3.331E-06	8.555E-06	0.000E+00
Am-241	U-233	1.000E+00	1.453E-15	1.017E-14	5.368E-14	4.785E-13	3.992E-12	4.176E-11	3.372E-10	0.000E+00
Am-241	Th-229	1.000E+00	6.680E-19	1.002E-17	1.168E-16	3.088E-15	7.488E-14	2.601E-12	6.407E-11	0.000E+00
Am-241	∑DSR(j)		7.293E-02	7.282E-02	7.258E-02	7.177E-02	6.950E-02	6.212E-02	4.506E-02	0.000E+00
Pu-238	Pu-238	1.000E+00	6.311E-02	6.261E-02	6.163E-02	5.831E-02	4.979E-02	2.864E-02	5.899E-03	0.000E+00
Pu-238	U-234	1.000E+00	8.495E-09	2.540E-08	5.880E-08	1.716E-07	4.617E-07	1.181E-06	1.954E-06	0.000E+00
Pu-238	Th-230	1.000E+00	5.065E-14	3.537E-13	1.860E-12	1.634E-11	1.309E-10	1.200E-09	7.147E-09	0.000E+00
Pu-238	Ra-226	1.000E+00	1.185E-16	1.775E-15	2.062E-14	5.391E-13	1.266E-11	3.952E-10	7.527E-09	0.000E+00
Pu-238	Pb-210	1.000E+00	3.999E-19	1.231E-17	3.056E-16	2.264E-14	1.384E-12	1.031E-10	3.153E-09	0.000E+00
Pu-238	∑DSR(j)		6.311E-02	6.261E-02	6.163E-02	5.831E-02	4.979E-02	2.864E-02	5.901E-03	0.000E+00
Pu-239	Pu-239	1.000E+00	7.007E-02	7.007E-02	7.007E-02	7.005E-02	7.001E-02	6.987E-02	6.947E-02	0.000E+00
Pu-239	U-235	1.000E+00	1.059E-11	3.178E-11	7.414E-11	2.224E-10	6.458E-10	2.126E-09	6.338E-09	0.000E+00
Pu-239	Pa-231	1.000E+00	7.425E-16	5.197E-15	2.747E-14	2.457E-13	2.071E-12	2.246E-11	2.001E-10	0.000E+00
Pu-239	Ac-227	1.000E+00	9.748E-18	1.452E-16	1.669E-15	4.195E-14	8.880E-13	2.097E-11	2.701E-10	0.000E+00
Pu-239	∑DSR(j)		7.007E-02	7.007E-02	7.007E-02	7.005E-02	7.001E-02	6.987E-02	6.947E-02	0.000E+00
U-234	U-234	1.000E+00	6.009E-03	6.009E-03	6.009E-03	6.009E-03	6.008E-03	6.007E-03	6.002E-03	0.000E+00
U-234	Th-230	1.000E+00	5.370E-08	1.611E-07	3.759E-07	1.128E-06	3.275E-06	1.079E-05	3.221E-05	0.000E+00
U-234	Ra-226	1.000E+00	1.675E-10	1.172E-09	6.195E-09	5.536E-08	4.654E-07	5.001E-06	4.342E-05	0.000E+00
U-234	Pb-210	1.000E+00	7.053E-13	1.051E-11	1.208E-10	3.038E-09	6.436E-08	1.519E-06	1.922E-05	0.000E+00
U-234	∑DSR(j)		6.009E-03	6.009E-03	6.009E-03	6.010E-03	6.012E-03	6.024E-03	6.097E-03	0.000E+00
U-235	U-235	1.000E+00	2.151E-02	2.151E-02	2.151E-02	2.151E-02	2.151E-02	2.151E-02	2.150E-02	0.000E+00
U-235	Pa-231	1.000E+00	2.262E-06	6.785E-06	1.583E-05	4.749E-05	1.379E-04	4.541E-04	1.355E-03	0.000E+00
U-235	Ac-227	1.000E+00	3.953E-08	2.742E-07	1.420E-06	1.183E-05	8.247E-05	5.279E-04	2.014E-03	0.000E+00
U-235	∑DSR(j)		2.151E-02	2.152E-02	2.153E-02	2.157E-02	2.173E-02	2.249E-02	2.487E-02	0.000E+00
U-238	U-238	1.000E+00	8.827E-03	8.827E-03	8.827E-03	8.826E-03	8.826E-03	8.826E-03	8.824E-03	0.000E+00
U-238	U-234	1.000E+00	8.517E-09	2.555E-08	5.962E-08	1.789E-07	5.195E-07	1.712E-06	5.115E-06	0.000E+00
U-238	Th-230	1.000E+00	5.075E-14	3.552E-13	1.878E-12	1.680E-11	1.416E-10	1.537E-09	1.373E-08	0.000E+00
U-238	Ra-226	1.000E+00	1.187E-16	1.781E-15	2.077E-14	5.504E-13	1.343E-11	4.767E-10	1.247E-08	0.000E+00
U-238	Pb-210	1.000E+00	4.004E-19	1.234E-17	3.073E-16	2.302E-14	1.454E-12	1.214E-10	5.044E-09	0.000E+00
U-238	∑DSR(j)		8.827E-03	8.827E-03	8.827E-03	8.827E-03	8.827E-03	8.828E-03	8.829E-03	0.000E+00

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
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 = 2.500E+01 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	3.428E+02	3.433E+02	3.444E+02	3.483E+02	3.597E+02	4.025E+02	5.548E+02	*3.430E+12
Pu-238	3.961E+02	3.993E+02	4.056E+02	4.287E+02	5.021E+02	8.728E+02	4.236E+03	*1.711E+13
Pu-239	3.568E+02	3.568E+02	3.568E+02	3.569E+02	3.571E+02	3.578E+02	3.599E+02	*6.212E+10
U-234	4.161E+03	4.160E+03	4.160E+03	4.160E+03	4.158E+03	4.150E+03	4.100E+03	*6.245E+09
U-235	1.162E+03	1.162E+03	1.161E+03	1.159E+03	1.150E+03	1.112E+03	1.005E+03	*2.160E+06
U-238	2.832E+03	2.832E+03	2.832E+03	2.832E+03	2.832E+03	2.832E+03	2.831E+03	*3.360E+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 = 0.000E+00 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Am-241	1.900E+00	0.000E+00	7.293E-02	3.428E+02	7.293E-02	3.428E+02
Pu-238	1.550E-01	0.000E+00	6.311E-02	3.961E+02	6.311E-02	3.961E+02
Pu-239	1.720E+01	0.000E+00	7.007E-02	3.568E+02	7.007E-02	3.568E+02
U-234	6.260E+00	849 ± 2	6.575E-03	3.802E+03	6.009E-03	4.161E+03
U-235	2.546E+00	849 ± 2	3.179E-02	7.864E+02	2.151E-02	1.162E+03
U-238	3.630E+00	849 ± 2	8.945E-03	2.795E+03	8.827E-03	2.832E+03

Summary : 0-030(g) Adult Recreational Scenario File: Site2.RAD

Individual Nuclide Dose Summed Over All Pathways

Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	1.386E-01	1.383E-01	1.379E-01	1.364E-01	1.321E-01	1.180E-01	8.559E-02	0.000E+00
Np-237	Am-241	1.000E+00	3.408E-08	1.022E-07	2.380E-07	7.101E-07	2.030E-06	6.329E-06	1.626E-05	0.000E+00
U-233	Am-241	1.000E+00	2.761E-15	1.932E-14	1.020E-13	9.091E-13	7.584E-12	7.935E-11	6.407E-10	0.000E+00
Th-229	Am-241	1.000E+00	1.269E-18	1.903E-17	2.219E-16	5.866E-15	1.423E-13	4.941E-12	1.217E-10	0.000E+00
Pu-238	Pu-238	1.000E+00	9.782E-03	9.705E-03	9.553E-03	9.039E-03	7.718E-03	4.439E-03	9.144E-04	0.000E+00
U-234	Pu-238	1.000E+00	1.317E-09	3.936E-09	9.114E-09	2.660E-08	7.156E-08	1.831E-07	3.029E-07	0.000E+00
U-234	U-234	1.000E+00	3.761E-02	3.761E-02	3.761E-02	3.761E-02	3.761E-02	3.760E-02	3.757E-02	0.000E+00
U-234	U-238	1.000E+00	3.092E-08	9.275E-08	2.164E-07	6.493E-07	1.886E-06	6.213E-06	1.857E-05	0.000E+00
U-234	∑DOSE(j)		3.762E-02	3.761E-02	3.761E-02	3.761E-02	3.761E-02	3.761E-02	3.759E-02	0.000E+00
Th-230	Pu-238	1.000E+00	7.851E-15	5.483E-14	2.883E-13	2.533E-12	2.029E-11	1.860E-10	1.108E-09	0.000E+00
Th-230	U-234	1.000E+00	3.362E-07	1.009E-06	2.353E-06	7.059E-06	2.050E-05	6.753E-05	2.017E-04	0.000E+00
Th-230	U-238	1.000E+00	1.842E-13	1.290E-12	6.816E-12	6.097E-11	5.141E-10	5.580E-09	4.984E-08	0.000E+00
Th-230	∑DOSE(j)		3.362E-07	1.009E-06	2.353E-06	7.060E-06	2.050E-05	6.754E-05	2.017E-04	0.000E+00
Ra-226	Pu-238	1.000E+00	1.837E-17	2.751E-16	3.197E-15	8.356E-14	1.962E-12	6.125E-11	1.167E-09	0.000E+00
Ra-226	U-234	1.000E+00	1.049E-09	7.339E-09	3.878E-08	3.466E-07	2.914E-06	3.131E-05	2.718E-04	0.000E+00
Ra-226	U-238	1.000E+00	4.309E-16	6.464E-15	7.539E-14	1.998E-12	4.876E-11	1.730E-09	4.525E-08	0.000E+00
Ra-226	∑DOSE(j)		1.049E-09	7.339E-09	3.878E-08	3.466E-07	2.914E-06	3.131E-05	2.718E-04	0.000E+00
Pb-210	Pu-238	1.000E+00	6.198E-20	1.908E-18	4.736E-17	3.509E-15	2.146E-13	1.599E-11	4.886E-10	0.000E+00
Pb-210	U-234	1.000E+00	4.415E-12	6.579E-11	7.561E-10	1.902E-08	4.029E-07	9.508E-06	1.203E-04	0.000E+00
Pb-210	U-238	1.000E+00	1.453E-18	4.481E-17	1.116E-15	8.357E-14	5.276E-12	4.407E-10	1.831E-08	0.000E+00
Pb-210	∑DOSE(j)		4.415E-12	6.579E-11	7.561E-10	1.902E-08	4.029E-07	9.508E-06	1.203E-04	0.000E+00
Pu-239	Pu-239	1.000E+00	1.205E+00	1.205E+00	1.205E+00	1.205E+00	1.204E+00	1.202E+00	1.195E+00	0.000E+00
U-235	Pu-239	1.000E+00	1.822E-10	5.465E-10	1.275E-09	3.825E-09	1.111E-08	3.656E-08	1.090E-07	0.000E+00
U-235	U-235	1.000E+00	5.476E-02	5.476E-02	5.476E-02	5.476E-02	5.476E-02	5.476E-02	5.475E-02	0.000E+00
U-235	∑DOSE(j)		5.476E-02	5.476E-02	5.476E-02	5.476E-02	5.476E-02	5.476E-02	5.475E-02	0.000E+00
Pa-231	Pu-239	1.000E+00	1.277E-14	8.939E-14	4.725E-13	4.226E-12	3.562E-11	3.863E-10	3.442E-09	0.000E+00
Pa-231	U-235	1.000E+00	5.758E-06	1.727E-05	4.030E-05	1.209E-04	3.511E-04	1.156E-03	3.449E-03	0.000E+00
Pa-231	∑DOSE(j)		5.758E-06	1.727E-05	4.030E-05	1.209E-04	3.511E-04	1.156E-03	3.449E-03	0.000E+00
Ac-227	Pu-239	1.000E+00	1.677E-16	2.498E-15	2.871E-14	7.216E-13	1.527E-11	3.607E-10	4.646E-09	0.000E+00
Ac-227	U-235	1.000E+00	1.006E-07	6.981E-07	3.616E-06	3.012E-05	2.100E-04	1.344E-03	5.128E-03	0.000E+00
Ac-227	∑DOSE(j)		1.006E-07	6.981E-07	3.616E-06	3.012E-05	2.100E-04	1.344E-03	5.128E-03	0.000E+00
U-238	U-238	1.000E+00	3.204E-02	3.204E-02	3.204E-02	3.204E-02	3.204E-02	3.204E-02	3.203E-02	0.000E+00

BRF(i) is the branch fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	1.900E+00	1.897E+00	1.891E+00	1.870E+00	1.811E+00	1.618E+00	1.174E+00	3.814E-01
Np-237	Am-241	1.000E+00	0.000E+00	6.149E-07	1.842E-06	6.105E-06	1.802E-05	5.685E-05	1.465E-04	3.062E-04
U-233	Am-241	1.000E+00	0.000E+00	1.345E-12	1.209E-11	1.338E-10	1.192E-09	1.276E-08	1.037E-07	8.400E-07
Th-229	Am-241	1.000E+00	0.000E+00	4.234E-17	1.142E-15	4.218E-14	1.129E-12	4.061E-11	1.010E-09	2.885E-08
Pu-238	Pu-238	1.000E+00	1.550E-01	1.538E-01	1.514E-01	1.432E-01	1.223E-01	7.035E-02	1.449E-02	5.746E-05
U-234	Pu-238	1.000E+00	0.000E+00	4.377E-07	1.303E-06	4.225E-06	1.174E-05	3.037E-05	5.038E-05	5.542E-05
U-234	U-234	1.000E+00	6.260E+00	6.260E+00	6.260E+00	6.260E+00	6.259E+00	6.258E+00	6.253E+00	6.237E+00
U-234	U-238	1.000E+00	0.000E+00	1.029E-05	3.087E-05	1.029E-04	3.087E-04	1.029E-03	3.085E-03	1.027E-02
U-234	ΣS(j):		6.260E+00	6.260E+00	6.260E+00	6.260E+00	6.260E+00	6.259E+00	6.256E+00	6.247E+00
Th-230	Pu-238	1.000E+00	0.000E+00	1.973E-12	1.766E-11	1.927E-10	1.647E-09	1.545E-08	9.262E-08	4.349E-07
Th-230	U-234	1.000E+00	0.000E+00	5.635E-05	1.691E-04	5.635E-04	1.690E-03	5.632E-03	1.687E-02	5.600E-02
Th-230	U-238	1.000E+00	0.000E+00	4.632E-11	4.169E-10	4.632E-09	4.168E-08	4.630E-07	4.163E-06	4.611E-05
Th-230	ΣS(j):		0.000E+00	5.635E-05	1.691E-04	5.635E-04	1.690E-03	5.632E-03	1.688E-02	5.604E-02
Ra-226	Pu-238	1.000E+00	0.000E+00	2.850E-16	7.663E-15	2.797E-13	7.251E-12	2.343E-10	4.508E-09	7.415E-08
Ra-226	U-234	1.000E+00	0.000E+00	1.220E-08	1.098E-07	1.219E-06	1.094E-05	1.203E-04	1.051E-03	1.057E-02
Ra-226	U-238	1.000E+00	0.000E+00	6.688E-15	1.805E-13	6.681E-12	1.800E-10	6.615E-09	1.747E-07	6.001E-06
Ra-226	ΣS(j):		0.000E+00	1.220E-08	1.098E-07	1.219E-06	1.094E-05	1.203E-04	1.051E-03	1.058E-02
Pb-210	Pu-238	1.000E+00	0.000E+00	2.202E-18	1.756E-16	2.053E-14	1.434E-12	1.119E-10	3.461E-09	6.928E-08
Pb-210	U-234	1.000E+00	0.000E+00	1.255E-10	3.335E-09	1.171E-07	2.737E-06	6.682E-05	8.530E-04	9.954E-03
Pb-210	U-238	1.000E+00	0.000E+00	5.165E-17	4.132E-15	4.886E-13	3.523E-11	3.080E-09	1.296E-07	5.475E-06
Pb-210	ΣS(j):		0.000E+00	1.255E-10	3.335E-09	1.171E-07	2.737E-06	6.683E-05	8.531E-04	9.960E-03
Pu-239	Pu-239	1.000E+00	1.720E+01	1.720E+01	1.720E+01	1.720E+01	1.719E+01	1.715E+01	1.705E+01	1.671E+01
U-235	Pu-239	1.000E+00	0.000E+00	1.694E-08	5.082E-08	1.694E-07	5.080E-07	1.691E-06	5.059E-06	1.669E-05
U-235	U-235	1.000E+00	2.546E+00	2.546E+00	2.546E+00	2.546E+00	2.546E+00	2.546E+00	2.545E+00	2.544E+00
U-235	ΣS(j):		2.546E+00	2.546E+00	2.546E+00	2.546E+00	2.546E+00	2.546E+00	2.545E+00	2.544E+00
Pa-231	Pu-239	1.000E+00	0.000E+00	1.792E-13	1.613E-12	1.792E-11	1.612E-10	1.789E-09	1.605E-08	1.761E-07
Pa-231	U-235	1.000E+00	0.000E+00	5.387E-05	1.616E-04	5.386E-04	1.616E-03	5.381E-03	1.611E-02	5.326E-02
Pa-231	ΣS(j):		0.000E+00	5.387E-05	1.616E-04	5.386E-04	1.616E-03	5.381E-03	1.611E-02	5.326E-02
Ac-227	Pu-239	1.000E+00	0.000E+00	1.887E-15	5.014E-14	1.759E-12	4.108E-11	1.004E-09	1.304E-08	1.655E-07
Ac-227	U-235	1.000E+00	0.000E+00	8.484E-07	7.477E-06	7.732E-05	5.749E-04	3.761E-03	1.442E-02	5.160E-02
Ac-227	ΣS(j):		0.000E+00	8.484E-07	7.477E-06	7.732E-05	5.749E-04	3.761E-03	1.442E-02	5.160E-02
U-238	U-238	1.000E+00	3.630E+00	3.630E+00	3.630E+00	3.630E+00	3.630E+00	3.630E+00	3.629E+00	3.627E+00

BRF(i) is the branch fraction of the parent nuclide.

RESCALC.EXE execution time = 1.77 seconds

Supplemental Attachment 2

Revised Ecological Screening Assessment

1.0 INTRODUCTION

The ecological screening is based on the exposure of ecological receptors to surficial contamination. The screening evaluation is intended to provide an indication of potential risk to receptors and is designed to be conservative (i.e., some assumptions may not represent actual conditions) in order to minimize the possibility of eliminating an analyte that may pose a potential ecological risk. The scoping portion of the assessment indicated that terrestrial receptors were appropriate for evaluating the concentrations of contaminants in tuff and sediment. Aquatic receptors were not evaluated because there was no evidence that aquatic communities were present in the drainage and the ephemeral stream channel. This process evaluated terrestrial receptors representing several trophic levels. These receptors included

- a generic plant,
- soil-dwelling invertebrates (represented by the earthworm),
- the deer mouse (mammalian omnivore),
- the vagrant shrew (mammalian insectivore),
- the desert cottontail (mammalian herbivore),
- the gray fox (mammalian carnivore),
- the American robin (avian invertevore, avian omnivore, and avian herbivore), and
- the American kestrel (avian invertebrate and flesh eater, and avian flesh eater as surrogate for threatened and endangered [T&E] avian species).

The rationale for these receptors is presented in "Screening Level Ecological Risk Assessment Methods" (LANL 1999, 64783). Soil ecological screening levels (ESLs) were derived for each of these receptors where information was available. The ESLs were based on similar species and derived from an experimentally determined no observed adverse effect levels (NOAELs), lowest observed adverse effect levels (LOAELs), or lethal doses to 50% of the population (LD50s). The derivation of ESLs is based on the approach presented in "Screening Level Ecological Risk Assessment Methods" (LANL 1999, 64783) and in the ECORISK Database (LANL 2000, 65691.1). All relevant information necessary for calculating hazard quotients (HQs) and hazard indices (HIs), including concentration equations, dose equations, bioconcentration factors, transfer factors, and toxicity reference values, are presented in "Screening Level Ecological Risk Assessment Methods" (LANL 1999, 64783) and in the ECORISK Database, version 1.1, April 2000 (LANL 2000, 65691.1).

The drainage is an inactive channel that receives water only periodically during storm events and snowmelt and does not support any aquatic communities. Similarly, the ephemeral stream channel has no aquatic receptors because the periodic inundation of water from storm events is insufficient to support these types of organisms. As described in the scoping evaluation, the Acid Canyon area is characterized by a well-developed terrestrial community. Therefore, the sample results for the drainage and ephemeral stream channel "sediments" were compared to the soil ESLs rather than the sediment ESLs, which were derived under the assumption of the presence of aquatic receptors (LANL 1999, 64783).

The data review identified 22 inorganic chemicals, 6 radionuclides, and 13 organic chemicals as chemicals of potential concern (COPCs) at solid waste management unit (SWMU) 00-030(g). The 95% UCLs of the mean concentrations for the COPCs were subjected to an ecological screening evaluation. Table 1.0-1 presents the comparison of these values to the final (minimum) terrestrial ESLs for soil for each COPC. An HQ was calculated for each chemical by dividing the maximum concentration or detection limit (DL) by the final ESL. An HQ greater than 0.3 was used as a threshold for identifying

chemicals of potential ecological concern (COPECs) and determining which chemicals needed to be evaluated further (LANL 1999, 64783).

Table 1.0-1
Comparison of 95% UCLs with Final ESLs[a] for the Drainage

Analyte	95% UCL	Final ESL	Receptor	HQ	Frequency of Detects Above Background Values (BVs) or DLs and Final ESLs
Nonradionuclide COPCs[b]					
Antimony	0.77	0.5	Plant	1.5	5/19, DL>ESL for 1/19
Arsenic	6.5	0.57	Vagrant shrew	11.4	4/19, DL>ESL for 2/19
Barium	93.9	23	Vagrant shrew	4.0	3/19
Cadmium	0.2	1.0	Plant	0.2	0/19
Chromium (hexavalent)	0.14	0.35	Plant	0.4	0/1
Cobalt	4.7	0.51	Robin (invertevore)	9.2	4/17
Copper	17.5	13	Earthworm	1.3	7/17
Lead	49.8	20	Plant	2.5	14/19
Mercury	0.5	0.05	Earthworm	10	12/19
Selenium	0.77	0.5	Plant	1.5	5/19
Silver	0.78	0.2	Plant	3.9	2/19
Thallium	1.9	0.1	Plant	19	2/19
Zinc	181	10	Plant	18.1	10/17
Acetone	0.022(J)[c]	1.8	Deer mouse	0.01	1/2
Aroclor-1254	0.42	0.12	Vagrant shrew	3.5	11/30
Aroclor-1260	0.032	0.05	Robin (invertevore)	0.6	1/30
Chlordane (alpha-)	0.018	2.1	Plant and robin (invertevore)	0.009	0/19
Chlordane (gamma-)	0.014	2.1	Plant and robin (invertevore)	0.007	0/19
DDD[4,4'-]	0.031	No value	—	—	—
DDE[4,4'-]	0.015	0.0018	Kestrel (carnivore)	8.3	5/19
DDT[4,4'-]	0.098	0.0028	Robin (invertevore)	35	16/19
Dieldrin	0.017	0.041	Vagrant shrew	0.4	1/19
Endosulfan I	0.007	0.35[d]	Vagrant shrew	0.02	0/19
Endosulfan II	0.012	0.35[d]	Vagrant shrew	0.03	0/19
Endrin aldehyde	0.011	0.0034[e]	Plant	3.2	1/19
Endrin ketone	0.014	0.0034[e]	Plant	4.1	2/12
Toxaphene	0.66	11	Robin (invertevore)	0.06	0/19

Table 1.0-1 (continued)

Analyte	95% UCL	Final ESL	Receptor	HQ	Frequency of Detects Above Background Values (BVs) or DLs and Final ESLs
Radionuclide COPCs[f]					
Americium-241	1.9	17	Earthworm	0.1	0/26
Plutonium-238	0.16	17	Earthworm	0.009	0/28
Plutonium-239	17.2	18	Earthworm	0.96	9/28
Uranium-234	6.3	20	Earthworm	0.3	2/17
Uranium-235	2.5	21	Earthworm	0.1	0/17
Uranium-238	3.6	22	Earthworm	0.2	0/17

[a] Based on Laboratory and New Mexico Environment Department (NMED)/Department of Energy (DOE) Oversight Bureau data.

[b] Units for nonradionuclide COPCs are mg/kg.

[c] J = The analyte is classified as *detected* but the reported concentration value is expected to be more uncertain than usual.

[d] ESLs for endosulfan I and endosulfan II are not available; the value used is for endosulfan.

[e] ESLs for endrin aldehyde and endrin ketone are not available; the value used is for endrin.

[f] Units for radionuclides are pCi/g.

Based on the comparison shown in Table 1.0-1, acetone, alpha-chlordane, gamma-chlordane, cadmium, endosulfan I, endosulfan II, americium-241, plutonium-238, toxaphene, uranium-234, uranium-235, and uranium-238 were not identified as COPECs and were not evaluated further. Magnesium and iron do not have ESLs because they are essential trace nutrients for plants and animals. These inorganic chemicals are not expected to be hazardous at the concentrations detected in the drainage and were not evaluated further. 4,4'-DDD does not have an ESL for comparison and is discussed in the uncertainty analysis with the rest of the COPECs.

2.0 UNCERTAINTY ANALYSIS

The ESLs for vertebrate terrestrial receptors were based on similar species and derived from experimentally determined no observed effect levels or concentrations (NOELs or NOECs), lowest observed effect levels or concentrations (LOELs or LOECs), or LD50s. Receptor-specific data for estimating potential ecological risk are often lacking, requiring that species-specific toxicological effect data from laboratory animals be extrapolated to wild receptors. These laboratory studies are often limited because they evaluate single chemical exposures in isolated and controlled conditions using a single exposure pathway. Additionally, laboratory-controlled toxicological studies are often performed on individuals obtained from artificial and maintained populations. Wild organisms are concomitantly exposed to a variety of stressors and risk drivers, thereby increasing the potential for synergistic and antagonistic physiological effects. Also, wild populations are considered more genetically diverse than laboratory animals, making wild populations, as a whole, potentially less sensitive to chemical exposure. The uncertainties associated with these differences may result in either an under- or overestimation of risk.

The assumptions used in the ESL derivations were conservative and do not necessarily represent actual conditions. These assumptions include maximum chemical bioavailability, maximum receptor ingestion rates, minimum body weight, 100% home range exposure, and additive effects of multiple COPECs. Most

of these factors tend to result in conservative estimates of the ESLs, which may lead to an overestimation of the potential risk. The assumption of additive effects for multiple COPECs may result in either an over- or underestimation of the potential risk to receptors.

The chemical form of the COPECs identified by the screening evaluation was not determined as part of this RFI. This is largely a matter of limitations on the analytical quantitation of individual chemical species. Toxicological data are typically based on the most toxic and bioavailable chemical species, which are not likely to be found in the environment. The inorganic and organic COPECs are generally not 100% bioavailable to receptors in the natural environment due to the adsorption of chemical constituents by matrix surfaces (e.g., soils and sediments) or rapid oxidation or reduction changes that render harmful chemical forms unavailable to biotic processes. The decreased bioavailability would reduce dose to the receptors as well as the relative toxicity. The organic COPECs have very low water solubility and high adsorption coefficients (K_{oc}s), indicating that they are likely to be immobilized via adsorption to sediment organic carbon and thereby much less bioavailable to receptors (Appendix F). As a result of these conditions, the exposure and subsequent toxicity of some COPECs to receptors are overestimated by the screening assessment.

The screening evaluation was performed using the 95% UCL of the arithmetic mean for nonradionuclide and radionuclide COPECs. Per NMED's request in the RSI, the 95% UCLs have been recalculated using nonparametric statistics (NMED 2002, 73394.1). The 95% UCLs were also recalculated using one-half of the DL, in keeping with EPA guidance (EPA 1989, 08021). The use of the 95% UCL is appropriate because exposure to receptor populations varies along the length of the drainage channel and the number of samples provides adequate data for calculating a representative exposure concentration for each COPC. The 95% UCL value represents the overall exposure of the receptors to the contaminants across an area versus exposure at one location (i.e., maximum concentration).

The 95% UCLs for several inorganic COPECs are similar to sediment background concentrations, indicating that, although there are locations where concentrations are elevated, exposure across the drainage area is similar to background. Therefore, exposure to several of the inorganic chemicals across the drainage does not pose a potential risk to receptors. The comparison of 95% UCLs for the inorganic COPECs to background values and the background data sets is presented in Table 2.0-1.

Table 2.0-1
Comparison of 95% UCLs for Inorganic COPECs to Sediment Background Concentrations[a]

Inorganic COPECs	95% UCL (mg/kg)	Sediment BV (mg/kg)	Range of Background Concentrations (mg/kg)
Antimony	0.77	0.83	0.1–1.0[b]
Arsenic	6.5	3.98	0.25–3.6
Barium	93.9	127	8–127
Cadmium	0.2	0.4	DL
Cobalt	4.7	4.73	0.6–4.2
Copper	17.5	11.2	0.77–12
Lead	49.8	19.7	2.0–25.6
Mercury	0.51	0.1	DL
Selenium	0.77	0.3	DL
Silver	0.78	1.0	DL
Thallium	1.9	0.73	0.063–1.0[b]
Zinc	181	60.2	9–56.2

[a] Background values and concentrations were obtained from "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory"(LANL 1998, 59730.2).

[b] Background concentrations for soil were used because a less sensitive analytical method was used for sediment samples (LANL 1998, 59730.2).

Based on the comparison, antimony, barium, cadmium, cobalt, and silver have 95% UCLs that are either less than the BVs (represented by DLs) or within the range of background concentrations for sediment. As a result, these inorganic COPECs are eliminated from further evaluation and are not included in the calculation of HIs (Table 2.0-2).

Table 2.0-2
HI Analyses[a]

Analyte	HQ, Plant	HQ, Invertebrate	HQ, Deer Mouse	HQ, Vagrant Shrew	HQ, Desert Cottontail	HQ, Robin (Invertevore)	HQ, Robin (Omnivore)	HQ, Robin (Herbivore)	HQ, Kestrel	HQ, Kestrel[b]	HQ, Gray Fox
Nonradionuclide COPECs											
Arsenic	0.7	0.96	5.9	11.4	0.3	0.5	0.3	0.07	0.07	0.003	0.07
Chromium (hexavalent)	0.4	0.01	0.0009	0.002	0.0003	0.003	0.003	0.002	0.0003	0.00009	0.00007
Copper	0.2	1.3	0.2	0.1	0.1	0.05	0.08	0.1	0.005	0.001	0.003
Lead	2.5	0.5	0.1	0.2	0.07	0.6	0.8	0.9	0.05	0.03	0.008
Mercury	0.02	10.2	0.008	0.009	0.004	0.5	0.5	0.5	0.07	0.03	0.0005
Selenium	1.5	0.1	0.6	0.8	0.2	0.7	0.6	0.4	0.1	0.02	0.02
Thallium	19	—	2.8	5.9	0.07	—	—	—	—	—	0.09
Zinc	18.1	2.1	0.2	0.09	0.2	1.8	4.4	7.2	0.3	0.2	0.01
Aroclor-1254	0.04	—	1.6	3.5	0.02	2.2	1.1	0.09	0.4	0.5	0.6
Aroclor-1260	—	—	0.2	0.4	0.003	0.6	0.3	0.03	0.1	0.2	0.09
DDE[4,4'-]	—	—	0.0004	0.0009	0.000004	6.8	3.5	0.2	2.9	8.3	0.0008
DDT[4,4'-]	—	—	0.03	0.07	0.0004	35	17.8	1.3	10.6	23.3	0.04
Dieldrin	0.002	—	0.2	0.4	0.004	0.2	0.1	0.01	0.03	0.009	0.02
Endrin aldehyde	3.2	—	0.03	0.06	0.0008	0.9	0.5	0.06	0.1	0.02	0.001
Endrin ketone	4.1	—	0.04	0.07	0.001	1.2	0.6	0.07	0.2	0.03	0.001
HI	**49.8**	**15.2**	**11.9**	**23**	**1.0**	**51.1**	**30.6**	**10.9**	**14.9**	**32.6**	**0.9**
Radionuclide COPECs											
Plutonium-239	0.0004	0.96	0.004	0.01	0.0001	0.02	0.01	0.002	0.02	0.0006	0.0003
Uranium-234	0.003	0.3	0.002	0.003	0.00005	0.006	0.003	0.0006	0.0008	0.00003	0.00002
HI	**0.003**	**1.3**	**0.006**	**0.01**	**0.0002**	**0.03**	**0.01**	**0.003**	**0.02**	**0.0006**	**0.0003**

[a] = These numbers are unitless.

[b] = Kestrel with a 100% meat diet; used as a surrogate for avian T&E species.

As discussed in the uncertainty analysis within the original RFI report, the area encompassed by the drainage channel is narrow and small, approximately 0.7 acres or 0.3 ha (approximately 600 ft long by 15- to 50-ft wide), when compared to the home range of some individual receptors and the receptor populations. In the screening assessment, it is assumed that the organisms spend 100% of their time in the area rather than the fraction of time that would normally be the case. The home range for the short-tailed shrew is approximately 0.39 ha (assumed to be similar for the vagrant shrew), for the deer mouse it is approximately 0.075 ha, for the cottontail it is approximately 1.5 ha, and for the fox it is approximately 699 ha (EPA 1993, 59109). The home range for the American robin is approximately 0.42 ha; for the kestrel it is approximately 13.1 ha, and for the Mexican spotted owl (for which the kestrel with a flesh diet is a surrogate) it is approximately 366 ha (EPA 1993, 59109). Therefore, applying an area use factor (AUF) when evaluating the potential effects of a site on an individual is one way to assess the COPECs with a more realistic exposure scenario for the receptor (EPA 2000, 73306).

The AUF, which is estimated by dividing the drainage area by the individual home range, reflects the portion of the home range that is composed of the site. The resulting value is multiplied by the receptor HI to determine if there is a potential impact on the individual across its home range. If the home range is less than the site area, as is the case with the deer mouse in the drainage below SWMU 00-030(g), there is no effect from the AUF on the individual HI. Using this type of assessment, the cottontail, kestrel, kestrel with a flesh diet (surrogate for the Mexican spotted owl), and the fox are not adversely affected by COPECs within their individual home range areas because their adjusted HIs are less than 1.0 (Table 2.0-3). However, the deer mouse, shrew, and robin may still be potentially impacted (although slightly) by COPECs within their individual home range areas because their adjusted HIs are elevated (Table 2.0-3).

Table 2.0-3
Summary of HIs with AUF[a] Adjustment

Receptor	Unadjusted HI	Receptor Home Range (ha)	AUF	HI Adjusted by AUF
Plant	49.8	NA[b]	NA	NA
Invertebrate	15.2	NA	NA	NA
Deer mouse	11.9	0.075	1.0	11.9
Shrew	23	0.39	0.77	17.7
Cottontail	1.0	1.5	0.2	0.2
Robin (invertevore)	51.1	0.42	0.71	36.6
Robin (omnivore)	30.6	0.42	0.71	21.7
Robin (herbivore)	10.9	0.42	0.71	7.7
Kestrel	14.9	13.1	0.022	0.3
Kestrel (flesh diet)	32.6	366	0.00082	0.03
Fox	0.9	699	0.00042	0.0004

[a] AUF is calculated as the drainage area (0.3 ha) divided by the individual home range area.

[b] NA = not applicable; plants and invertebrates do not have home ranges, so an AUF is not calculated.

EPA guidance manages the ecological risk to populations rather than individuals, except in the case of T&E species (EPA 1999, 70086). One approach to addressing the potential effects on populations in the drainage area of SWMU 00-030(g) is to estimate the spatial extent of the area inhabited by the local population that overlaps with the contaminated area. This calculation is based on the individual receptor home range and its dispersal distance (Bowman et al. 2002, 73475).

Bowman estimates that the median dispersal distance for mammals is seven times the linear dimension of the home range (i.e., the square root of the home range area). If only the dispersal distances for the mammals with home ranges within the range of the screening receptors are used (Bowman et al. 2002, 73475), the median dispersal distance becomes 3.6 times the square root of the home range ($R^2 = 0.91$). If it is assumed that receptors can disperse the same distance in any direction, the population area is circular and the dispersal distance is the radius of the circle. Therefore, the population area can be derived from $\pi(3.6\sqrt{HR})^2$ where HR represents home range, or approximately 40HR. This calculation results in a population area for the deer mouse of approximately 3.0 ha (40 × 0.075 ha), and a population area for the shrew of approximately 15.6 ha (40 × 0.39 ha).

A similar relationship is assumed for the avian receptor, so the population area for the robin is approximately 16.8 ha (40 × 0.42 ha). The population area use factors (PAUFs) [drainage area (0.3 ha) divided by the population area] are applied—in the same manner as the AUFs—to the individual HIs from Table 2.0-2. Based on this assessment, the population HIs for the drainage from SWMU 00-030(g) are 1.2 for the deer mouse, 0.4 for the shrew, and 0.2–0.9 for the robin (Table 2.0-4). Therefore, the COPECs in the drainage do not pose a potential risk to the small mammal and avian receptor populations.

Table 2.0-4
Summary of HIs with PAUF[a] Adjustment

Receptor	Unadjusted HI	Population Area (ha)	PAUF	HI Adjusted by PAUF
Plant	49.8	NA[b]	NA	NA
Invertebrate	15.2	NA	NA	NA
Deer mouse	11.9	3.0	0.1	1.2
Shrew	23	15.6	0.019	0.4
Robin (invertevore)	51.1	16.8	0.018	0.9
Robin (omnivore)	30.6	16.8	0.018	0.6
Robin (herbivore)	10.9	16.8	0.018	0.2

[a] PAUF is calculated as the drainage area (0.3 ha) divided by the population area.

[b] NA= not applicable.

The qualitative uncertainty analysis evaluates 17 COPECs (8 inorganic chemicals, 7 organic chemicals, and 2 radionuclides) that were identified by the screening evaluation as well as 1 organic chemical that has no ecological toxicity information (Table 2.0-2).

Antimony, barium, cadmium, cobalt, and silver. The 95% UCLs for these inorganic COPECs are similar to sediment background concentrations (Table 2.0-1), indicating that exposure across the drainage area is similar to background. Therefore, exposure to these inorganic chemicals across the drainage does not pose a potential risk to receptors. In addition, the EPA's Ecological Soil Screening Levels (Eco-SSLs) for antimony and cobalt are 21 mg/kg and 340 mg/kg, respectively, for mammals; for cobalt and birds it is 32 mg/kg (EPA 2000, 73306). The Eco-SSLs would reduce the HQs to less than 1.0 for the wildlife receptors. Therefore, antimony, barium, cadmium, cobalt, and silver are not retained as COPECs for SWMU 00-030(g).

Arsenic. Arsenic was detected at levels above the sediment BV (3.98 mg/kg) in four samples from four locations along the drainage channel, from approximately 0 to 1 ft. The arsenic concentrations ranged from 4.1 mg/kg to 28 mg/kg. A Laboratory sample (RE00-99-0169) collected from the same approximate location as the NMED/DOE Oversight Bureau sample (OB030-g-2) that contained the elevated arsenic

(28 mg/kg) reported arsenic at 0.73 mg/kg, below sediment background. Additional samples that were collected down drainage from the elevated arsenic reported this inorganic chemical at levels either below background (3.98 mg/kg) or less than twice background (4.1–5.8 mg/kg). Therefore, the elevated arsenic level is localized relative to receptor population distributions. The ECORISK Database, version 1.1, provides toxicity information for all receptors for arsenic (LANL 2000, 65691.1). The ESLs for all receptors, except for the deer mouse and vagrant shrew, are equivalent to, or greater than, the 95% UCL. The 95% UCL for arsenic (6.5 mg/kg) is approximately 5 to 11 times greater than the ESLs for the deer mouse and vagrant shrew, resulting in HQs of 5.9 and 11.4, respectively. The small size of the drainage area relative to the individual AUF (0.77 for the shrew), the PAUFs (0.1 and 0.019 for the deer mouse and shrew, respectively), and the localized nature of the elevated arsenic concentrations, indicate that arsenic does not pose a potential risk to ecological receptors. Arsenic is not retained as a COPEC for SWMU 00-030(g).

Hexavalent chromium. Hexavalent chromium was detected in one sample within the drainage channel, at a depth of approximately 8 to 16 in. There is no sediment BV for hexavalent chromium. The ECORISK Database, version 1.1, provides toxicity information for all receptors for hexavalent chromium (LANL 2000, 65691.1). The ESLs for all receptors were less than the maximum detected concentration (0.14 mg/kg); therefore, hexavalent chromium does not pose a potential risk to ecological receptors and is not retained as a COPEC for SWMU 00-030(g).

Copper. Copper was detected at levels above the sediment BV (11.2 mg/kg) in eight samples from four locations along the drainage channel, at depths of 0 to 16 in. The elevated copper concentrations ranged from 12.5 mg/kg to 37.5 mg/kg, or up to approximately 3.5 times the sediment BV. The ECORISK Database, version 1.1, provides toxicity information for all receptors for copper (LANL 2000, 65691.1). The ESLs were greater than the 95% UCL (17.5 mg/kg) for all receptors except the soil-dwelling invertebrate, which was slightly less than the 95% UCL. The resulting HQs were equivalent to, or less than, 1.0, indicating that copper does not pose a potential risk to ecological receptors. Therefore, copper is not retained as a COPEC for SWMU 00-030(g).

Lead. Lead was detected at levels above the sediment BV (19.7 mg/kg) in fourteen samples from seven locations along the drainage channel, at depths of 0 to 2 ft. The elevated lead concentrations ranged from 21.7 mg/kg to 96.4 mg/kg, or up to approximately 5 times the sediment BV. The ECORISK Database, version 1.1, provides toxicity information for all receptors for lead (LANL 2000, 65691.1). The ESLs were greater than the 95% UCL (49.8 mg/kg) for all wildlife receptors and the earthworm (i.e., HQs were less than 1.0). The plant ESL was approximately one-half of the 95% UCL and resulted in an HQ of 2.5. Because of the low HQs (2.5 or less), lead does not pose a potential risk to ecological receptors. Therefore, lead is not retained as a COPEC for SWMU 00-030(g).

Mercury. Mercury was detected at levels above the sediment BV (0.1 mg/kg) in fourteen samples from eight locations along the drainage channel, at depths of approximately 0 to 16 in. The 95% UCL (0.51 mg/kg) is approximately five times the sediment BV, but only elevated by 0.4 mg/kg. The ECORISK Database, version 1.1, provides toxicity information for all receptors for mercury (LANL 2000, 65691.1). The ESLs were greater than the 95% UCL for all receptors except the soil-dwelling invertebrate, resulting in HQs of less than 1.0. The ESL for the soil-dwelling invertebrate, represented by the earthworm, is 0.05 mg/kg, which is 50% of the sediment BV, and results in an HQ of 10.2. Because mercury is not greatly elevated above sediment background and the HQs for all except the earthworm are less than 1.0, mercury does not pose a potential for adverse impact to the ecology of the area. Therefore, mercury is not retained as a COPEC for SWMU 00-030(g).

Selenium. Selenium was detected at levels above the sediment BV (0.3 mg/kg) in nine samples from seven locations along the drainage channel, at depths of approximately 0 to 2.5 ft. Several samples

collected by the NMED/DOE Oversight Bureau from approximately the same locations had sample DLs (2.0 mg/kg) above the sediment BV. The 95% UCL, using both detected and undetected values, is 0.77 mg/kg, which is approximately 2.5 times the sediment BV. The ECORISK Database, version 1.1, provides toxicity information for all receptors for selenium (LANL 2000, 65691.1). The ESLs were greater than the sediment BV for all receptors and, except for the plant, were greater than the original 95% UCL (HQs range from 0.02 to 1.5). The small size of the drainage area relative to the individual AUFs (0.77 for the shrew, and 0.71 for the robin), the PAUFs (0.1, 0.019, and 0.018 for the deer mouse, shrew, and robin, respectively), and the relatively low HQs (1.5 or less), indicate that selenium does not pose a potential risk to ecological receptors. Therefore, selenium is not retained as a COPEC for SWMU 00-030(g).

Thallium. Thallium was detected at levels above the sediment BV (0.73 mg/kg) in two samples from two locations along the drainage channel, at depths of approximately 0 to 8 in. The infrequent detection of thallium above the sediment BV indicates that the elevated thallium is localized relative to receptor population distributions. Thallium also had elevated DLs (0.79 mg/kg to 10 mg/kg) above the sediment BV in five of the NMED/DOE Oversight Bureau samples and one of the Laboratory samples. The elevated detection limits of four of the five NMED/DOE Oversight Bureau samples corresponded to DLs below the sediment BV in samples collected by the Laboratory from approximately the same locations. The detected concentrations of thallium (4.1 mg/kg and 6.7 mg/kg) corresponded to Laboratory samples that reported thallium as undetected at less than 0.33 mg/kg and 0.79 mg/kg, respectively. Therefore, the 95% UCL (1.9 mg/kg) overestimates the exposure concentration of thallium along the drainage channel. The ECORISK Database, version 1.1, provides toxicity information for the plant and mammalian receptors for thallium (LANL 2000, 65691.1). The ESLs for the plant, deer mouse, and vagrant shrew are less than the sediment BV and less than the 95% UCL, while the ESLs for the other mammals are greater than the 95% UCL. The small size of the drainage area relative to the individual AUF (0.77 for the shrew), the PAUFs (0.1 and 0.019 for the deer mouse and shrew, respectively), the low HQs for the other wildlife receptors, and the localized nature of the elevated thallium concentrations indicate that thallium does not pose a potential risk to ecological receptors. In addition, the plant population within the drainage channel, in particular, and within Acid Canyon, in general, appears healthy and does not show any signs of stress. Therefore, thallium is not retained as a COPEC for SWMU 00-030(g).

Zinc. Zinc was detected at levels above the sediment BV (60.2 mg/kg) in ten samples from six locations, at depths of approximately 0 to 2 ft. In general, sample data showed that zinc concentrations decreased to below background with depth. The elevated zinc concentrations ranged from 60.2 mg/kg to 840 mg/kg or up to an order of magnitude above the sediment BV. The highest zinc concentration was reported in a sample from the base of the slope ; the concentration returned to below the sediment BV in the next sample down the drainage, approximately 50 ft away. Therefore, the highest zinc is localized and not indicative of drainage-wide zinc concentrations. The 95% UCL for zinc is 181 mg/kg, or approximately three times the sediment BV. If the highest zinc concentration (840 mg/kg) is not included in the calculation of the 95% UCL, the value becomes 69 mg/kg. This adjusted 95% UCL is similar to sediment background. The ECORISK Database, version 1.1, provides toxicity information for all receptors for zinc (LANL 2000, 65691.1). The ESLs were greater than the 95% UCL, except in the cases of the plant, the soil-dwelling invertebrate, and the robin (invertivorous, omnivorous, and herbivorous). The receptors with the highest HQs (plant and robin) also had ESLs below the sediment BV. The HQs using the adjusted 95% UCL are reduced to approximately 7 for the plant and less than 3 for the robin. The small size of the drainage area relative to the individual AUF (0.71 for the robin), the PAUF (0.018 for the robin), and the low HQs for the other wildlife receptors, indicate that zinc does not pose a potential risk to ecological receptors. In addition, the plant population within the drainage channel, in particular, and within Acid Canyon, in general, appears healthy and does not show any signs of stress. The effects on plants that were hypothesized based on an HQ of 18.1 after more than 50 years are not evident from field observations. As a result, zinc is not retained as a COPEC for SWMU 00-030(g).

Aroclor-1254. Aroclor-1254 was detected in the sediment along the drainage channel in fourteen samples, near the surface. The detected concentrations were reported in the upper portion of the drainage channel, from below the outfall to approximately one-third of the way down the channel to location 00-3731. It was not detected in the middle and lower portions of the drainage channel, including the catchment area, even though the DLs were similar for all the samples (EQLs were approximately 0.014 mg/kg in the upper portion of the drainage channel as opposed to 0.04 mg/kg in the middle and lower portions of the drainage channel); no detected concentrations of Aroclor-1254 were below the EQLs. The limited extent and low-level detected concentrations (1.1 mg/kg or less) of Aroclor-1254 indicate that the contamination is localized relative to receptor population distributions. The ECORISK Database, version 1.1, provides toxicity information for all receptors for aroclor-1254 except the plant and soil invertebrate (LANL 2000, 65691.1). The ESLs were less than the 95% UCL for the deer mouse, the vagrant shrew, the invertivorous robin, and the omnivorous robin, but greater than the 95% UCL for the other receptors. The small size of the drainage area relative to the individual AUFs (0.77 for the shrew, and 0.71 for the robin), the PAUFs (0.1, 0.019, and 0.018 for the deer mouse, shrew, and robin, respectively), and the low HQs for the other wildlife receptors, indicate that Aroclor-1254 does not pose a potential risk to ecological receptors. Therefore, Aroclor-1254 is not retained as a COPEC for SWMU 00-030(g).

Aroclor-1260. Aroclor-1260 was detected in the sediment along the drainage channel in two samples, near the surface. The detected concentrations were (1) at the head of the drainage on the slope below the outfall (0.71 mg/kg); and (2) at the end of the drainage in the catchment area (0.023 mg/kg). The concentration of Aroclor-1260 decreased by an order of magnitude from the head of the drainage to the end. The infrequent and low-level detection of Aroclor-1260 indicates that the elevated Aroclor-1260 is localized relative to receptor population distributions. The ECORISK Database, version 1.1, provides toxicity information for all receptors for Aroclor-1260 except the plant and soil invertebrate (LANL 2000, 65691.1). The ESLs were greater than the 95% UCL for all the receptors. The small size of the drainage area relative to the individual AUFs (0.77 for the shrew, and 0.71 for the robin), the PAUFs (0.1, 0.019, and 0.018 for the deer mouse, shrew, and robin, respectively), and the low HQs for the other wildlife receptors, indicate that Aroclor-1260 does not pose a potential risk to ecological receptors. Therefore, Aroclor-1260 is not retained as a COPEC for SWMU 00-030(g).

DDD. DDD was detected in the sediment along the drainage channel in four samples, from depths of approximately 0 to 1 ft. Two of the detected concentrations were reported at the head of the drainage, on the slope below the outfall (0.011 mg/kg and 0.0045 mg/kg); two were reported at the end of the drainage, in the catchment area (0.11 mg/kg and 0.025 mg/kg). The 95% UCL for DDD along the drainage is 0.031 mg/kg. The infrequent and low-level detection of DDD indicates that the elevated DDD is localized relative to receptor population distributions. The ECORISK Database, version 1.1, does not have any toxicity information for receptors for DDD (LANL 2000, 65691.1). However, the distribution of receptor populations across the area relative to the drainage channel makes exposure to DDD minimal. The small size of the drainage area relative to the individual AUFs (0.77 for the shrew and 0.71 for the robin), the PAUFs (0.1, 0.019, and 0.018 for the deer mouse, shrew, and robin, respectively), and the infrequent and low-level detections of DDD, indicate that DDD does not pose a potential risk to ecological receptors. Therefore, DDD is not retained as a COPEC for SWMU 00-030(g).

DDE. DDE was detected in five sediment samples from five locations along the drainage channel, at depths of approximately 0 to 16 in. The infrequency of the detection of DDE indicates that there was no concentrated release at this SWMU, and that this pesticide is not a major contributor to the contamination. The 95% UCL for DDE along the drainage is 0.015 mg/kg. The ECORISK Database, version 1.1, provides toxicity information for all receptors for DDE except the plant and soil invertebrate (LANL 2000, 65691.1). The ESLs were greater than the 95% UCLs for all receptors, resulting in HQs less

than 1.0, except in the cases of the robin (invertivorous and omnivorous) and the kestrel (omnivorous and carnivorous). The small size of the drainage area relative to the individual AUFs (0.71 for the robin, 0.022 for the kestrel, and 0.0082 for the kestrel [flesh diet]), the PAUF (0.018 for the robin), and the low HQ for the mammalian receptors, indicate that DDE does not pose a potential risk to ecological receptors. Therefore, DDE is not retained as a COPEC for SWMU 00-030(g).

DDT. DDT was detected in sixteen sediment samples from nine locations along the drainage channel, at depths of approximately 0 to 2.5 ft. The 95% UCL for DDT is 0.098. The ECORISK Database, version 1.1, provides toxicity information for all receptors for DDT except the plant and soil invertebrate (LANL 2000, 65691.1). The ESLs were greater than the 95% UCLs for all receptors, resulting in HQs less than 1.0, except in the cases of the robin and the kestrel. The small size of the drainage area relative to the individual AUFs (0.71 for the robin, 0.022 for the kestrel, and 0.0082 for the kestrel [flesh diet]), the PAUF (0.018 for the robin), and the low HQ for the mammalian receptors, indicate that DDT does not pose a potential risk to ecological receptors. Therefore, DDT is not retained as a COPEC for SWMU 00-030(g).

Dieldrin. Dieldrin was detected in two sediment samples from two locations along the drainage channel, near the surface. The detected concentrations (0.044 mg/kg and 0.008 mg/kg) were reported at the head of the drainage, on the slope below the outfall, and were not detected elsewhere along the drainage channel. The infrequent and low-level detection of dieldrin indicates that the elevated levels are localized relative to receptor population distributions. The 95% UCL for dieldrin along the drainage is 0.017 mg/kg. The ECORISK Database, version 1.1, provides toxicity information for all receptors for dieldrin except the soil-dwelling invertebrate (LANL 2000, 65691.1). The ESLs were greater than the 95% UCLs for all receptors, resulting in HQs less than 1.0. Dieldrin does not pose a potential risk to the Mexican spotted owl, based on the low HQ (0.009) for the carnivorous kestrel. Therefore, dieldrin is not retained as a COPEC for SWMU 00-030(g).

Endrin aldehyde. Endrin aldehyde was detected in one sediment sample from one location along the drainage channel, near the surface. The detected concentration (0.009 mg/kg) was reported at the head of the drainage, on the slope below the outfall, and was not detected elsewhere along the drainage channel. The infrequent and low-level detection of endrin aldehyde indicates that the elevated levels are localized relative to receptor population distributions. The 95% UCL for endrin aldehyde along the drainage is 0.011 mg/kg. The ECORISK Database, version 1.1, provides toxicity information for all receptors for endrin, which is the parent compound, except the soil-dwelling invertebrate (LANL 2000, 65691.1). The endrin aldehyde ESLs were greater than the 95% UCLs for all receptors, resulting in HQs less than 1.0, except the plant, which had an HQ of 3.2. The small size of the drainage area relative to the individual AUF (0.71 for the robin) and the PAUF (0.018 for the robin) indicate that endrin aldehyde does not pose a potential risk to the robin. The plant population within the drainage channel, in particular, and within Acid Canyon, in general, appears healthy and does not show any signs of stress. The effects on plants that were hypothesized based on an HQ of 3.2 after more than 50 years are not evident from field observations. Endrin aldehyde does not pose a potential risk to the Mexican spotted owl, based on the low HQ (0.02) for the carnivorous kestrel. As a result, endrin aldehyde is not retained as a COPEC for SWMU 00-030(g).

Endrin ketone. Endrin ketone was detected in two sediment samples from two locations along the drainage channel, at depths of approximately 0 to 2 ft. The detected concentrations (0.033 mg/kg and 0.007 mg/kg) were reported along the drainage and decreased to below detection at the end of the channel. The infrequent and low-level detection of endrin ketone indicates that the elevated levels are localized relative to receptor population distributions. The 95% UCL for endrin ketone along the drainage is 0.014 mg/kg. The ECORISK Database, version 1.1, provides toxicity information for all receptors for endrin, which is the parent compound, except the soil-dwelling invertebrate (LANL 2000, 65691.1). The

endrin ketone ESLs were greater than the 95% UCLs for all receptors, resulting in HQs less than 1.0, except the plant and the invertivorous robin. These receptors had HQs of 4.1 and 1.2, respectively. The small size of the drainage area relative to the individual AUF (0.71 for the robin) and the PAUF (0.018 for the robin) indicate that endrin ketone does not pose a potential risk to the robin. The plant population within the drainage channel, in particular, and within Acid Canyon, in general, appears healthy and does not show any signs of stress. The effects on plants that were hypothesized based on an HQ of 4.1 after more than 50 years are not evident from field observations. Endrin ketone does not pose a potential risk to the Mexican spotted owl, based on the low HQ (0.03) for the carnivorous kestrel. As a result, endrin ketone is not retained as a COPEC for SWMU 00-030(g).

Plutonium-239. Plutonium-239 was detected above the sediment BV (0.068 pCi/g) along the entire length of the drainage channel in twenty-eight samples, at depths of approximately 0 to 2.5 ft. The 95% UCL for plutonium-239 is 17.2 pCi/g. The ECORISK Database, version 1.1, provides toxicity information for all receptors for plutonium-239 (LANL 2000, 65691.1). The ESLs were greater than the 95% UCLs for all receptors. The soil-dwelling invertebrate had the highest HQ of 0.96. Because the HQs for plutonium-239 were less than or equivalent to 1.0, plutonium-239 is not retained as a COPEC for SWMU 00-030(g).

Uranium-234. Uranium-234 was detected above the sediment BV (2.59 pCi/g) in seven samples from four locations, at depths of approximately 0 to 16 in. The 95% UCL for uranium-234 is 6.3 pCi/g. The ECORISK Database, version 1.1, provides toxicity information for all receptors for uranium-234 (LANL 2000, 65691.1). The ESLs were greater than the 95% UCLs for all receptors, resulting in HQs less than 1.0. Therefore, uranium-234 is not retained as a COPEC for SWMU 00-030(g).

3.0 INTERPRETATION

Because of the previously mentioned uncertainties related to the toxicity values that were used to derive the ESLs, as well as the conservative assumptions used in the calculations, the ESLs probably overestimate the potential risk to a given receptor from a COPEC. As a result, the HQs and HIs whose calculations are based on the ESLs also overestimate the potential risk. The HI analyses presented in Table 2.0-2 further assume that each receptor is exposed to all COPECs at a particular concentration all the time. The fact that this is not true is indicated by the frequencies of detected concentrations for each COPEC above BV or DLs and the final ESLs (Table 1.0-1). Many of the COPECs were detected, or detected above background, in less than 20% of the samples, and approximately 75% of the COPECs were detected, or detected above background, in less than 50% of the samples collected along the drainage. The exceptions to this are lead, mercury, selenium, zinc, alpha-chlordane, and gamma-chlordane, which were detected or detected above background in 53–74% of the drainage samples; and 4,4'-DDT and plutonium-239, which were detected or detected above background in all the drainage samples.

Only a small portion of Acid Canyon was affected by the discharges from the septic tank outfall at SWMU 00-030(g). The tract of land within the drainage channel is approximately 0.7 acres or 0.3 ha. Except for the deer mouse, this area is less than the individual home ranges for the wildlife receptors. Based on the individual AUFs for the receptors, the HIs for the kestrel, cottontail, and fox are less than 1.0. Because ecological risk is assessed at the population level, except when T&E species are present (and they are not present in Acid Canyon), population AUFs (PAUFs) were determined. Based on the PAUFs, the HIs for the robin, deer mouse, and shrew are near, or less than, 1.0. Therefore, the exposure of receptor populations to contaminants is infrequent and does not pose potential adverse effects.

The plant HI was 49.8, which indicates a potential for adverse effects (Table 2.0-2). However, the drainage and surrounding area is characterized by a healthy and lush vegetative community, as

described in the scoping section of this assessment and in the scoping checklist (Appendix F). The canyon has a variety of terrestrial receptors and is characterized by a mixed conifer community dominated by ponderosa pine, Douglas fir, juniper, bearberry and gambel oak, and grasses (Biggs 1996, 62928.1). The vegetation community is typical of a canyon setting and there are no indications of stressed vegetation. Therefore, the hypothesized effects on plants (based on an HI of 49.8) from releases from this SWMU after more than 50 years are not evident from field observations.

Based on this assessment, the inorganic, organic, and radionuclide COPECs remaining in the sediment along the drainage channel from SWMU 00-030(g) do not pose a potential for adverse effects on ecological receptors.

4.0 REFERENCES

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Supplemental Attachment 3

Comparison of Revised UCLs with SALs

The 95% upper confidence level (UCL_{95}) on the mean was calculated for each drainage COPC using the nonparametric method of bootstrapping. Acetone and hexavalent chromium are the only COPCs without enough data points to calculate a UCL_{95}; therefore, the maximum detected concentration for each was used in the following comparison to SALs.

All noncarcinogens are less than their respective SALs. All radionuclide COPCs are less than their respective SALs. Arsenic, whose SAL is less than background, is the only carcinogen that was greater than its SAL.

Table 2.4-2
Comparison of Carcinogenic Drainage Channel COPCs to SALs

Analyte	Carcinogenic Classification	Location ID	Sample ID	Depth (in.)	UCL (mg/kg)	SAL (10-6) (mg/kg)
Aroclor-1254	B2[a]	n/a[b]	n/a	n/a	0.417	1.0
Aroclor-1260	B2	n/a	n/a	n/a	0.0324	1.0
Arsenic	A[c]	n/a	n/a	n/a	6.53	0.39
Chlordane (alpha-)	B2	n/a	n/a	n/a	0.0183	1.6
Chlordane (gamma-)	B2	n/a	n/a	n/a	0.0138	1.6
Chromium (hexavalent)	A	na[d]	OB030-g-2	7.9–15.7	0.14 (maximum used)	30
DDD[4,4'-]	B2	n/a	n/a	n/a	0.0308	2.4
DDE[4,4'-]	B2	n/a	n/a	n/a	0.0149	1.7
DDT[4,4'-]	B2	n/a	n/a	n/a	0.0978	1.7
Dieldrin	B2	n/a	n/a	n/a	0.0168	0.03
Toxaphene	B2	n/a	n/a	n/a	0.664	0.44

[a] *B2* denotes a probable human carcinogen.

[b] n/a = not applicable; UCLs incorporate a number of locations, samples, and depths.

[c] *A* denotes a human carcinogen.

[d] na = Sample locations for NMED/DOE Oversight Bureau samples not available.

Table 2.4-4
Comparison of Noncarcinogenic Drainage Channel COPCs to SALs

Analyte	Location ID	Sample ID	Depth (in.)	UCL (mg/kg)	SAL (mg/kg)
Acetone	00-3725	AAB0278	0–6	0.022(J)[a] (maximum used)	1400
Antimony	n/a[b]	n/a	n/a	0.767	30
Barium	n/a	n/a	n/a	93.9	5400
Cadmium	n/a	n/a	n/a	0.237	39
Cobalt	n/a	n/a	n/a	4.73	3400
Copper	n/a	n/a	n/a	17.46	2800
Endosulfan I	n/a	n/a	n/a	0.00697	330
Endosulfan II	n/a	n/a	n/a	0.0124	330
Endrin aldehyde	n/a	n/a	n/a	0.0108	16
Endrin ketone	n/a	n/a	n/a	0.0142	16
Lead	n/a	n/a	n/a	49.8	400
Mercury	n/a	n/a	n/a	0.507	23
Selenium	n/a	n/a	n/a	0.774	**370**
Silver	n/a	n/a	n/a	0.777	**370**
Thallium	n/a	n/a	n/a	1.88	**5.2**
Zinc	n/a	n/a	n/a	181	**22000**

[a] J = The analyte is classified as *detected* but the reported concentration value is expected to be more uncertain than usual.

[b] n/a = not applicable; UCLs incorporate a number of locations, samples, and depths.

Table 2.4-6
Comparison of Drainage Channel Radionuclide COPCs to SALs

Analyte	Location ID	Sample ID	Depth (ft)	UCL (pCi/g)	SAL (pCi/g)
Americium-241	n/a[a]	n/a	n/a	1.9	22
Plutonium-238	n/a	n/a	n/a	0.155	27
Plutonium-239	n/a	n/a	n/a	17.2	24
Uranium-234	n/a	n/a	n/a	6.26	13
Uranium-235	n/a	n/a	n/a	2.546	10
Uranium-238	n/a	n/a	n/a	3.63	67

[a] n/a = not applicable; UCLs incorporate a number of locations, samples, and depths.