LANL ER/OU 1049

Radiological Addendum to the RFI Report for Potential Release Sites

10-002(a,b)
10-003(a-o)
10-004(a,b)
10-005
10-007

TA-10 Subsurface

Field Unit 1

Environmental Restoration Project

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EXECUTIVE SUMMARY

This Radiological Addendum to the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Report for Potential Release Sites (PRSs) in Technical Area (TA) 10 describes the results for radionuclide analyses conducted for the TA-10 Subsurface Aggregate at Los Alamos National Laboratory (LANL). Although radiological constituents are not regulated under RCRA, the investigation of the TA-10 Subsurface Aggregate included both hazardous (as defined by RCRA) and radiological constituents. The results for hazardous RCRA constituents were included in the RFI Report for the TA-10 Subsurface Aggregate. Included in this addendum are the screening assessments and radiological dose assessments based on the radionuclide results from samples collected during the Phase I investigation of PRSs 10-002(a,b), 10-003(a-o), 10-004(a,b), 10-005, and 10-007.

TA-10, also referred to as Bayo Site, was used from 1943 to 1961 as a firing site to conduct experiments using high explosives in conjunction with nuclear weapons research. The site consisted of firing pads, control buildings, battery buildings, a radiochemistry laboratory, subsurface disposal systems, and other associated structures. Decontamination and decommissioning of the site, including both firing pads and the radiochemistry laboratory, was completed in 1963. TA-10 was released to Los Alamos County in 1967. Bayo Canyon is currently open to the public for recreational use.

The specific area under investigation for this addendum is the Subsurface Aggregate, which includes all areas at TA-10 where subsurface contamination is a concern. The Subsurface Aggregate is located near the former radiochemistry laboratory and includes PRSs 10-002(a,b), 10-003(a-o), 10-004(a,b), 10-005, and 10-007. Radionuclides were associated with former Laboratory processes at TA-10 and previous investigations have shown radionuclides to be present. Total uranium, isotopic uranium, and strontium-90 were included as chemicals of potential concern (COPCs) for the TA-10 Subsurface Aggregate.

The primary objective of the TA-10 Subsurface Aggregate Phase I investigation was to characterize the nature, concentrations, and lateral and vertical extent of potential subsurface contamination related to historical activities at the site. The investigation was conducted from May to November 1994 and included geodetic surveys, radiological surveys, geophysical surveys, borehole drilling, and subsurface sampling.

The screening assessments presented in Section 5.0 of this addendum consider the Subsurface Aggregate as six investigation areas. These areas are consistent with those presented in the RFI Report.

- PRS 10-002(a) consists of a former solid waste disposal pit (TA-10-44) for the former radiochemistry laboratory (TA-10-1).
- PRS 10-002(b) consists of another former solid waste disposal pit (TA-10-48) for the former radiochemistry laboratory (TA-10-1).
- The Central Area consists of the former radiochemistry laboratory liquid waste disposal complex [PRSs 10-003(a-o)] as well as the building debris landfill (PRS 10-007) created during the 1963 decontamination and decommissioning of this area.
- PRS 10-004(a) consists of a former sanitary septic tank and overflow pit (TA-10-40) that served the personnel building (TA-10-21).
- PRS 10-004(b) consists of a former sanitary septic tank (TA-10-38) that served the former radiochemistry laboratory (TA-10-1).
- PRS 10-005 consists of a former open surface disposal pit used to contain shot debris swept from TA-10 firing sites and adjacent areas.

In the RFI report, which addressed only hazardous RCRA constituents, all of these investigation areas were recommended for removal from LANL's RCRA operating permit because no hazardous RCRA constituents were retained as COPCs as a result of the risk screening process. In this addendum, which addresses radiological constituents, four of the six investigation areas [PRSs 10-002(a), 10-004(a), 10-004(b), and 10-005] require no further action because no radionuclides are retained as COPCs as a result of the risk screening process. In the remaining two areas, the Central Area [PRSs 10-003(a-o) and 10-007] and PRS 10-002(b), radionuclides were retained as COPCs as a result of the screening assessments, and risk assessments were conducted.

The results for the current recreational scenarios for PRSs 10-002(b) and the Central Area indicate that current use of these areas for hiking is not associated with an unacceptable health risk level. The results for the residential use scenarios for these areas indicate unacceptable risk levels, due primarily to ingestion of garden produce. If Bayo Canyon is developed for residential or agricultural purposes, remedial action may be warranted. The results of the site-wide future recreational scenario indicate that unacceptable risk levels may occur, primarily from ingestion of edible plants. An interim action will be conducted to remove the chamisa bushes containing elevated levels of strontium-90 from this area. In addition, the potential for future surface contamination from plant uptake will be evaluated and, if necessary, remedial alternatives will be considered.

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1.0 INTRODUCTION

This Radiological Addendum to the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Report for Potential Release Sites (PRSs) in Technical Area (TA) 10 describes the results for radionuclide analyses conducted for the TA-10 Subsurface Aggregate at Los Alamos National Laboratory (LANL). Although radiological constituents are not regulated under RCRA, the investigation of the TA-10 Subsurface Aggregate included both hazardous (as defined by RCRA) and radiological constituents. The results for hazardous RCRA constituents were included in the RFI Report for the TA-10 Subsurface Aggregate (LANL 1996, 06-0131). Included in this addendum are the screening assessments and radiological dose assessments based on the radionuclide results from samples collected during the Phase I Investigation of PRSs 10-002(a,b), 10-003(a-o), 10-004(a,b), 10-005, and 10-007.

1.1 General Site History

TA-10, also referred to as Bayo Site, was used from 1943 to 1961 as a firing site to conduct experiments using high explosives in conjunction with nuclear weapons research. The site consisted of firing pads, control buildings, battery buildings, a radiochemistry laboratory, subsurface disposal systems, and other associated structures. Decontamination and decommissioning of the site, including both firing pads and the radiochemistry laboratory, was completed in 1963 (LANL 1992, 0783). TA-10 was released to Los Alamos County in 1967. Bayo Canyon is currently open to the public for recreational use.

The specific area under investigation for this report is the Subsurface Aggregate, which includes all areas at TA-10 where subsurface contamination is a concern. The Subsurface Aggregate is mostly located near the radiochemistry laboratory and includes PRSs 10-002(a,b), 10-003(a-o), 10-004(a,b), 10-005, and 10-007.

The screening assessments presented in Section 5.0 of this addendum consider the Subsurface Aggregate as six distinct investigation areas (Fig. 1.1-1). These areas are consistent with those presented in the RFI Report (LANL 1996, 06-0131).

- PRS 10-002(a) consists of a former solid waste disposal pit (TA-10-44) for the former radiochemistry laboratory (TA-10-1).
- PRS 10-002(b) consists of another former solid waste disposal pit (TA-10-48) for the former radiochemistry laboratory (TA-10-1).

- The Central Area consists of the former radiochemistry laboratory liquid waste disposal complex [PRSs 10-003(a-o)] as well as the building debris landfill (PRS 10-007) created during the 1963 decontamination and decommissioning of this area.
- PRS 10-004(a) consists of a former sanitary septic tank and overflow pit (TA-10-40) that served the personnel building (TA-10-21).
- PRS 10-004(b) consists of a former sanitary septic tank (TA-10-38) that served the former radiochemistry laboratory (TA-10-1).
- PRS 10-005 consists of a former open surface disposal pit used to contain shot debris swept from TA-10 firing sites and adjacent areas.

Radionuclides were associated with former Laboratory processes at TA-10 and previous investigations have shown radionuclides to be present. Total uranium, isotopic uranium, and strontium-90 were included as chemicals of potential concern (COPCs) in the Phase I RFI of the TA-10 Subsurface Aggregate.

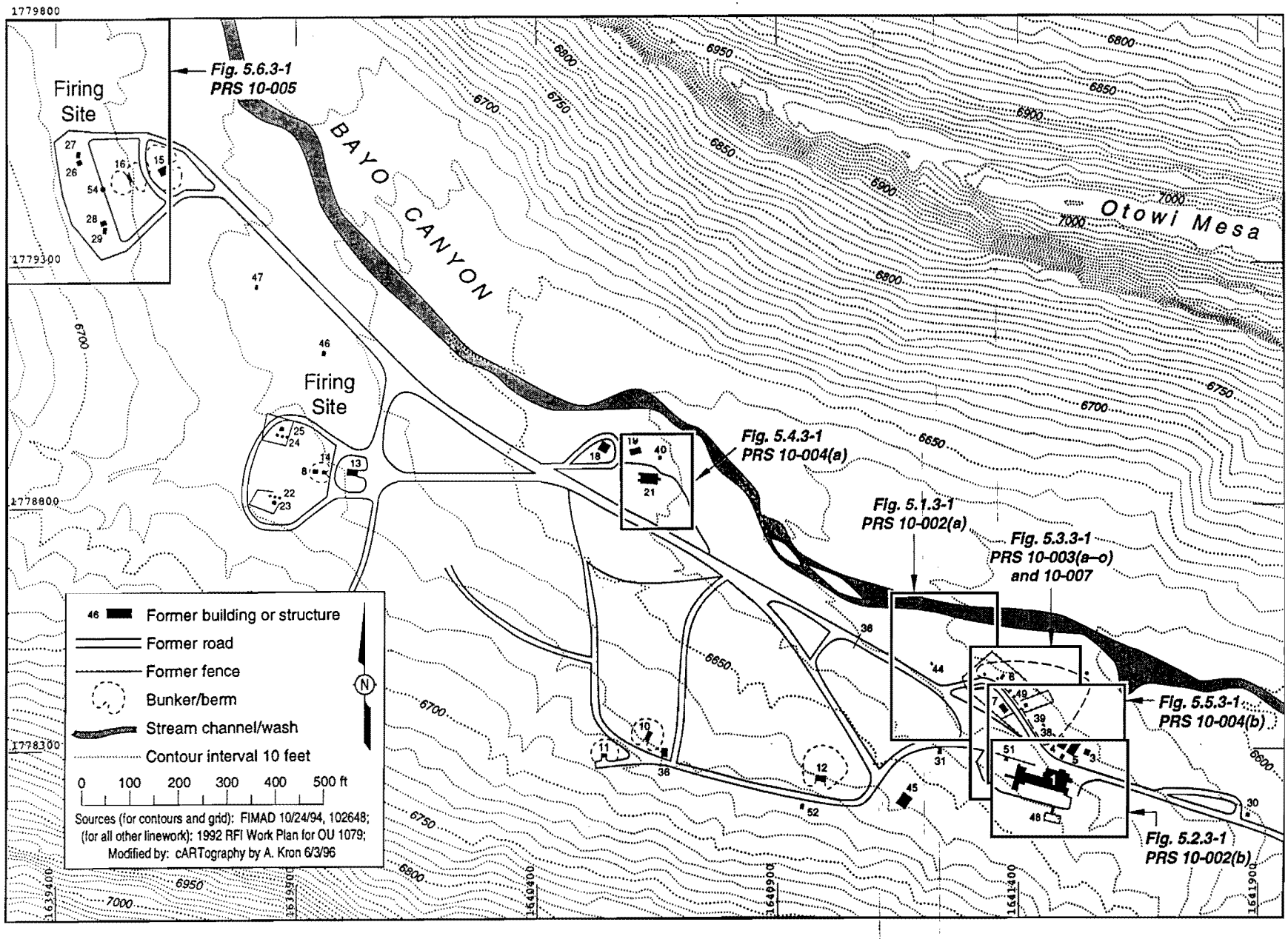

Fig. 1.1-1. Index map of investigation areas within the TA-10 Subsurface Aggregate.

1.2 RFI Overview

The primary objective of the TA-10 Subsurface Aggregate Phase I investigation was to characterize the nature, concentrations, and lateral and vertical extent of potential subsurface contamination related to historical activities at the site.

1.3 Field Activities

The Phase I investigation of the TA-10 Subsurface Disposal Aggregate was conducted from May to November 1994. The investigation included geodetic surveys, radiological surveys, geophysical surveys, drilling, and subsurface sampling. Details of these field activities are discussed in Section 1.3 of the RFI report (LANL 1996, 06-0131).

In summary, geodetic and geophysical surveys were conducted to identify the locations of former buildings and structures associated with former TA-10 operations. A radiological survey was also conducted for health and safety purposes before drilling activities began. The ground surface and vegetation in the areas in and around the drilling arrays and support areas were surveyed with an Eberline™ ESP-1/HP-260 for the presence of beta and gamma radiation. Elevated radioactivity was detected in the surface soils and chamisa plants near drilling arrays 1 and 2 in the western portion of the Central Area. This area of elevated readings is cordoned off with temporary fencing, and appropriate control signs are posted. An additional radiological survey was conducted after drilling activities were complete, and the results of this survey indicated that no radiological contamination was introduced to the surface during drilling activities.

Sampling activities during the TA-10 Subsurface Aggregate investigation included borehole drilling and subsurface sampling, as discussed in Section 1.3.4 of the RFI report (LANL 1996, 06-0131). A total of 93 boreholes were drilled and sampled. Boreholes were organized into 12 four-armed drilling arrays, each consisting of between 5 and 10 boreholes. The arrays were generally centered on former structure locations or areas known or suspected to be contaminated based on the results of previous investigations. Some of the drilling arrays were oriented according to the expected distribution of subsurface contaminants and others were oriented in the four cardinal directions. Borehole spacing within each array ranged from 5 to 15 ft. Sampling arrays are shown on Figs. 5.1.3-1, 5.2.3-1, 5.3.3-1, 5.4.3-1, 5.5.3-1, and 5.6.3-1 in Section 5.0 of this addendum.

Boreholes were advanced to a minimum depth of 50 ft below ground surface (bgs). A minimum of four soil samples were collected from each borehole for laboratory analysis of selected radiological and nonradiological constituents. Based on field screening and mobile laboratory analytical data, drilling arrays were advanced vertically and laterally to adequately bound the zones of contamination.

Recovered core was field-screened for gross beta and gamma radiation using an Eberline™ ESP-1 with an HP 260 probe or a Ludlum Model 12™ with a 44-40 shielded probe, and for volatile organic compounds (VOCs) using a Thermo Environmental™ Model 580B photoionization detector (PID). Core barrels and borehole cuttings were initially screened for gross beta/gamma radioactivity as they were retrieved from the borehole. Each borehole was screened for VOCs and combustible gases. Gross beta/gamma and VOC screening were performed immediately after the core barrel was opened and prior to core logging and sampling. Samples were collected at 5-ft intervals for gross radioactivity screening at the mobile radiological analytical laboratory (MRAL) and screening of selected nonradiological constituents at the mobile chemistry analytical laboratory (MCAL). Samples were collected from that portion of the core showing the highest radioactivity based on field screening or, if there was no reading greater than background, from an interval selected at random. MRAL analysis suites included moisture and gross alpha, beta, and gamma radiation. MCAL analyses included analyses of semivolatile organic compounds (SVOCs) and x-ray fluorescence (XRF) metals.

At least four samples were collected from each borehole for a full suite of fixed laboratory analyses. These four samples were collected from 1) the midpoint of the first 10-ft interval, 2) the bottom of the borehole, 3) the interval exhibiting the highest field screening levels for radionuclides and VOCs, and 4) a random core interval retrieved from below 10 ft bgs and selected to target locations immediately underlying previously existing structures, exhibiting a change in color or obvious staining of the core, showing significant changes in lithology, and/or contacting the fill/tuff interface.

2.0 ENVIRONMENTAL SETTING

Information about the climate, geology, and hydrology of the TA-10 Subsurface Aggregate area, as well as biological and cultural surveys conducted at the site, can be found in Section 2.0 of the RFI report (LANL 1996, 06-0131).

3.0 APPROACH TO DATA ASSESSMENT AND ANALYSIS

The general approach used for data analysis in this addendum is summarized in Section 3.0 of the RFI report. This section summarizes only those aspects of data analysis that differ from the approach discussed in the RFI report.

3.1 Human Health Screening Assessment Approach for Radionuclides

Radionuclide analyses conducted by gamma spectroscopy often yield results for radionuclides that are not appropriate to evaluate as potential site contaminants. These include short-lived activation/fission products, naturally occurring background radionuclides, and daughter radionuclides of naturally occurring radionuclides. These three classes of radionuclides are not considered site contaminants for the following reasons.

Short-lived activation/fission products that are commonly reported in gamma spectroscopy analyses (e.g., barium-140, cerium-144, cesium-134, cobalt-57, europium-152, manganese-54, ruthenium-106, and sodium-22) have half-lives ranging from a few days to 2.6 years. They are routinely reported because they are used as internal standards to measure such things as equipment performance and laboratory background or contamination. However, these activation/fission products are not related to the RFI and are not expected to occur normally at TA-10 sites. Therefore, short-lived activation/fission products are not evaluated as COPCs.

The only naturally occurring radionuclide reported in the gamma spectroscopy analyses for this site was potassium-40. Potassium-40 is routinely reported because it is used as an internal standard. There is no process knowledge of the use of potassium-40 at TA-10, and reported concentrations are generally within known background ranges (Longmire et al. 1995,1266). Therefore, potassium-40 will not be evaluated as a COPC.

The daughters of uranium and thorium, which are naturally occurring radionuclides, are also reported by gamma-spectroscopy analyses. These daughters (e.g., isotopes of actinium, bismuth, lead, protactinium, radium, radon, thallium, and thorium) are present in secular equilibrium concentrations and are not directly evaluated as potential radionuclide contaminants. Quality assurance/quality control (QA/QC) activities review daughter radionuclides for anomalies, and any daughter radionuclides that can not be attributed to the parent at background concentrations are retained as COPCs.

Primary radionuclides that were analyzed for this site include americium-241, cesium-137, cobalt-60, neptunium-237, radium-226 and -228, strontium-90, and isotopic uranium.

Detection limits for radionuclides are not available. A value of 3 sigma (three times the measurement uncertainty or one standard deviation) is used to calculate a sample-specific minimum detectable activity, which is then employed in the same manner as a detection limit. This methodology is similar to Currie's method of determining the maximum detectable activity of radionuclides (Currie 1988, 0792). This 3 sigma screening value takes into account variability due to counting statistics, but does not account for spectral peak identification problems. Thus, this 3 sigma screening is conservative, and may include radionuclides whose presence is spuriously reported due to spectral interferences or misidentifications. Any radionuclides below the minimum detectable activity are eliminated as COPCs.

3.2 Human Health Risk Assessment Approach

Human health risks are calculated in this report using the RESRAD code, a program developed by the Department of Energy (DOE) to estimate dose from direct and indirect soil exposure pathways (Yu et al. 1993, 1177). RESRAD also incorporates the Environmental Protection Agency (EPA) cancer risk slope factors so that lifetime excess cancer risks can be calculated in addition to annual doses (mrem/yr). LANL has developed site-specific input parameters for the RESRAD code to reflect the local meteorology, hydrogeology, and topography. LANL has also developed default exposure assumptions for different land uses, including residential, industrial, construction, and recreational (trail user and camper) scenarios. These parameters are available in the Derivation and Use of Radionuclide Soil Cleanup Guidelines document (Perona 1996, 1326).

Although RESRAD and the guidelines document have default values for most input assumptions, PRS-specific assumptions are also needed to reflect the conditions and potential exposure routes for each PRS. The TA-10 subsurface input assumptions that differ from the default values are shown in Appendix C.

4.0 RESULTS OF QUALITY ASSURANCE/QUALITY CONTROL ACTIVITIES

This section describes the results of QA/QC activities for radionuclide analyses of samples collected from the TA-10 Subsurface Aggregate. The discussion is organized according to the suite of analyses performed and the request numbers under which samples were analyzed for each suite. In Appendix B of this addendum, the QA/QC issues that arose during analysis are summarized according to the request number and associated samples.

Samples were analyzed for radionuclides under many different request numbers. The specif radionuclide analyses included strontium-90, gamma spectroscopy, isotopic uranium, and total uranium. The specific analytes associated with each request are presented in Appendix B of this addendum.

For requests 18323, 18782, 18742, 18900, 18990, 18994, 19014, 19706, 19760, 19763, 19764, 19770, 19771, 19773, 19794, 19811, 19964, 20068, 20070, 20073, 20077, 20080, 20083, 20084, 20086, 20315, 20343, 20370, and 20438, all data are valid and usable without qualification.

For requests 18709, 18710, and 18932, all uranium data are qualified J, estimated detected quantities, for a low recovery in the QC sample (34 to 35%). All other data are valid and usable without qualification.

For requests 18713, 18716, 18725, 18727, 18731, and 18741, all uranium data are qualified J for low recoveries in the QC sample (32 to 65%). Detected values of strontium-90 are also qualified J for high recoveries in the QC sample (122 to 154%).

For request 18729, uranium data are qualified R, rejected, for a recovery of less than 1% in the QC sample. Detected values of strontium-90 are qualified J for a high recovery in the Q sample (122%).

For request 18743, uranium data are qualified J for a low recovery in the QC sample (26%). All other data are valid and usable without qualification.

For request 18898, uranium and strontium-90 data are qualified J for low recoveries in the QC and matrix spike samples, respectively.

For requests 19101 and 19102, there were several QC problems. In all samples except AAB6460, which was included in another batch, uranium data are qualified J for low recoveries in the QC sample (66 to 78%). In all samples except AAB6454 and AAB6455, which were included in another batch, strontium-90 data are qualified R for a recovery in the QC sample of less than 10% (approximately 6%). For samples AAB6454 and AAB6455, strontium-90 data are qualified J for low recovery in the QC sample (69%). All other data are valid and usable without qualification.

For request 19104, strontium-90 data are qualified J for a low recovery in the QC sample (22%). All other data are valid and usable without qualification.

For request 19106, uranium data are qualified J for low recoveries in the QC sample (59%). Strontium-90 data are qualified J for low recoveries in the QC sample (22 to 29%).

For request 19574, the lab used a sample amount that was too small for proper quantitation for gamma spectroscopy and total uranium. Therefore, data for gamma spectroscopy and total uranium are qualified J.

For request 19604, strontium-90 data are qualified J for low recoveries in the QC sample and laboratory control sample (LCS) (52% and 64%). All other data are valid and usable without qualification.

For request 19695, strontium-90 data are qualified J for a low recovery in the QC sample (44%). Uranium data for samples AAB6379 and AAB6501 are qualified J for having internal standards outside control limits (lifetime decay values below allowable limits). All other data are valid and usable without qualification.

For request 19789, uranium data are qualified J for low recovery in the QC sample (76%). All other data are valid and usable without qualification.

For requests 19804 and 19805, uranium and strontium-90 data are qualified J for low matrix spike recoveries (75% and 21%, respectively).

For request 19807, strontium-90 data are qualified J for a high recovery in the LCS sample (121%). Uranium data are qualified J for having internal standards outside control limits (lifetime decay values below allowable limits).

For request 19808, strontium-90 data are qualified J for low recoveries in the matrix spike sample (36 to 76%). Uranium data are qualified J for a high recovery in the LCS sample (122%).

For request 19809, strontium-90 data are qualified J for a low recovery in the QC sample (42%). Uranium data are qualified J for a high recovery in the LCS sample (121%) and a low recovery in the QC sample (79%).

For requests 19812 and 19814, strontium-90 data are qualified J for a low recovery in the LCS sample (70%). For samples AAB8686 and AAB8687, uranium data are qualified J for having internal standards outside control limits (lifetime decay values below allowable limits). All other data are valid and usable without qualification.

For request 19815, strontium-90 and uranium data are qualified J for low recoveries in the QC sample (40 and 51%, respectively).

For requests 19878 and 19880, the samples were split into several batches. For samples AAB9257, AAB9448, AAB9451, AAB9454, AAB9248, and AAB9253, the strontium-90 data are qualified J for a low recovery in the QC sample (70%). For sample AAB9440, the uranium data are qualified J for a low matrix spike recovery. All other data are valid and usable without qualification.

For request 19884, all uranium data are qualified J for low recoveries in the QC sample (45 to 73%). For samples AAB8701 and AAB8709, strontium-90 data are qualified J for a low recovery in the matrix spike sample (42%). All other data are valid and usable without qualification.

For request 19886, strontium-90 data are qualified J for a low recovery in the matrix spike sample (77%) and uranium data are qualified J for a high recovery in the matrix spike sample (156%).

For request 19887, strontium-90 data are qualified J for a low recovery in the matrix spike sample (60%) and uranium data are qualified J for a low recovery in the matrix spike sample (76%).

For request 19888, strontium-90 data are qualified J for a low recovery in the matrix spike sample (77%) and the QC sample (46%). All other data are valid and usable without qualification.

For request 19890, strontium-90 data are qualified J for a low recovery in the matrix spike sample (63%) and the QC sample (38%). All other data are valid and usable without qualification.

For request 19892, uranium and strontium-90 data are qualified J for low matrix spike recoveries (78 and 77%, respectively).

For request 19898, uranium data are qualified J for low recoveries in the QC sample (78%), and strontium-90 data are qualified J for low matrix spike recoveries (77%).

For request 20012, strontium-90 results are qualified J for heterogeneity shown in duplicate analyses. The duplicates varied by more than 20% for values greatly exceeding the screening action level (SAL). All other data are valid and usable without qualification.

For request 20082, uranium data are qualified J for having internal standards outside control limits (lifetime decay values below allowable limits). All other data are valid and usable without qualification.

For request 20087, uranium data are qualified J for a low recovery in the QC sample (75%). All other data are valid and usable without qualification.

For request 20109, strontium-90 data are qualified J for a low recovery in the QC sample (70%). All other data are valid and usable without qualification.

For request 20111, uranium and strontium-90 data are qualified J for low recoveries in the QC sample (78 and 27%, respectively).

For request 20113, strontium-90 data are qualified J for a low recovery in the QC sample (58%), and uranium data are qualified J for a low recovery in the LCS (43%).

For request 20232, uranium data are qualified J for a high recovery in the LCS (127%). All other data are valid and usable without qualification.

For request 20325, strontium-90 data are qualified J for a low recovery in the matrix spike sample (46%), and uranium data are qualified J for a low recovery in the LCS (76%).

For request 20328, strontium-90 data are qualified J for a low recovery in the QC sample (63%). All other data are valid and usable without qualification.

For request 20332, uranium and strontium-90 data are qualified J for low recoveries in the QC sample (63 and 71%, respectively).

For request 2010, two samples were analyzed for gamma spectroscopy and isotopic plutonium. All QC parameters were within allowed limits, therefore all data are valid without qualification.

5.0 SITE-SPECIFIC RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

5.1 PRS 10-002(a)

PRS 10-002(a) consists of a former solid waste disposal pit (TA-10-44) for the former radiochemistry laboratory. No radiological constituents are retained as COPCs in the human health screening assessment for PRS 10-002(a), and no further action (NFA) is recommended for this PRS.

5.1.1 History of PRS 10-002(a)

PRS 10-002(a) is discussed in Subsection 3.1.4 of the RFI Work Plan for Operable Unit (OU) 1079 (LANL 1992, 0783).

PRS 10-002(a) was a waste disposal pit measuring 8 ft long x 5 ft wide x 12 ft deep that was used to dispose of spent chemicals, laboratory equipment, and trash such as gloves, rags, and acid bottles. The exact dates of use for this pit are not known, but are thought to have been between 1945 and 1950. It is also not known whether this pit was covered during or after the period of active use, but it is thought that after it was no longer in use in the early 1950s, it was covered with soil until cleanup activities began in 1963. The quantities of contaminants buried in the pit are also unknown. Specific contaminants listed as potentially present in the pit include strontium-90, uranium, barium, cadmium, platinum, benzene, carbon tetrachloride, unspecified acids (probably nitric, hydrochloric, hydrofluoric, and sulfuric acids), and unspecified organics and inorganics. Other radionuclides may have been in the waste, but were not documented. PRS 10-002(a) was decontaminated and decommissioned in 1963. All waste items were removed and the pit was excavated to a depth of 15 ft. The pit was then backfilled with clean soil.

The COPCs for PRS 10-002(a) include strontium-90, total uranium, barium, cadmium, target analyte list (TAL) metals, VOCs, and SVOCs. Only the radionuclides are discussed in this addendum.

5.1.2 Previous Investigations of PRS 10-002(a)

PRS 10-002(a) was investigated previous to the RFI. These previous investigations are described in Subsection 3.1.4.2.2 of the RFI Work Plan for OU 1079 and summarized below (LANL 1992, 0783).

During the 1963 decontamination and decommissioning, readings at the bottom of the pit after excavation indicated 1.5 mR/hr of beta/gamma radioactivity. In addition, five holes were drilled in or near PRS 10-002(a) during the 1977 Former Utilized Sites Remedial Action Program (FUSRAP) survey. These holes indicated no gross beta radioactivity above background, but did indicate above background gross alpha radioactivity.

5.1.3 Field Investigation of PRS 10-002(a)

The objective of the Phase I RFI at PRS 10-002(a) was to characterize the nature, concentration, and lateral and vertical extent of potential subsurface contamination related to historical activities at the site. The RFI was conducted in July 1994. The area of PRS 10-002(a) was characterized using one four-armed sampling array (Fig. 5.1.3-1). This array was centered on structure TA-10-44, and was oriented in the four cardinal directions. The array consisted of 5 boreholes augered to 50 ft bgs. Boreholes were spaced 10 ft apart along the arms of the array.

Samples collected from each borehole were submitted for analysis for SVOCs, TAL metals, gamma spectroscopy, total uranium, and strontium-90. All appropriate QC samples, including duplicates, field blanks, and rinsate blanks, were collected during subsurface soil sampling activities. Sampling information is summarized in Table 5.1.4-1 of the RFI report. Radioactive field screening data indicated that no radioactivity was detected above instrument background levels in this drilling array. Boreholes were backfilled with drill cuttings and completed with a 2-ft thick concrete cap.

For more information about the RFI field activities at PRS 10-002(a), refer to Section 5.1.4 of the RFI report.

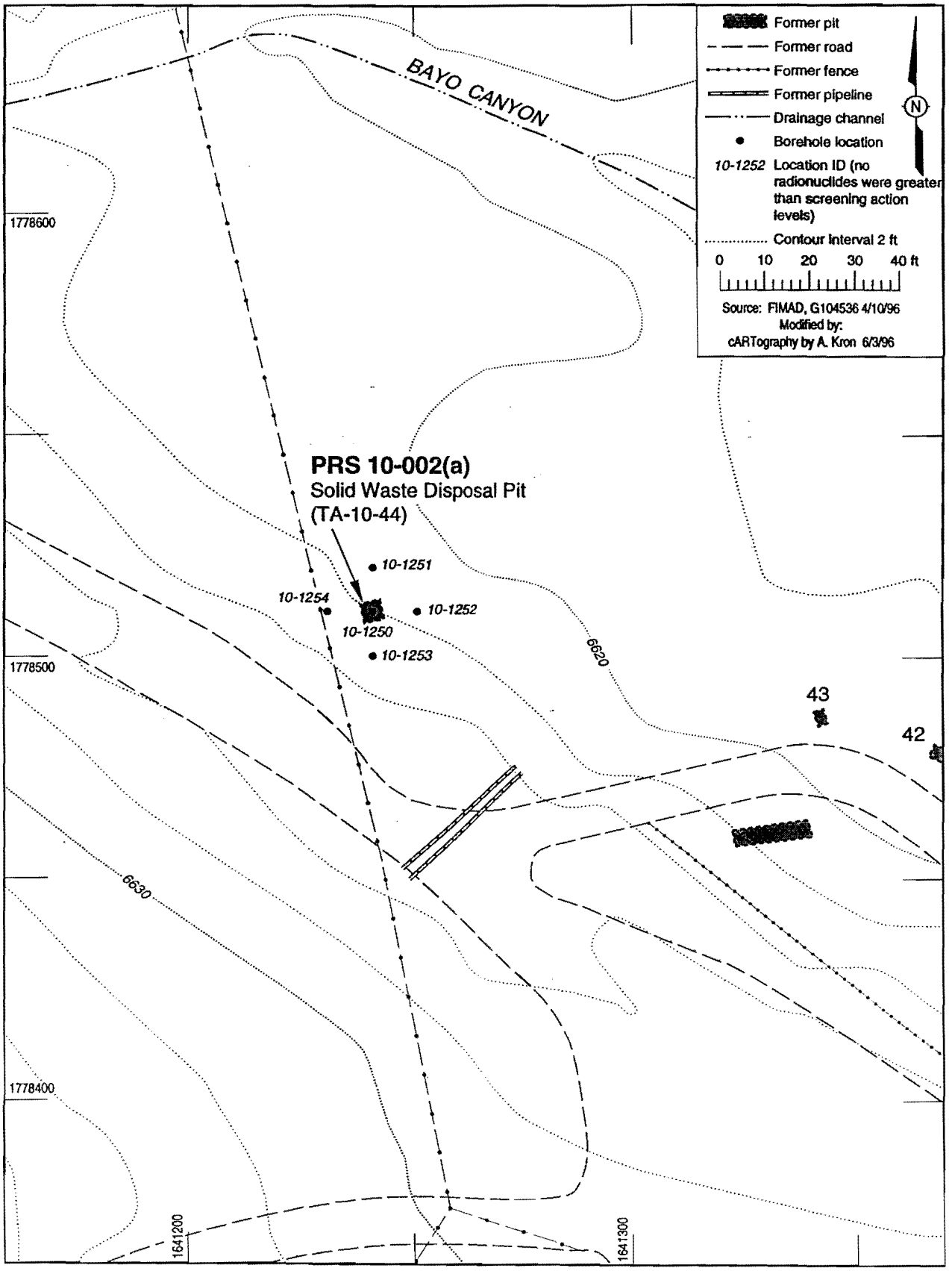

Fig. 5.1.3-1. Locations of PRS 10-002(a) samples.

5.1.4 Background Comparison for Radiological Constituents at PRS 10-002(a)

Radionuclides detected in the PRS 10-002(a) area were compared to the minimum detectable activity as described in Section 3.1 of this addendum. The results from PRS 10-002(a) samples with activities exceeding the minimum detectable activity are presented in Table 5.1.4-1. Strontium-90 was the only radionuclide detected at levels greater than the minimum detectable activity, and it will be carried forward in the screening assessment to the SALs comparison.

TABLE 5.1.4-1

PRS 10-002(a) SOIL CONCENTRATIONS FOR RADIONUCLIDES WITH VALUES GREATER THAN THE MINIMUM DETECTABLE ACTIVITY

SAMPLE ID	SAMPLE LOCATION	MATRIX	DEPTH (ft)	STRONTIUM-90 (pCi/g)
			SAL[a]	5.9
AAB6215	10-1250	Alluvium	3.3–3.9	0.77
AAB6228D[b]	10-1252	Alluvium	3.4–4	0.73
AAB6228	10-1252	Alluvium	3.4–4	0.81
AAB6231	10-1252	Alluvium	15.4–16.6	0.72
AAB6232	10-1252	Alluvium	15.4–16.6	0.55
AAB6241	10-1252	Pumice	40.9–41.5	1.62
AAB6251	10-1253	Transitional	26.5–27.1	0.13J[c]
AAB6256	10-1253	Pumice	49.4–50	0.48J

[a] SAL = Screening action level.
[b] D = Duplicate sample.
[c] J = Value is an estimated detected quantity (see Section 4.0).

5.1.5 Human Health Assessment for Radiological Constituents at PRS 10-002(a)

This section presents the human health assessment for radiological data collected from the PRS 10-002(a) area.

5.1.5.1 Screening Assessment for Radiological Constituents at PRS 10-002(a)

This section discusses the SALs comparison for PRS 10-002(a) radionuclides detected at levels greater than minimum detectable activity.

Greater Than or Equal to SAL. No radionuclide was detected at levels greater than or equal to the SAL.

No SAL. All radionuclides had SALs for comparison.

Less than SAL. Strontium-90 was detected at levels less than the SAL (see Table 5.1.4-1).

Because strontium-90 was the only radionuclide detected at levels below SAL, no multiple chemical evaluation is conducted. At the conclusion of this screening assessment, no radionuclides are retained as COPCs.

5.1.5.2 Extent of Contamination for Radiological Constituents at PRS 10-002(a)

No radionuclides were retained as COPCs in the screening assessment for PRS 10-002 (a).

5.1.5.3 Risk Assessment for Radiological Constituents at PRS 10-002(a)

No dose assessment was conducted for PRS 10-002(a) because no radionuclides were retained as COPCs in the screening assessment.

5.1.6 Ecological Assessment for Radiological Constituents at PRS 10-002(a)

The preliminary ecological screening assessment indicates that this site is located in a floodplain and is potentially within the foraging range of the spotted bat and peregrine falcon. These factors must be taken into consideration should any remedial action be undertaken at this site.

According to guidance from the International Atomic Energy Agency, human health assessment results for radionuclides are assumed to be protective of most animal populations (International Atomic Energy Agency 1992, 0983). As a result, the human health assessment results adequately represent the ecological concerns for this site.

5.1.7 Conclusions and Recommendations for PRS 10-002(a)

Based on the results from the Phase I RFI, no radionuclides are present at levels exceeding SALs at PRS 10-002(a). In addition, no RCRA constituents were detected above SALs (see Section 5.1.7 of the RFI report). Therefore, PRS 10-002(a) is recommended for NFA.

5.2 PRS 10-002(b)

PRS 10-002(b) consists of a former solid waste disposal pit (TA-10-48) for the former radiochemistry laboratory. Strontium-90 was retained as a COPC in the human health screening assessment for PRS 10-002(b). A radiological dose assessment performed on the PRS 10-002(b) data indicates that risk levels are acceptable in the current recreational land-use scenario, but are unacceptable in the future residential land-use scenario. If the site is developed for residential or agricultural use, remedial action may be warranted.

5.2.1 History of PRS 10-002(b)

PRS 10-002(b) is discussed in Subsection 3.1.4 of the RFI Work Plan for OU 1079 (LANL 1992, 0783).

PRS 10-002(b) was a waste disposal pit used to dispose of spent chemicals, laboratory equipment, and trash such as gloves, rags, and acid bottles. In addition, this pit was used to dispose of residues from the lanthanum-140 extraction process performed in the radiochemistry laboratory. PRS 10-002(b) was divided into two sections, each measuring 5 ft x 5 ft x 10 ft. The pit sections were lined with boards and had wood covers. The quantities of contaminants buried in the pit are unknown. Specific contaminants listed as potentially present in the pit include strontium-90, uranium, barium, cadmium, platinum, benzene, carbon tetrachloride, unspecified acids (probably nitric, hydrochloric, hydrofluoric, and sulfuric acids), and unspecified organics and inorganics. No other radionuclideswere documented in the waste.

The exact dates of use for this pit are not known, but are thought to have been between 1945 and 1950. After it was no longer in use in the early 1950s, the pit was covered with soil until it was decontaminated and decommissioned in 1963. All solid waste was then removed and the pit was excavated to a depth of 26 ft. The pit was then backfilled with clean fill.

The COPCs for PRS 10-002(b) include strontium-90, total uranium, barium, cadmium, TAL metals, VOCs, and SVOCs. Only the radionuclides are discussed in this addendum.

5.2.2 Previous Investigations of PRS 10-002(b)

PRS 10-002(b) was investigated previous to the RFI. These previous investigations are described in Subsection 3.1.4.3.2 of the RFI Work Plan for OU 1079 and summarized below (LANL 1992, 0783).

During the 1963 decontamination and decommissioning, it was determined that slight strontium contamination remained in the bottom of the pit. However, because gross beta radioactivity was approaching background, the pit was backfilled with clean fill.

Several test holes were drilled at or near PRS 10-002(b) in 1973 and 1974. Test hole Mq, drilled in 1973 to a depth of approximately 38 ft, was a few meters north of the PRS. Plutonium and strontium-90 analyses indicated only background activity, indicating no subsurface migration had occurred from the pit. A test hole drilled in the pit in 1974 to a depth of approximately 11 ft contained only background gross alpha and beta radioactivity.

During the 1977 FUSRAP survey, five holes were augered in or near PRS 10-002(b). Contrary to the results from the 1973 and 1974 test holes, the FUSRAP boreholes indicated gross beta activity up to 291 pCi/g with the highest concentrations occurring in borehole 48bb at depths of 15 to 20 ft.

5.2.3 Field Investigation of PRS 10-002(b)

The objective of the RFI at PRS 10-002(b) was to characterize the nature, concentration, and lateral and vertical extent of potential subsurface contamination related to historical activities at the site. The RFI was conducted in July 1994. The area of PRS 10-002(b) was characterized using two four-armed sampling arrays (Fig. 5.2.3-1). The first of these arrays consisted of eight boreholes and was drilled according to the survey coordinates of the array, which were thought to be centered on structure TA-10-48. However, it was later determined that this original array was too far west of the location of the former waste pit and the beta contamination detected during previous investigations. It was determined that the center of the array should have been 50 ft east of the original surveyed location, and a second sampling array consisting of eight boreholes was drilled at that location. Both arrays were oriented in the four cardinal directions. All boreholes were drilled to approximately 50 ft bgs. Boreholes were spaced 5 ft apart along the arms of the original array and 10 ft apart along the arms of the second array.

Samples collected from these boreholes were submitted for analysis for SVOCs, TAL metals, gamma spectroscopy, total uranium, and strontium-90. If field screening revealed elevated gross radioactivity, the laboratory analysis request also included isotopic uranium and gamma spectroscopy. Fifty percent of the total number of samples sent to the fixed laboratory for analysis were also analyzed for high explosives. All appropriate QC samples, including duplicates, field blanks, and rinsate blanks, were collected during subsurface soil sampling activities. Sampling information is summarized in Table 5.2.4-1 of the RFI report. Radioactive field screening with hand-held instruments indicated elevated radioactivity was present only in borehole 10-1289 from 10 ft to 14 ft bgs. All boreholes were backfilled with drill cuttings and completed with a 2-ft thick concrete cap except borehole 10-1289. Because MRAL analytical results indicated the presence of elevated beta radioactivity in samples collected from this borehole, it was backfilled with a cement/bentonite slurry.

For more information on the RFI field activities at PRS 10-002(b), refer to Section 5.2.4 of the RFI report.

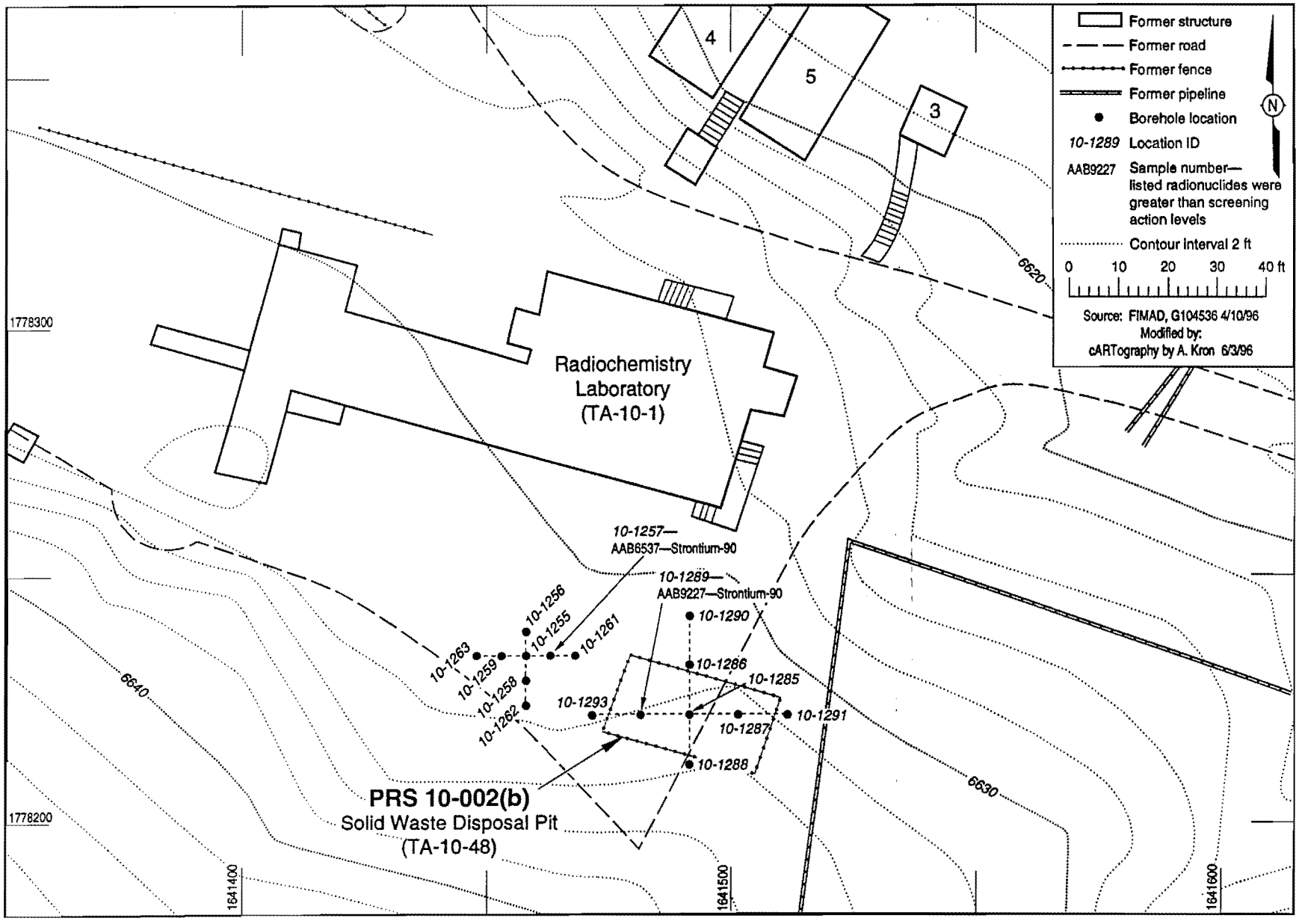

Fig. 5.2.3-1. Locations of PRS 10-002(b) samples and radionuclides detected at levels greater than the minimum detectable activity.

5.2.4 Background Comparison for Radiological Constituents at PRS 10-002(b)

Radionuclides detected in the PRS 10-002(b) area were compared to the minimum detectable activity as described in Section 3.1 of this addendum. The results from PRS 10-002(b) samples with activities exceeding the minimum detectable activity are presented in Table 5.2.4-1. Strontium-90 was the only radionuclide detected at levels greater than the minimum detectable activity, and it will be carried forward in the screening assessment to the SALs comparison.

TABLE 5.2.4-1

PRS 10-002(b) SOIL CONCENTRATIONS FOR RADIONUCLIDES WITH VALUES GREATER THAN THE MINIMUM DETECTABLE ACTIVITY

SAMPLE ID	SAMPLE LOCATION	MATRIX	DEPTH (ft)	STRONTIUM-90 (pCi/g)
			SAL[a]	5.9
AAB6537	10-1257	Alluvium	3.6–4.2	**340.02J[b]**
AAB6552	10-1261	Alluvium	2.8–3.8	1.8J
AAB8674	10-1262	Transitional	29.5–29.8	0.52J
AAB8678	10-1262	Pumice	47.3–48.3	0.65J
AAB8691	10-1286	Alluvium	4.2–4.6	0.51J
AAB8701	10-1290	Alluvium	4.1–4.5	0.698J
AAB9205	10-1287	Qbo[c]	29.1–30	1.97J
AAB9211	10-1291	Alluvium	2.8–3.7	1.17J
AAB9433	10-1288	Alluvium	22.5–23.5	1.08J
AAB9227	10-1289	Alluvium	11.4–12.1	**150J**
AAB9234	10-1289	Pumice	48.5–49.4	0.691J
AAB9246	10-1293	Pumice	48.6–49.6	2.98J
AAB9247	10-1293	Alluvium	10–10.8	3.59J

[a] SAL = Screening action level.
[b] J = Value is an estimated detected quantity (see Section 4.0).
[c] Qbo = The Otowi Member of the Bandelier Tuff.

5.2.5 Human Health Assessment for Radiological Constituents at PRS 10-002(b)

This section presents the human health assessment for radiological data collected from the PRS 10-002(b) area.

5.2.5.1 Screening Assessment for Radiological Constituents at PRS 10-002(b)

This section discusses the SALs comparison for PRS 10-002(b) radionuclides detected at levels greater than the minimum detectable activity.

Greater Than or Equal to SAL. Strontium-90 was detected at levels greater than its SAL (see Table 5.2.4-1 and Fig. 5.2.3-1).

No SAL. All radionuclides had SALs for comparison.

Less than SAL. No radionuclide was detected at levels less than the SAL.

Because no radionuclides were detected at levels below SAL, no multiple chemical evaluation is conducted. At the conclusion of this screening assessment, strontium-90 is retained as a COPC.

5.2.5.2 Extent of Contamination for Radiological Constituents at PRS 10-002(b)

Boreholes 10-1257 and 10-1289 are the only locations at PRS 10-002(b) where strontium-90 concentrations exceeded the SAL. As shown in Fig. 5.2.3-1, these boreholes are bounded laterally by neighboring boreholes with strontium-90 concentrations below the SAL. In addition, the elevated values of strontium-90 are limited to one depth at each location and are bounded by lower strontium-90 concentrations in samples collected at lower depths. Additional discussion of the vertical and lateral extent of contamination, as well as a comparison of the RFI data and FUSRAP data, is presented in Section 5.7.1 of this addendum.

5.2.5.3 Risk Assessment for Radiological Constituents at PRS 10-002(b)

This section discusses the dose assessment for PRS 10-002(b). The dose assessment consists of identification of radionuclides of potential concern, exposure assessment, and development of dose contributions.

5.2.5.3.1 Identification of Radionuclides of Potential Concern

The results of the screening assessment for PRS 10-002(b) show that strontium-90 is retained as a radionuclide of potential concern.

5.2.5.3.2 Exposure and Dose Assessment for PRS 10-002(b)

An exposure and dose assessment of the elevated strontium-90 at PRS 10-002(b) was conducted to determine if the remaining strontium-90 poses a current or potential future health risk. Two scenarios were evaluated for their exposure potential:

- Current recreational use of the area, and
- Future residential use of the area.

Both scenarios were evaluated using the DOE RESRAD program and the LANL-specific default exposure and site parameters specified in Derivation and Use of Radionuclide Soil Cleanup Guidelines (Yu et al. 1993, 1177; Perona 1996, 1326). All dose evaluations include the evaluation of strontium-90 and its decay product yttrium-90. Because strontium-90 and yttrium-90 have relatively short half-lives (approximately 29 years and 64 hours, respectively), all doses estimated for these radionuclides are highest in the present and decrease over time.

Current Recreational Use

The current recreational use scenario is based on the assumption that someone hiking through the area may be exposed to COPCs through inhalation of resuspended dust and incidental ingestion of soil. The highest level of near-surface contamination at PRS 10-002(b) is 340 pCi/g of strontium-90, which was detected at a depth of 3.6 to 4.2 ft in borehole 10-1257. The current recreational use scenario assumes that this level of contamination (340 pCi/g of strontium-90) was located continuously from the surface down to 4 ft bgs over an area of approximately 30 m^2 (which is the approximate size of the area between borehole 10-1257 and the next uncontaminated borehole). These assumptions regarding the source term are expected to overestimate the potential dose in order to compensate for uncertainties in the database. In actuality, the isolated reading of 340 pCi/g for strontium-90 appears to be associated with a piece of shrapnel because further screening of this boring indicated no elevated activities at any other location.

The results of the dose assessment for the current recreational scenario indicate that a dose of 0.5 mrem/yr would be received under the exposure assumptions described above. Because the exposure assumptions are expected to overestimate dose and the estimated dose is well below the EPA guideline of 15 mrem/yr, current recreational use of this area does not pose a significant risk to human health. For details of the RESRAD calculations for this scenario, refer to Appendix C, section C-1.

Future Residential Use

The residential use scenario is based on the assumption that a house is built in the most highly contaminated area. The residential use scenario assumes that the contaminated area excavated for the home is 25 ft x 50 ft, which is the approximate size of the area containing all of the boreholes associated with PRS 10-002(b). The scenario also assumes that the average strontium-90 activity in the 25 ft x 50 ft area is 37.1 pCi/g. This value is the actual average strontium-90 activity for the volume of soil contained in the 25 ft x 50 ft area to a depth of 20 ft, which includes the maximum strontium-90 value of 470.9 pCi/g[1] in FUSRAP borehole

48bb. These assumptions regarding the source term are expected to overestimate the potential dose in order to compensate for uncertainties in the database.

The exposure pathways for the residential use scenario include the following:

- Inhalation of resuspended dust,
- Ingestion of produce from a home garden,
- Ingestion of home-grown meat,
- Ingestion of home-grown milk, and
- Incidental soil ingestion.

Based on the groundwater model used in RESRAD, strontium-90 would not reach the water table prior to its decay. Therefore, pathways associated with groundwater do not contribute to the exposure potential.

The results of the dose assessment for the future residential scenario indicate that an estimated dose of 17 mrem/yr would be received under the exposure assumptions described above. Of this dose, 16 mrem/yr is received from ingestion of homegrown produce, 0.4 mrem/yr is received from meat ingestion, 0.1 mrem/yr is received from milk ingestion, 0.03 mrem/yr is received from incidental soil ingestion, and 0.01 mrem/yr is received from inhalation of resuspended dust. A total dose of 16 mrem/yr would be equivalent to a lifetime excess cancer risk of 1 in 10 000 over a thirty-year exposure period. Due to the conservative nature of the input parameters, this risk level may be significantly overestimated. However, these results indicate that future residential use of this area may pose a significant risk to human health. If this area is developed for future residential use, remedial action may be warranted. For details of the RESRAD calculations for this scenario, refer to Appendix C, section C-2.

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[1] Because the FUSRAP investigation focused on laboratory analysis of gross beta counts, there are limited analytical data available from that investigation for strontium-90. As a result, a statistical model was developed to estimate strontium-90 activity for a particular location based on gross beta counts measured at that location. This statistical model is presented in Fig. 5.7.1-5 of this addendum. The value of 470.9 pCi/g is an interpolated value derived from this model.

5.2.6 Ecological Assessment for Radiological Constituents at PRS 10-002(b)

The preliminary ecological screening assessment indicates that this site is located in a floodplain and is potentially within the foraging range of the spotted bat and peregrine falcon. These factors must be taken into consideration should any remedial action be undertaken at this site.

According to guidance from the International Atomic Energy Agency, human health assessment results for radionuclides are assumed to be protective of most animal populations (International Atomic Energy Agency 1992, 0983). As a result, the human health assessment results adequately represent the ecological concerns for this site.

5.2.7 Conclusions and Recommendations for PRS 10-002(b)

Several areas of elevated strontium-90 concentrations were detected in PRS 10-002(b). Borehole 10-1257 had one elevated level of 340 pCi/g in the first sampling interval of (3.6 to 4.2 ft), but no elevated levels were found upon further screening of adjacent intervals. Borehole 10-1289 had one elevated level of 150 pCi/g at a depth of 11 ft. FUSRAP borehole 48bb had two elevated levels of 68 pCi/g at 12 ft and 471 pCi/g at 17 ft.

In the current recreational scenario, only near-surface contamination was considered, and the value of 340 pCi/g was conservatively assumed to be located continuously from the surface down to 4 ft bgs over an area of approximately 30 m^2. A dose of 0.5 mrem/yr would be received under the current recreational scenario, which is well below the EPA guideline of 15 mrem/yr. Therefore, current recreational use of this area does not pose a significant risk to human health.

In the future residential scenario, all of the elevated levels were averaged with other detected strontium-90 activities across a residential exposure unit. A dose of 17 mrem/yr would be received under the future residential scenario, primarily due to ingestion of garden produce. This equates to a lifetime excess cancer risk of 1 in 10 000. Comparison of these risk estimates to the EPA recommended dose limit of 15 mrem/yr and the National Contingency Plan lifetime excess cancer limit range of 1 in 10 000 to 1 in 10 000 000 indicates a marginal risk potential from residential use of this area. If the area is developed for residential or agricultural purposes, remedial action may be warranted.

PRS 10-002(b) was also included in a site-wide risk evaluation, which is presented in Section 5.7.2 of this addendum.

5.3 Central Area, PRSs 10-003(a-o) and 10-007

The Central Area includes the former radiochemistry laboratory liquid waste disposal complex [PRSs 10-003(a-o)] as well as the building debris landfill (PRS 10-007) created during the 1963 decontamination and decommissioning of TA-10. Strontium-90 was retained as a COPC in the human health screening assessment for PRSs 10-003(a-o) and 10-007. A radiological dose assessment performed on the data for these PRSs indicates that risk levels are acceptable in the current recreational land-use scenario, but are unacceptable in the future residential land-use scenario. If the site is developed for residential or agricultural purposes, remedial action may be warranted.

5.3.1 History of PRSs 10-003(a-o) and 10-007

The PRSs of the TA-10 Subsurface Aggregate Central Area [PRSs 10-003(a-o) and 10-007] are discussed in Subsection 3.1.4 of the RFI Work Plan for OU 1079 (LANL 1992, 0783).

PRSs 10-003(a-o) were part of a liquid waste disposal complex that served the former radiochemistry laboratory, TA-10-1. The radiochemistry laboratory was used to separate, precipitate, and encapsulate lanthanum-140 into sources. The liquid disposal complex consisted of liquid disposal pits, industrial waste manholes and septic tanks, industrial waste lines, and a leach field that received the liquid radioactive and chemical wastes generated by radiochemistry laboratory operations.

The entire liquid waste disposal complex [PRSs 10-003(a-o)] was excavated to a depth of approximately 18.6 ft during the 1963 decontamination and decommissioning of TA-10. The excavation was then backfilled with soil from other parts of Bayo Canyon as well as building debris from the TA-10 decontamination and decommissioning. The landfill (PRS 10-007) was sited within the excavation created by the removal of the liquid waste disposal complex near the intermittent stream at TA-10. Items in the landfill include concrete from the two former firing site detonation control buildings (TA-10-13 and TA-10-15), as well as soil from the vicinity of the former inspection building (TA-10-8), one of the former battery buildings (TA-10-14), and former building TA-10-13 (LANL 1992, 0783).

The COPCs in the Central Area include strontium-90, total uranium, barium, cadmium, lead, beryllium, TAL metals, VOCs, and SVOCs. Only the radionuclides are discussed in this addendum.

5.3.2 Previous Investigations of PRSs 10-003(a-o) and 10-007

PRSs 10-003(a-o) were investigated previous to the RFI. These previous investigations are described in Subsection 3.1.4.1.2 of the RFI Work Plan for OU 1079 and summarized below (LANL 1992, 0783).

During the 1963 decontamination and decommissioning activities, radiation levels in the Central Area excavation area ranged up to 35 mR/hr. It was recognized at the time of decommissioning that potentially radioactive materials may have remained in the canyon. Periodic surveys were therefore conducted from 1966 to 1976.

In 1973, a test hole was drilled to a depth of 18.9 ft in the vicinity of PRS 10-003(g), a former industrial waste manhole. The drill encountered blocks of concrete from the building debris left in the excavation during decommissioning, and sample analyses indicated surface and subsurface strontium-90 contamination. Five additional test holes were drilled in 1974. Samples from these holes had gross beta activity at levels above background.

Extensive sampling was also performed at the former radiochemistry laboratory (TA-10-1) and the entire liquid waste disposal complex [PRS 10-003(a-o)] through trenching and drilling during the 1977 FUSRAP survey. The FUSRAP results indicated that subsurface contamination was mostly low level and was within 31 ft of the radiochemistry laboratory and the liquid waste disposal complex. The highest levels were found near PRS 10-003(b), a former liquid waste disposal pit.

No investigations specific to PRS 10-007 occurred previous to the RFI discussed in this report.

5.3.3 Field Investigation of PRSs 10-003(a-o) and 10-007

The objective of the RFI at PRSs 10-003(a-o) and 10-007 was to characterize the nature, concentration, and lateral and vertical extent of potential subsurface contamination related to historical activities at the site. The RFI was conducted from June through November 1994. The TA-10 Central Area was characterized using seven four-armed sampling arrays (Fig. 5.3.3-1). These arrays were generally centered on or near former waste pits, drain lines, manholes, septic tanks, or known areas of subsurface beta contamination as determined from previous studies. The arrays consisted of 5, 9, or 10 boreholes with depths of 50 ft bgs. The arms of some arrays were oriented along former drain lines, trenches, surface depressions, or the long axis of suspected areas of contamination. The arms of other arrays were oriented in the four cardinal directions. Boreholes were spaced 5 to 15 ft apart along the arms of each array.

Samples collected from these boreholes were submitted for analysis for SVOCs, TAL metals, gamma spectroscopy, total uranium, and strontium-90. If field screening revealed elevated gross radioactivity, the laboratory analysis request also included isotopic uranium and gamma spectroscopy. Fifty percent of the total number of samples sent to the fixed laboratory for analysis were also analyzed for high explosives. All appropriate QC samples, including duplicates, field blanks, and rinsate blanks, were collected during subsurface soil sampling activities. Sampling information is summarized in Table 5.3.4-1 of the RFI report. Radioactivity field screening data indicated no radioactivity above background levels in drilling arrays 4, 5, 6, and 7. However, field screening and MRAL results did indicate the presence of radioactivity above background levels in boreholes in arrays 1, 2, and 3. These results are summarized in Table 5.3.4-2 of the RFI report. Within the TA-10 Central Area, 14 boreholes were backfilled with the cement/bentonite slurry because of elevated radioactivity detected by hand-held screening instruments and/or MRAL results, and 38 boreholes were backfilled with drill cuttings and completed with the concrete cap.

In addition to the seven drilling arrays, borehole 10-1295 was added south of the former radiochemistry laboratory (structure TA-10-1) during the course of the field program when three radiochemists formerly employed at the radiochemistry laboratory identified an area suspected to be the location of an undocumented laboratory waste pit. The borehole was drilled to assess the presence of subsurface radioactivity. Samples collected were submitted to the MRAL for analysis, and no radioactivity was detected above background levels.

For more information about the RFI field activities for PRSs 10-003(a-o) and 10-007, refer to Section 5.3.4 of the RFI report

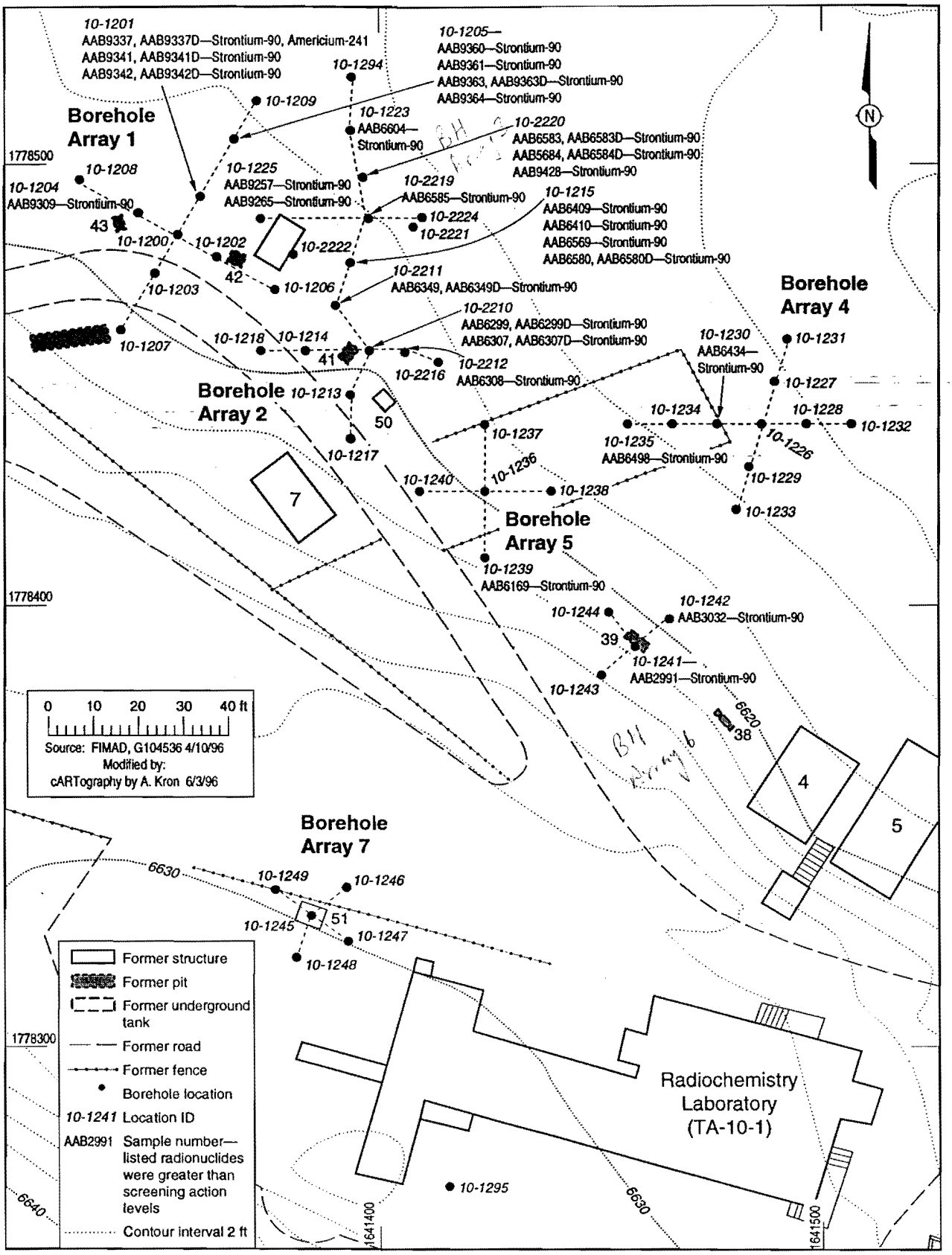


Fig. 5.3.3-1 Locations of samples collected at PRSs 10-003(a-o) and 10-007 and radionuclides detected at levels greater than the minimum detectable activity.

5.3.4 Background Comparison for Radiological Constituents at PRSs 10-003(a-o) and 10-007

Radionuclides detected in the area of PRSs 10-003(a-o) and 10-007 were compared to the minimum detectable activity as described in Section 3.1 of this addendum. The results from samples with activities exceeding the minimum detectable activity are presented in Table 5.3.4-1. Americium-241, cesium-137, and strontium-90 were detected at levels greater than the minimum detectable activity, and they are carried forward in the screening assessment to the SALs comparison.

TABLE 5.3.4-1

PRSs 10-003(a-o) and 10-007 SOIL CONCENTRATIONS FOR RADIONUCLIDES WITH VALUES GREATER THAN THE MINIMUM DETECTABLE ACTIVITY

SAMPLE ID	SAMPLE LOCATION	MATRIX	DEPTH (ft)	AMERICIUM-241 (pCi/g)	CESIUM-137 (pCi/g)	STRONTIUM-90 (pCi/g)
			SAL[a]	22	5.1	5.9
AAB2845	10-1249	Alluvium	0.9–1.5	–[b]	–	1.75
AAB2861	10-1247	Alluvium	0.8–1.4	–	–	3.26
AAB2991	10-1241	Alluvium	3.5–4	–	–	**9.44**
AAB3001	10-1241	Pumice	49.1–49.6	–	–	0.74
AAB3001D[c]	10-1241	Pumice	49.1–49.6	–	–	0.75
AAB3002	10-1241	Alluvium	22–22.3	–	–	0.8
AAB3003	10-1241	Transitional	33.9–34.3	–	–	0.84
AAB3004D	10-1244	Alluvium	4.3–4.9	–	–	0.86
AAB3018	10-1244	Alluvium	12.5–13.1	–	–	0.28J[d]
AAB3019D	10-1242	Alluvium	4.1–4.7	–	–	3.91
AAB3019	10-1242	Alluvium	4.1–4.7	–	–	4.19J
AAB3032	10-1242	Alluvium	6.2–6.8 t	–	–	**26.22J**
AAB3057	10-1226	Transitional	32.5–33	–	–	2.3R[e]
AAB3059	10-1226	Pumice	43.9–44.3	–	–	0.7R
AAB3062	10-1228	Alluvium	3.5–4.2	–	–	5.21J
AAB3069	10-1228	Transitional	32.1–32.5	–	–	1.06J
AAB3072	10-1228	Pumice	49–49.8	–	–	0.52J
AAB3073	10-1228	Alluvium	21.4–21.8	–	–	0.35
AAB3073D	10-1228	Alluvium	21.4–21.8	–	–	0.59
AAB6126	10-1236	Fill	2.8–3.4	–	–	0.84
AAB6129	10-1248	Alluvium	3.4–4.05	–	–	1.27
AAB6152	10-1236	Transitional	30–31.2	–	–	0.33
AAB6157D	10-1237	Alluvium	2.5–3.1	–	–	0.76
AAB6157	10-1237	Alluvium	2.5–3.1	–	–	0.96

TABLE 5.3.4-1 (CONTINUED)

PRSs 10-003(a-o) and 10-007 SOIL CONCENTRATIONS FOR RADIONUCLIDES WITH VALUES GREATER THAN THE MINIMUM DETECTABLE ACTIVITY

SAMPLE ID	SAMPLE LOCATION	MATRIX	DEPTH (ft)	AMERICIUM-241 (pCi/g)	CESIUM-137 (pCi/g)	STRONTIUM-90 (pCi/g)
			SAL[a]	22	5.1	5.9
AAB6169	10-1239	Alluvium	2.5–3.1	–	–	**7.97**
AAB6182	10-1240	Alluvium	3.1–3.7	–	–	0.9J
AAB6186	10-1240	Alluvium	19–19.6	–	–	0.7J
AAB6193	10-1240	Pumice	36.6–37.6	–	–	0.4J
AAB6194	10-1240	Pumice	36.6–37.6	–	–	0.7J
AAB6197	10-1240	Pumice	49.4–50	–	–	3.1J
AAB6198	10-1238	Alluvium	4.4–5	–	–	0.8J
AAB6205	10-1238	Alluvium	23.1–23.7	–	–	1.6J
AAB6211	10-1238	Pumice	38.8–39.4	–	–	0.9J
AAB6211D	10-1238	Pumice	38.8–39.4	–	–	1.1J
AAB6214	10-1238	Pumice	49.4–50	–	–	0.9
AAB6292	10-1210	Alluvium	6–6.6	–	–	0.83R
AAB6299	10-2210	Alluvium	18–18.6	–	–	**1 378**
AAB6299D	10-2210	Alluvium	18–18.6	–	–	**1 399**
AAB6306	10-2210	Pumice	49–49.8	–	–	0.66J
AAB6307D	10-2210	Alluvium	11.9–12.5	–	–	**2 748.9**
AAB6307	10-2210	Alluvium	11.9–12.5	–	–	**2 908.2**
AAB6308	10-1212	Fill	3.6–4.2	–	–	**8.14J**
AAB6321	10-2216	Alluvium	7.5–8.5	–	–	1.82J
AAB6322	10-2216	Alluvium	7.5–8.5	–	–	2.56J
AAB6330	10-2216	Alluvium	27.5–28	–	–	0.61J
AAB6338	10-2211	Alluvium	13.8–14.3	–	–	3.3
AAB6343	10-2211	Alluvium	31.4–31.9	–	–	0.64
AAB6348	10-2211	Pumice	49.5–50	–	–	0.86
AAB6349	10-2211	Alluvium	16.3–16.8	–	–	**255.05**
AAB6349D	10-2211	Alluvium	16.3–16.8	–	–	**265.76**
AAB6371	10-1214	Alluvium	25.9–26.4	–	–	0.48J
AAB6376	10-1214	Transitional	36.6–37.1	–	–	0.53J
AAB6404	10-1213	Pumice	39.2–39.7	–	–	0.51J
AAB6409	10-1215	Alluvium	15–15.9	–	–	**11.76J**
AAB6410	10-1215	Alluvium	15–15.9	–	–	**21.72J**
AAB6421	10-1229	Qbo[f]	35–35.8	–	–	0.45J
AAB6423	10-1227	Alluvium	3.1–3.7	–	–	5.54J

TABLE 5.3.4-1 (CONTINUED)

PRSs 10-003(a-o) and 10-007 SOIL CONCENTRATIONS FOR RADIONUCLIDES WITH VALUES GREATER THAN THE MINIMUM DETECTABLE ACTIVITY

SAMPLE ID	SAMPLE LOCATION	MATRIX	DEPTH (ft)	AMERICIUM-241 (pCi/g)	CESIUM-137 (pCi/g)	STRONTIUM-90 (pCi/g)
			SAL[a]	22	5.1	5.9
AAB6432	10-1227	Qbo	49.1–49.8	–	–	0.42J
AAB6433	10-1227	Qbo	44.5–45	–	–	0.76J
AAB6434	10-1230	Alluvium	4–4.5	–	–	**7.42**
AAB6445	10-1230	Qbo	48.5–49.5	–	–	0.36J
AAB6446	10-1230	Qbo	46.6–47.1	–	–	1.35J
AAB6447	10-1233	Alluvium	3.7–4.3	–	–	0.94
AAB6454	10-1233	Transitional	28.6–29.5	–	–	0.43J
AAB6461	10-1231	Alluvium	4–4.5	–	–	1.38
AAB6473	10-1234	Alluvium	0.6–1	–	–	0.57J
AAB6478	10-1234	Alluvium	23.4–23.9	–	–	0.56J
AAB6485	10-1235	Alluvium	3.5–4.5	–	–	1.52J
AAB6492	10-1235	Transitional	33.1–33.7	–	–	5.67J
AAB6498	10-1235	Pumice	48.9–49.4	–	–	**10.45J**
AAB6500	10-1235	Pumice	43.6–44.1	–	–	4.32J
AAB6569	10-1215	Alluvium	21.7–22.2	–	–	**1 226.8**
AAB6580D	10-1215	Alluvium	26.6–27.1	–	–	**2 686.5**
AAB6580	10-1215	Alluvium	26.6–27.1	–	–	**2 930**
AAB6583D	10-2220	Alluvium	14–14.5	–	–	**34.3**
AAB6583	10-2220	Alluvium	14–14.5	–	–	**37.2**
AAB6584	10-2220	Alluvium	17–17.5	–	–	**40 325.8**
AAB6584D	10-2220	Alluvium	17–17.5	–	–	**41 886.8**
AAB6585	10-2219	Alluvium	20.3–20.8	–		**1 053**
AAB6604	10-1223	Alluvium	16–16.5		0.0777	**236J**
AAB6612	10-1223	Transitional	37.5–38	–	–	0.723J
AAB6623D	10-2224	Transitional	37.5–38.3	–	–	1.64J
AAB9337	10-1201	Alluvium	11.1–11.8	**51.02**	–	**506.6J**
AAB9341	10-1201	Alluvium	16.9–17.5	13.12	–	**4 103.4J**
AAB9342D	10-1201	Alluvium	19.2–20	13.95	–	**11 637.6J**
AAB9248	10-2222	Alluvium	15.7–16.5	–	–	1.12J
AAB9253	10-2222	Qbo	40.6–41.6	–	–	0.764J
AAB9257	10-1225	Alluvium	16.4–16.9	–	–	**10.7J**
AAB9265	10-1225	Pumice	41.2–42.1	–	–	**13**
AAB9271	10-1294	Alluvium	26.5–27.1	–	–	1.19

TABLE 5.3.4-1 (CONTINUED)

PRSs 10-003(a-o) and 10-007 SOIL CONCENTRATIONS FOR RADIONUCLIDES WITH VALUES GREATER THAN THE MINIMUM DETECTABLE ACTIVITY

SAMPLE ID	SAMPLE LOCATION	MATRIX	DEPTH (ft)	AMERICIUM-241 (pCi/g)	CESIUM-137 (pCi/g)	STRONTIUM-90 (pCi/g)
			SAL[a]	22	5.1	5.9
AAB9309	10-1204	Alluvium	15.7–16.4	–	–	**4 201.4**
AAB9330	10-1207	Alluvium	25.5–26.1	–	–	0.75J
AAB9337D	10-1201	Alluvium	11.1–11.8	–	–	**532.2J**
AAB9341D	10-1201	Alluvium	16.9–17.5	–	–	**5 137.8J**
AAB9342	10-1201	Alluvium	19.2–20	–	–	**12 735.3J**
AAB9351	10-1209	Alluvium	14–14.7	–	–	0.808J
AAB9359	10-1209	Qbo	48.4–49.2	–	–	1.1J
AAB9360	10-1205	Alluvium	10–10.5	–	–	**29.7J**
AAB9361	10-1205	Alluvium	14.3–14.8	–	–	**2 432.33**
AAB9363	10-1205	Alluvium	19.5–20	–	–	**3 570J**
AAB9363D	10-1205	Alluvium	19.5–20	–	–	**4 180J**
AAB9364	10-1205	Alluvium	20–20.9	–	–	**2 185.42**
AAB9399	10-1205	Qbo	49.3–50	–	–	1.1J
AAB9428	10-2220	Alluvium	18–18.6	–	–	**18 654**

[a] SAL = Screening action level.
[b] – = The radionuclide was not detected.
[c] A "D" notation indicates that the sample is a duplicate analysis.
[d] A "J" notation indicates that the value is an estimated detected quantity (see Section 4.0).
[e] An "R" notation indicates that the value is a rejected quantity (see Section 4.0).
[f] Qbo = The Otowi Member of the Bandelier Tuff.

5.3.5 Human Health Assessment for Radiological Constituents at PRSs 10-003(a-o) and 10-007

This section presents the human health assessment for the radiological data collected from the area of PRSs 10-003(a-o) and 10-007.

5.3.5.1 Screening Assessment for Radiological Constituents at PRSs 10-003(a-o) and 10-007

This section discusses the SALs comparison for radionuclides detected at PRSs 10-003(a-o) and 10-007 at levels greater than minimum detectable activity.

Greater Than or Equal to SAL. Two radionuclides, americium-241 and strontium-90, were detected at concentrations greater than their respective SALs (see Table 5.3.4-1 and Fig. 5.3.3-1). Elevated americium-241 concentrations were measured in one borehole

(10-1201) drilled during the Phase I RFI. Further analytical assessment of the presence of americium-241 and plutonium isotopes (which are parents of americium-241) was conducted. Samples were collected from the original core of borehole 10-1201 in the intervals adjacent to the intervals in which gamma spectrometry results indicated the presence of americium-241. The results from these additional samples indicated that no plutonium isotopes nor americium-241 are present in the adjacent sections of core above background concentrations. Nonetheless, americium-241 will be retained as a COPC.

No SAL. All radionuclides had SALs for comparison.

Less than SAL. Cesium-137 was detected at a concentration less than SAL.

Because cesium-137 was the only radionuclide detected at levels below SAL, no multiple chemical evaluation is conducted. At the conclusion of this screening assessment, americium-241 and strontium-90 are retained as COPCs.

5.3.5.2 Extent of Contamination for Radiological Constituents at PRSs 10-003(a-o) and 10-007

The Central Area boreholes with strontium-90 activities exceeding SALs include boreholes 10-1201, 10-1204, 10-1205, 10-1212, 10-1215, 10-1223, 10-1225, 10-1227, 10-1228, 10-1230, 10-1235, 10-1239, 10-1241, 10-1242, 10-2210, 10-2211, 10-2219, and 10-2220. As shown in Fig. 5.3.3-1, these boreholes are bounded laterally by neighboring boreholes with strontium-90 concentrations below the SAL. In addition, the elevated values of strontium-90 are bounded by lower strontium-90 concentrations in samples collected at lower depths (see Table 5.3.4-1).

Borehole 10-1201 is the only Central Area location where americium-241 values exceeded the SAL. As shown in Fig. 5.3.3-1, this borehole is bounded laterally by neighboring boreholes with lower americium-241 concentrations. In addition, the elevated values of americium-241 are bounded by lower concentrations in samples collected at lower depths. Additional discussion of the vertical and lateral extent of contamination, as well as a comparison of the RFI data and FUSRAP data, is presented in Section 5.7.1 of this addendum.

5.3.5.3 Risk Assessment for Radiological Constituents at PRSs 10-003(a-o) and 10-007

This section discusses the dose assessment for the Central Area, PRSs 10-003(a-o) and 10-007. The dose assessment consists of identification of radionuclides of potential concern, exposure assessment, and development of dose contributions.

5.3.5.3.1 Identification of Radionuclides of Potential Concern for PRSs 10-003(a-o) and 10-007

The results of the screening assessment for the Central Area show that americium-241 and strontium-90 are retained as radionuclides of potential concern.

5.3.5.3.2 Exposure and Dose Assessment for PRSs 10-003(a-o) and 10-007

An exposure and dose assessment of the elevated strontium-90 and americium-241 at PRSs 10-003(a-o) and 10-007 was conducted to determine if the remaining strontium-90 and americium-241 pose a current or potential future health risk. Two scenarios were evaluated for their exposure potential:

- Current recreational use of the area, and
- Future residential use of the area.

Both scenarios were evaluated using the DOE RESRAD program with the LANL-specific default exposure and site parameters specified in Derivation and Use of Radionuclide Soil Cleanup Guidelines (Yu et al. 1993, 1177; Perona 1996, 1326). All dose evaluations include the evaluation of the parent nuclide and its radioactive decay progeny. Most of the detected activity and potential risk is from strontium-90/yttrium-90. Because strontium-90 and yttrium-90 have relatively short half-lives (approximately 29 years and 64 hours, respectively), all doses estimated for these radionuclides are highest in the present and decrease over time.

Current Recreational Use

The current recreational use scenario is based on the assumption that someone hiking through the area may be exposed to COPCs through inhalation of resuspended dust and incidental ingestion of soil. The highest level of surface contamination in the Central Area is 191 pCi/g of strontium-90, which was detected near a chamisa bush known to have taken up strontium-90 from the subsurface. The current recreational use scenario assumes that incidental ingestion of soil would occur in this area at the highest level (191 pCi/g). Surface sampling in Bayo Canyon indicates that contaminated areas such as this are likely to be limited and isolated. Therefore, the current recreational scenario also assumes that a single incident of

atypically high soil ingestion would occur. The scenario assumes that such an exposure results from a small child deliberately ingesting soil, and that an estimated 10 g of soil are ingested (EPA 1996, 1304). These assumptions are expected to overestimate the potential dose in order to compensate for uncertainties in the database.

The results of the dose assessment for the current recreational scenario indicate that a dose of 0.3 mrem would be received assuming a single incident of atypically high soil ingestion, as described above. This would equate to an excess cancer risk of 1 in 10 000 000. The dose associated with inhalation of resuspended dust while hiking is less than 0.1 mrem/yr. Because the exposure assumptions are expected to overestimate dose and the estimated dose is well below the EPA guideline of 15 mrem/yr, current recreational use of this area does not pose a significant risk to human health. For details of the RESRAD calculations for this scenario, refer to Appendix C, section C-3.

Future Residential Use

The residential use scenario is based on the assumption that a house is built in the most highly contaminated area. The residential use scenario assumes that the contaminated area excavated for the home is 25 ft x 50 ft, which is the approximate size of the area containing all boreholes with average detected radionuclide activities of greater than 1 000 pCi/g. The scenario also assumes that the average strontium-90 activity in the 25 ft x 50 ft area is 5 419 pCi/g. This value is the actual average strontium-90 activity for the volume of soil contained in the 25 ft x 50 ft area to a depth of 20 ft, which includes the maximum detected strontium-90 value of 41 106 pCi/g in borehole 10-2220. This volume of soil also includes the detected values for americium-241, which average 15 pCi/g.

The exposure pathways for the residential use scenario include the following:

- Inhalation of resuspended dust,
- Ingestion of produce from a home garden,
- Ingestion of home-grown meat,
- Ingestion of home-grown milk, and
- Incidental soil ingestion.

Based on the groundwater model used in RESRAD, strontium-90 and americium-241 would not reach the water table prior to decay. Therefore, pathways associated with groundwater do not contribute to the exposure potential.

The results of the dose assessment for the future residential scenario indicate that an estimated dose of 2 570 mrem/yr would be received under the exposure assumptions described above. Of this dose, 93% is from ingestion of homegrown produce, 3% from direct radiation, 2% from meat ingestion, and less than 1% from milk ingestion, incidental soil ingestion, and inhalation of resuspended dust. Less than 0.1% of the dose resulted from americium-241. These results show that the potential dose is primarily due to ingestion of homegrown produce with strontium-90 contamination. Strontium-90 is readily taken up by plant roots. If edible plants were grown in the material containing elevated levels of strontium-90 (either through excavation or direct root intrusion), routine garden consumption alone would be associated with a radiological dose of more than 2 400 mrem/yr and a lifetime excess cancer risk of 1 in 100.

The total dose of 2 570 mrem/yr would be equivalent to a lifetime excess cancer risk of 1 in 100 over a thirty year exposure period. These results indicate that future residential use of this area may pose a significant risk to human health. If this area is developed for future residential use, remedial action may be warranted. For details of the RESRAD calculations for this scenario, refer to Appendix C, section C-4.

5.3.6 Ecological Assessment for Radiological Constituents at PRSs 10-003(a-o) and 10-007

The preliminary ecological screening assessment indicates that this site is located in a floodplain and is potentially within the foraging range of the spotted bat and peregrine falcon. These factors must be taken into consideration should any remedial action be undertaken at this site.

According to guidance from the International Atomic Energy Agency, human health assessment results for radionuclides are assumed to be protective of most animal populations (International Atomic Energy Agency 1992, 0983). As a result, the human health assessment results adequately represent the ecological concerns for this site.

5.3.7 Conclusions and Recommendations for PRSs 10-003(a-o) and 10-007

Several areas of elevated strontium-90 concentrations were detected in the area of PRSs 10-003(a-o) and 10-007. The highest strontium-90 results were from samples collected from depths between 11 and 18 ft.

In the current recreational scenario, a dose of 0.3 mrem would be received assuming a single incident of atypically high soil ingestion. This would equate to an excess cancer risk of 1 in 10 000 000. The dose associated with inhalation of resuspended dust while hiking is less than 0.1 mrem/yr. Both dose levels are well below the EPA guideline of 15 mrem/yr. Therefore, current recreational use of this area does not pose a significant risk to human health. However, because the chamisa bushes in the area are known to have taken up strontium-90 from the subsurface, an interim action will be conducted to remove the chamisa containing elevated levels of strontium-90 from this area.

In the future residential scenario, all of the elevated levels were averaged with other detected strontium-90 activities across a residential exposure unit. A dose of 2 400 mrem/yr would be received under the future residential scenario, primarily due to assumed routine ingestion of garden produce. This equates to a lifetime excess cancer risk of 1 in 100. Comparison of these risk estimates to the EPA recommended dose limit of 15 mrem/yr and the National Contingency Plan lifetime excess cancer limit range of 1 in 10 000 to 1 in 10 000 000 indicates an unacceptable risk level for residential use of this area. If the area is developed for residential or agricultural purposes, remedial action may be warranted.

PRSs 10-003(a-o) and 10-007 were also included in a site-wide risk evaluation, which is presented in Section 5.7.2 of this addendum.

5.4 PRS 10-004(a)

PRS 10-004(a) consists of a former sanitary septic tank (TA-10-40) that served the former personnel building (TA-10-21) at TA-10. No radiological constituents are retained as COPCs in the human health screening assessment for PRS 10-004(a), and this PRS is recommended for NFA.

5.4.1 History of PRS 10-004(a)

PRS 10-004(a) is discussed in Subsection 3.1.4 of the RFI Work Plan for OU 1079 (LANL 1992, 0783).

PRS 10-004(a) was a sanitary septic tank that served the personnel building (TA-10-21) at TA-10 from 1949 through 1963. The tank had a capacity of 1 060 gal., and discharged to a pit measuring 8 ft long x 12 ft deep. This septic system discharged to a drain line and outfall located in a stream channel approximately 200 ft north-northeast of PRS 10-002(a). PRS 10-004(a) was removed during the 1963 decontamination and decommissioning of TA-10. No information is available concerning the fate of the disposal pit associated with this PRS.

The COPCs for PRS 10-004(a) include strontium-90, total uranium, barium, cadmium, lead, beryllium, TAL metals, VOCs, and SVOCs. Only the radionuclides are discussed in this addendum.

5.4.2 Previous Investigations of PRS 10-004(a)

PRS 10-004(a) was investigated previous to the RFI. These previous investigations are described in Subsection 3.1.4.7.2 of the RFI Work Plan for OU 1079 and summarized below (LANL 1992, 0783).

During the 1977 FUSRAP survey, several boreholes were drilled and trenches were excavated around PRS 10-004(a). One trench was excavated across the area where the line led from the personnel building. Another was excavated across the septic tank location, and two more were excavated across the location of the line leading from the tank to the pit. Two boreholes were augered in and near the pit location. The auger holes and trenches indicated background or below background levels of gross alpha and gross beta activity. Gross alpha radioactivity ranged from 4 to 44 pCi/g and gross beta radioactivity ranged from 2 to 4 pCi/g.

5.4.3 Field Investigation of PRS 10-004(a)

The objective of the RFI at PRS 10-004(a) was to determine the presence or absence of contaminants at the site. The RFI was conducted in September and October 1994. The area of PRS 10-004(a) was characterized using one four-armed drilling array (Fig. 5.4.3-1). This array was centered on structure TA-10-40, and was oriented in the four cardinal directions. The array consisted of eight boreholes, each drilled to a depth of 50 ft bgs. Boreholes were spaced 10 ft apart along the arms of the array.

Samples collected from these boreholes were submitted for analysis for VOCs, SVOCs, TAL metals, gamma spectroscopy total uranium, and strontium-90. Fifty percent of the total number of samples sent to the fixed laboratory for analysis were also analyzed for high explosives. All appropriate QC samples, including duplicates, field blanks, and rinsate blanks, were collected during subsurface soil sampling activities. Sampling information is summarized in Table 5.4.4-1 of the RFI report. No elevated radioactivity was detected by field screening with hand-held instruments in any of the boreholes drilled at PRS 10-004(a). All boreholes were backfilled with drill cuttings and completed with a 2-ft thick concrete cap, except boreholes 10-1276 and 10-1267, which were completed as a groundwater monitoring well and a neutron access tube for long-term soil moisture monitoring, respectively.

For more information about the RFI field investigation at PRS 10-004(a), refer to Section 5.4.4 of the RFI report.

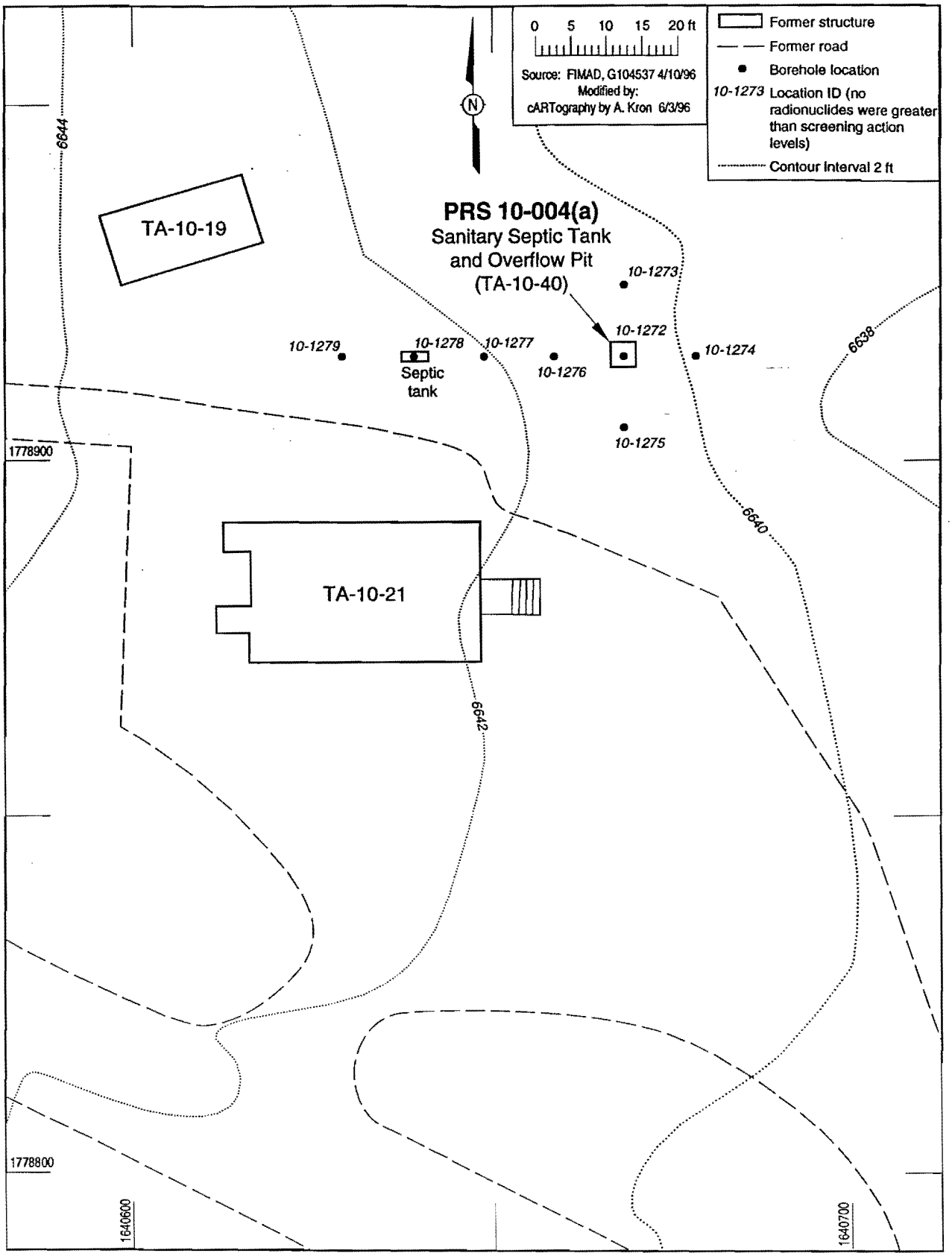


Fig. 5.4.3-1. Locations of PRS 10-004(a) samples.

5.4.4 Background Comparison for Radiological Constituents at PRS 10-004(a)

Radionuclides detected in the PRS 10-004(a) area were compared to the minimum detectable activity as described in Section 3.1 of this addendum. The results from PRS 10-004(a) samples with activities exceeding the minimum detectable activity are presented in Table 5.4.4-1. Strontium-90 was the only radionuclide detected at levels greater than the minimum detectable activity, and it will be carried forward in the screening assessment to the SALs comparison.

TABLE 5.4.4-1

PRS 10-004(a) SOIL CONCENTRATIONS FOR RADIONUCLIDES WITH VALUES GREATER THAN THE MINIMUM DETECTABLE ACTIVITY

SAMPLE ID	SAMPLE LOCATION	MATRIX	DEPTH (ft)	STRONTIUM-90 (pCi/g)
			SAL[a]	5.9
AAB9488	10-1276	Alluvium	2.5–3.6	0.78

[a] SAL = Screening action level.

5.4.5 Human Health Assessment for Radiological Constituents at PRS 10-004(a)

This section presents the human health assessment for radiological data collected from the PRS 10-004(a) area.

5.4.5.1 Screening Assessment for Radiological Constituents at PRS 10-004(a)

This section discusses the SALs comparison for PRS 10-004(a) radionuclides detected at levels greater than minimum detectable activity.

Greater Than or Equal to SAL. No radionuclide was detected at levels greater than or equal to the SAL.

No SAL. All radionuclides had SALs for comparison.

Less than SAL. Strontium-90 was detected at levels less than the SAL (see Table 5.4.4-1).

Because strontium-90 was the only radionuclide detected at levels below SAL, no multiple chemical evaluation is conducted. At the conclusion of this screening assessment, no radionuclides are retained as COPCs.

5.4.5.2 Extent of Contamination for Radiological Constituents at PRS 10-004(a)

No radionuclides were retained as COPCs in the screening assessment for PRS 10-004(a).

5.4.5.3 Risk Assessment for Radiological Constituents at PRS 10-004(a)

No dose assessment was conducted for PRS 10-004(a) because no radionuclides were retained as COPCs in the screening assessment.

5.4.6 Ecological Assessment for Radiological Constituents at PRS 10-004(a)

The preliminary ecological screening assessment indicates that this site is located in a floodplain and is potentially within the foraging range of the spotted bat and peregrine falcon. These factors must be taken into consideration should any remedial action be undertaken at this site.

According to guidance from the International Atomic Energy Agency, human health assessment results for radionuclides are assumed to be protective of most animal populations (International Atomic Energy Agency 1992, 0983). As a result, the human health assessment results adequately represent the ecological concerns for this site.

5.4.7 Conclusions and Recommendations for PRS 10-004(a)

Based on the results from the Phase I RFI, no radionuclides are present at levels exceeding SALs at PRS 10-004(a). In addition, no RCRA constituents were detected above SALs (see Section 5.4.7 of the RFI report). Therefore, PRS 10-004(a) is recommended for NFA.

5.5 PRS 10-004(b)

PRS 10-004(b) consists of a former sanitary septic tank (TA-10-38) that served the former radiochemistry laboratory. No radiological constituents are retained as COPCs in the human health screening assessment for PRS 10-004(b), and this PRS is recommended for NFA.

5.5.1 History of PRS 10-004(b)

PRS 10-004(b) is discussed in Subsection 3.1.4 of the RFI Work Plan for OU 1079 (LANL 1992, 0783).

PRS 10-004(b) was a 540-gal. sanitary septic tank that served the radiochemistry laboratory. It was constructed of reinforced concrete and measured 4 ft x 10 ft x 4 ft deep. This tank handled sanitary waste, but is suspected to have also received liquid wastes from the radiochemistry laboratory (TA-10-1). The overflow from PRS 10-004(b) drained through a 4-in. diameter vitrified clay open-joint drain pipe to the stream channel. PRS 10-004(b) was used from 1944 to 1963. PRS 10-004(b) was removed during the 1963 decontamination and decommissioning of TA-10.

The COPCs for PRS 10-004(b) include strontium-90, total uranium, barium, cadmium, lead, beryllium, TAL metals, VOCs, and SVOCs. Only the radionuclides are discussed in this addendum.

5.5.2 Previous Investigations of PRS 10-004(b)

PRS 10-004(b) was investigated previous to the RFI. These previous investigations are described in Subsection 3.1.4.8.2 of the RFI Work Plan for OU 1079 and summarized below (LANL 1992, 0783).

During the 1963 decontamination and decommissioning, readings from PRS 10-004(b) prior to its removal were less than 5.0 mR/hr. In 1973, a test hole designated M-2 was drilled to a depth of 18.9 ft near the outfall of PRS 10-004(b). Sample analyses indicated strontium-90 surface and subsurface contamination, while plutonium levels were at background. Five additional test holes were drilled near test hole M-2 in 1974. These holes indicated above background gross beta radioactivity.

During the 1977 FUSRAP survey, trenching was performed along the line leading from the radiochemistry laboratory (TA-10-1) to PRS 10-004(b), and then along the outfall line leading from 10-004(b) to the stream bed leach field. Many samples were collected along the trench, and they indicated gross beta radioactivity of up to 48 pCi/g and gross alpha radioactivity of up to 62 pCi/g.

5.5.3 Field Investigation of PRS 10-004(b)

The objective of the RFI at PRS 10-004(b) was to characterize the nature, concentration, and lateral and vertical extent of potential subsurface contamination related to historical activities at the site. The RFI was conducted in June and July 1994. The area of PRS 10-004(b) was characterized using one four-armed drilling and sampling array (Fig. 5.5.3-1). This array was centered on structure TA-10-38, and was oriented slightly east of north following a line of trenching remaining from previous investigations. The east-west arms of this array are oriented to align with structure TA-10-39, which was examined as part of the Central Area. The array consisted of 7 boreholes, each drilled to a depth of 50 ft bgs. Boreholes were spaced 10 ft apart along the arms of the array.

Samples collected from these boreholes were submitted for analysis for SVOCs, TAL metals, gamma spectroscopy, total uranium, and strontium-90. All appropriate QC samples, including duplicates, field blanks, and rinsate blanks, were collected during subsurface soil sampling activities. Sampling information is summarized in Table 5.5.4-1 of the RFI report. Radioactive field screening with hand-held instruments indicated that beta/gamma radiation was detected in borehole 10-1271 at levels greater than background. Elevated levels were not confirmed by MRAL analyses of samples collected from the borehole. Boreholes were backfilled with drill cuttings and completed with a 2-ft thick concrete cap.

For more information about the RFI field activities at PRS 10-004(b), refer to Section 5.5.4 of the RFI report.

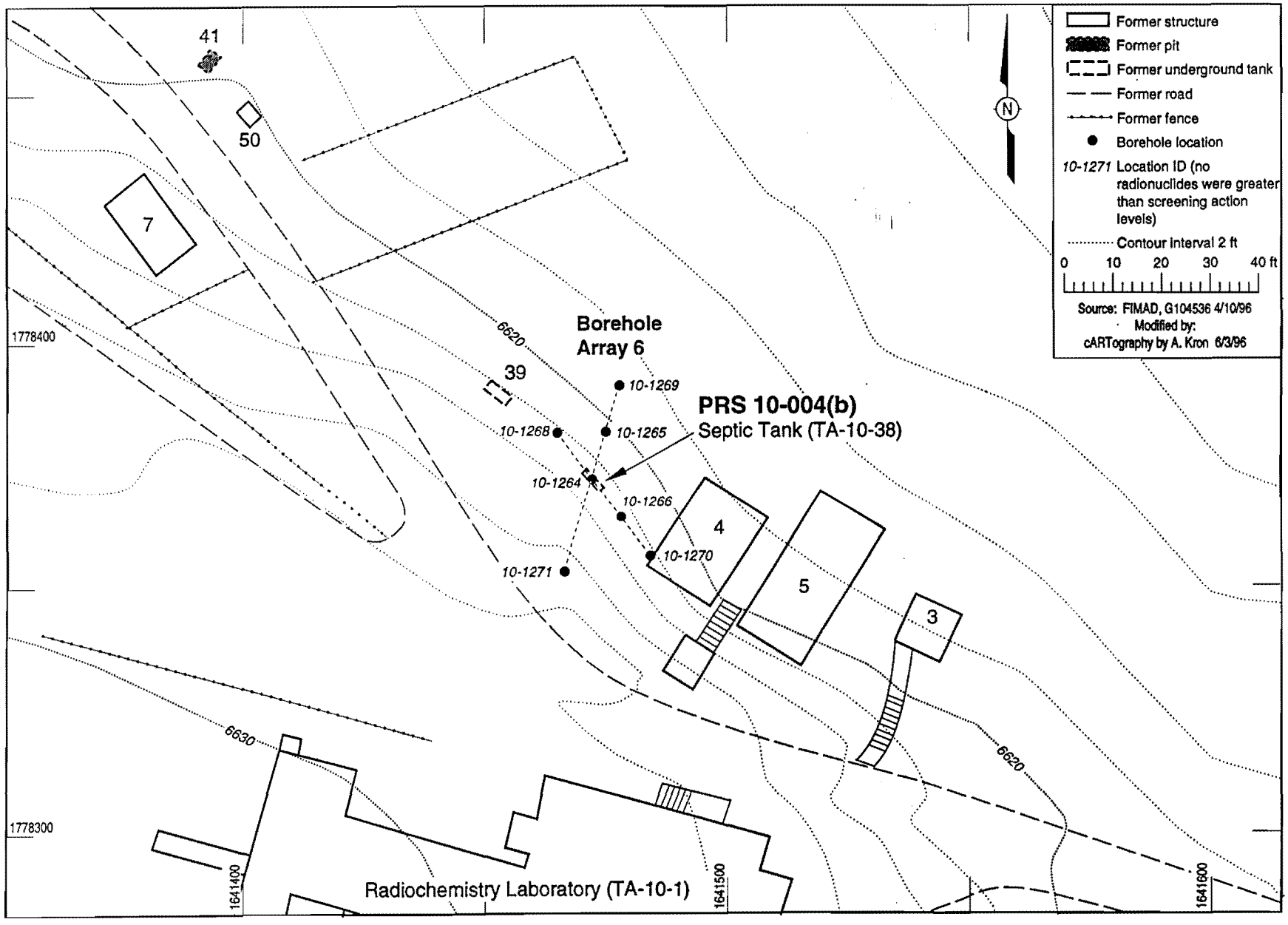


Fig. 5.5.3-1. Locations of PRS 10-004(b) samples.

5.5.4 Background Comparison for Radiological Constituents at PRS 10-004(b)

Radionuclides detected in the PRS 10-004(b) area were compared to the minimum detectable activity as described in Section 3.1 of this addendum. The results from PRS 10-004(b) samples with activities exceeding minimum detectable activity are presented in Table 5.5.4-1. Strontium-90 was the only radionuclide detected at levels greater than the minimum detectable activity, and it will be carried forward in the screening assessment to the SALs comparison.

TABLE 5.5.4-1

PRS 10-004(b) SOIL CONCENTRATIONS FOR RADIONUCLIDES WITH VALUES GREATER THAN THE MINIMUM DETECTABLE ACTIVITY

SAMPLE ID	SAMPLE LOCATION	MATRIX	DEPTH (ft)	STRONTIUM-90 (pCi/g)
			SAL[a]	5.9
AAB2893	10-1264	Alluvium	3.5–4.1	2.54
AAB2963	10-1270	Alluvium	4–4.8	0.8J[b]
AAB2964	10-1270	Alluvium	4–4.8	1.1J
AAB2977	10-1270	Transitional	45.5–46	1J
AAB2978	10-1270	Transitional	34.6–34.8	0.4J

[a] SAL = Screening action level.
[b] J = Value is an estimated detected quantity (see Section 4.0).

5.5.5 Human Health Assessment for Radiological Constituents at PRS 10-004(b)

This section presents the human health screening assessment for radiological data collected from the PRS 10-004(b) area.

5.5.5.1 Screening Assessment for Radiological Constituents at PRS 10-004(b)

This section discusses the SALs comparison for PRS 10-004(b) radionuclides detected at levels greater than minimum detectable activity.

Greater Than or Equal to SAL. No radionuclide was detected at levels greater than or equal to the SAL.

No SAL. All radionuclides had SALs for comparison.

Less than SAL. Strontium-90 was detected at levels less than the SAL (see Table 5.5.4-1).

Because strontium-90 was the only radionuclide detected at levels below SAL, no multiple chemical evaluation is conducted. At the conclusion of this screening assessment, no radionuclides are retained as COPCs.

5.5.5.2 Extent of Contamination for Radiological Constituents at PRS 10-004(b)

No radionuclides were retained as COPCs in the screening assessment for PRS 10-004(b).

5.5.5.3 Risk Assessment for Radiological Constituents at PRS 10-004(b)

No dose assessment was conducted for PRS 10-004(b) because no radionuclides were retained as COPCs in the screening assessment.

5.5.6 Ecological Assessment for Radiological Constituents at PRS 10-004(b)

The preliminary ecological screening assessment indicates that this site is located in a floodplain and is potentially within the foraging range of the spotted bat and peregrine falcon. These factors must be taken into consideration should any remedial action be undertaken at this site.

According to guidance from the International Atomic Energy Agency, human health assessment results for radionuclides are assumed to be protective of most animal populations (International Atomic Energy Agency 1992, 0983). As a result, the human health assessment results adequately represent the ecological concerns for this site.

5.5.7 Conclusions and Recommendations for PRS 10-004(b)

Based on the results from the Phase I RFI, no radionuclides are present at levels exceeding SALs at PRS 10-004(b). In addition, no RCRA constituents were detected above SALs (see Section 5.5.7 of the RFI report). Therefore, PRS 10-004(b) is recommended for NFA.

5.6 PRS 10-005

PRS 10-005 was an open pit used to contain shot debris swept from TA-10 firing sites and adjacent areas. No radiological constituents are retained as COPCs in the human health screening assessment for PRS 10-005, and this PRS is recommended for NFA.

5.6.1 History of PRS 10-005

PRS 10-005 is discussed in Subsection 3.1.4 of the RFI Work Plan for OU 1079 (LANL 1992, 0783).

PRS 10-005 was an open pit located approximately 62 ft west of the northwest firing point. It was used during the 1940s and 1950s to contain shot debris swept from the firing sites and adjacent areas. The dimensions of this pit are unknown, as are the quantities and types of materials that were placed into it. The debris may have contained small quantities of uranium, strontium-90, lead, high explosives residues, and possibly beryllium. In 1957, PRS 10-005 was excavated, the wastes burned, and the ash taken to Material Disposal Area C at TA-50. The specifics on how this operation was conducted, including pre- and post-burning activities are unknown.

The COPCs for PRS 10-005 include strontium-90, total uranium, lead, beryllium, barium, TAL metals, and high explosives. Only the radionuclides are discussed in this addendum.

5.6.2 Previous Investigations of PRS 10-005

PRS 10-005 was investigated previous to the RFI. These previous investigations are described in Subsection 3.1.4.9.2 of the RFI Work Plan for OU 1079 and summarized below (LANL 1992, 0783).

The TA-10 FUSRAP survey in 1977 encompassed this disposal area. Results of that survey demonstrated that the highest surface gross alpha and gross beta activity were measured in the firing sites that encompassed this disposal area. However, the proximity of the firing sites to this disposal area lead to ambiguity about the surface disposal area's contributions to the measured soil radioactivity.

During the 1986 Comprehensive Environmental Assessment and Response Program (CEARP) field survey, the extent of this disposal area (observed as a depression) was determined, as well as the presence of residual metal debris within the depression.

5.6.3 Field Investigation of PRS 10-005

The objective of the RFI at PRS 10-005 was to determine the presence or absence of contaminants at the site. The RFI was conducted in October and November 1994. The area of PRS 10-005 was intended to be characterized using one four-armed sampling array centered on the suspected location of the pit, a shallow, linear surface depression west of the firing sites (Fig. 5.6.3-1). The original dimensions and precise location of the center of the disposal pit were unknown. Because of the large dimensions of the existing depression and the lack of information regarding the location of the pit, a four-armed drilling array centered on the existing depression was deemed impractical. Therefore, the array was replaced with a series of boreholes aligned along the center of the depression. The first borehole (10-1284) was drilled at the western end of the linear depression with the succeeding four boreholes (10-1283 through 10-1280) spaced approximately 15 ft apart and extending downslope in an easterly direction. The boreholes were 50-ft deep. A four-armed array was to be extended to the north and south if radioactivity was detected by field screening in any of the five boreholes. However, no elevated radioactivity or VOCs were detected in the PRS 10-005 boreholes.

Samples collected from these boreholes were submitted for analysis for VOCs, SVOCs, TAL metals, gamma spectroscopy, total uranium, and strontium-90. More than fifty percent of the total number of samples sent to the fixed laboratory for analysis were also analyzed for high explosives. All appropriate QC samples, including duplicates, field blanks, and rinsate blanks, were collected during subsurface soil sampling activities. Sampling information is summarized in Table 5.6.4-1 of the RFI report. Radioactivity field screening data indicated that no radioactivity was detected above background levels in this drilling array. Boreholes were backfilled with drill cuttings and completed with a 2-ft-thick concrete cap.

For more information about the RFI field activities at PRS 10-005, refer to Section 5.6.4 of the RFI report.

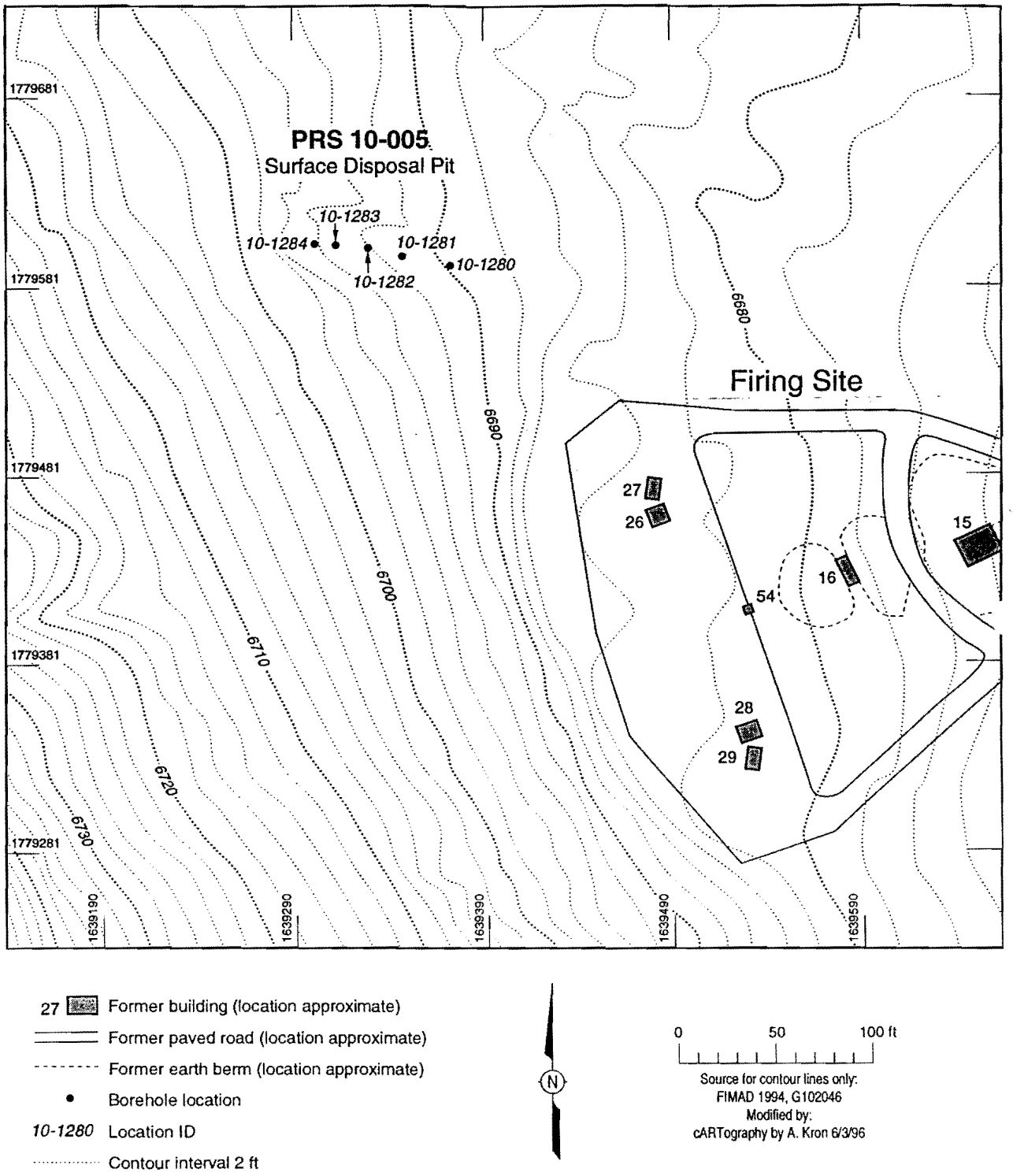


Fig. 5.6.3-1. Locations of PRS 10-005 samples.

5.6.4 Background Comparison for Radiological Constituents at PRS 10-005

Radionuclides detected in the PRS 10-004(b) area were compared to the minimum detectable activity as described in Section 3.1 of this addendum. No radionuclides were detected at values exceeding minimum detectable activity.

5.6.5 Human Health Assessment for Radiological Constituents at PRS 10-005

No human health screening assessment was conducted for PRS 10-005 because no radiological COPCs were detected at levels exceeding minimum detectable activity.

5.6.6 Ecological Assessment for Radiological Constituents at PRS 10-005

The preliminary ecological screening assessment indicates that this site is located in a floodplain and is potentially within the foraging range of the spotted bat and peregrine falcon. These factors must be taken into consideration should any remedial action be undertaken at this site.

According to guidance from the International Atomic Energy Agency, human health assessment results for radionuclides are assumed to be protective of most animal populations (International Atomic Energy Agency 1992, 0983). As a result, the human health assessment results adequately represent the ecological concerns for this site.

5.6.7 Conclusions and Recommendations for PRS 10-005

Based on the results from the Phase I RFI, no radionuclides are present at levels exceeding SALs at PRS 10-005. In addition, no RCRA constituents were detected above SALs (see Section 5.6.7 of the RFI report). Therefore, PRS 10-005 is recommended for NFA.

5.7 Site-Wide Evaluation

5.7.1 Site-Wide Evaluation of the Extent of Contamination

This section presents a comparison of the extent of elevated radionuclides in the RFI and FUSRAP data sets. The screening assessment for the radionuclide data in this subsurface investigation indicated that elevated concentrations of strontium-90 were present in two PRS aggregates: 10-002(b) and the Central Area [10-003(a-o) and 10-007]. In addition, elevated values of americium-241 were measured in one location at PRSs 10-003(a-o) and 10-007. The extent of americium-241 was bounded at 11 to 20 ft. The remainder of this section considers the extent of elevated strontium-90 values.

Elevated values of strontium-90 were expected based on previous investigations in Bayo Canyon. These previous investigations are discussed the RFI Work Plan for OU 1079 (LANL 1992, 0783). The previous data that are most relevant to this investigation are from the FUSRAP Program for Bayo Canyon (Mayfield et al. 1979, 06-0041). Section 3.0 of the RFI Work Plan for OU 1079 presents figures showing FUSRAP sampling locations, and Appendix B of the work plan presents the FUSRAP data (LANL 1992, 0783).

5.7.1.1 Vertical Extent of Contamination

This section presents a comparison of the vertical extent of elevated strontium-90 in the RFI and FUSRAP data sets. The vertical extent of contamination for each data set is graphically displayed using scatter plots. The scatter plots for the FUSRAP data are presented in Fig. 5.7.1-1, and the scatter plots for the RFI data are presented in Fig. 5.7.1-2.

In all of these scatter plots, strontium-90 is plotted as a function of depth below ground surface. In both the FUSRAP and RFI data, most strontium-90 results are in the -1 to +1 range, which most likely results from instrument or measurement noise. In each data set, there are only a limited number of samples that are significantly elevated above other values in the data set. A linear scale is useful in representing these values, but tends to obscure the majority of the results (Figs. 5.7.1-1a and 5.7.1-2a). A natural log-transformation was used to provide another display of the relationship between strontium-90 activity and depth (Figs. 5.7.1-1b and 5.7.1-2b). The log-transformation clarifies patterns in the lower range of the data.

In the FUSRAP data, the highest strontium-90 activities were measured in the 10 to 20 ft bgs depth interval, with lower activities measured in the 20 to 30 ft bgs depth interval (Fig. 5.7.1-1). Values consistent with instrument noise were recorded in the 0 to 10 ft bgs depth interval and the depth interval at greater than 30 ft bgs.

In the RFI data, the highest strontium-90 activities were also measured in the 10 to 20 ft bgs depth interval, with lower activities in the 20 to 30 ft bgs depth interval (Fig. 5.7.1-2). As with the FUSRAP data, most of the RFI values in the 0 to 10 ft bgs depth interval and the depth interval greater than 30 ft bgs were within the range for instrument noise. One important difference in the RFI data is the presence of a small number of elevated strontium-90 activities in the 0 to 10 ft depth interval. However, there is no evidence that significant vertical downward migration of strontium-90 has occurred in this area of Bayo Canyon.

The most significant comparison between the RFI and FUSRAP data is the difference of a factor of 10 in the maximum values for each data set. The RFI maximum is approximately 10 times higher than the FUSRAP maximum. This discrepancy occurs because the building debris landfill, PRS 10-007, was sampled in the RFI investigation but not in the FUSRAP study.

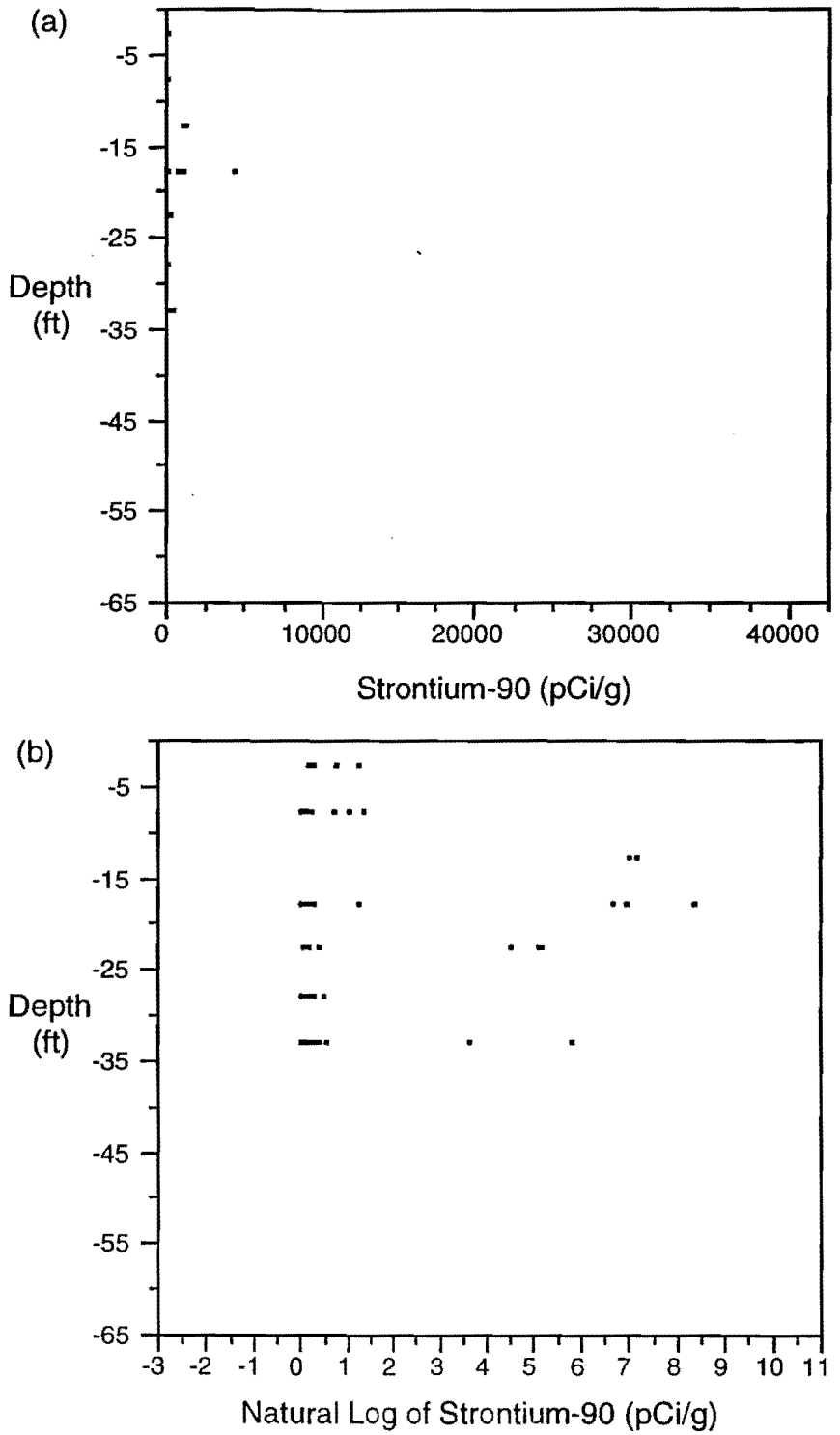


Fig. 5.7.1-1. Strontium-90 concentration versus depth below ground level for the FUSRAP data.

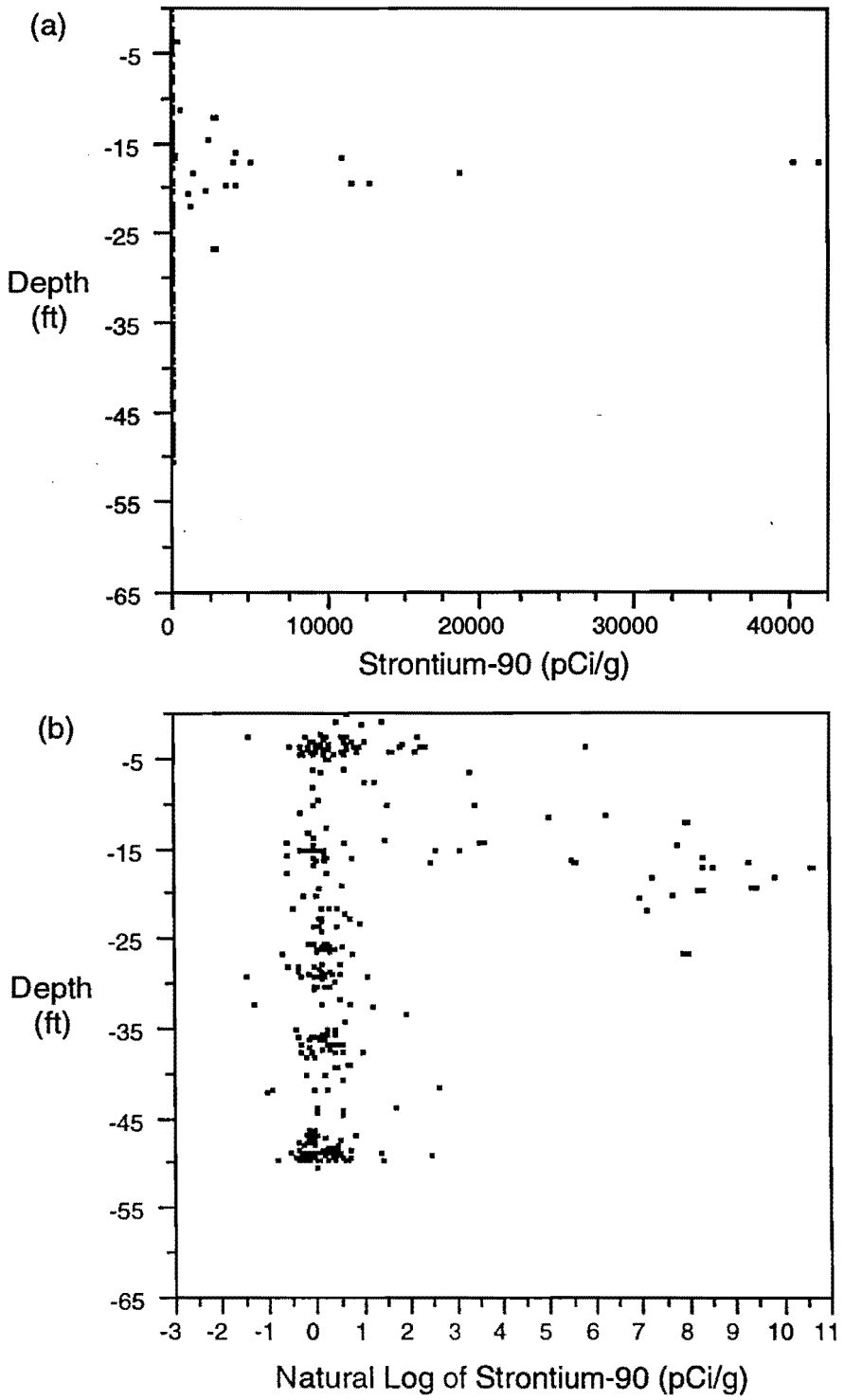


Fig. 5.7.1-2. Strontium-90 concentration versus depth below ground level for the RFI data.

5.7.1.2 Lateral Extent of Contamination

This section presents a comparison of the lateral extent of elevated strontium-90 in the RFI and FUSRAP data sets. Based on process knowledge of activities in Bayo Canyon, the data for this area can be addressed as part of one of two spatial aggregates. The first spatial aggregate is the Central Area [PRSs 10-003(a-o) and 10-007], which includes the drain lines, disposal pits, and landfill associated with the former radiochemistry laboratory. The second spatial group is associated with PRS 10-002(b), which is a disposal pit (TA-10-48) located 100 ft from the nearest Central Area drain line.

The lateral extent of contamination in the Central Area for both the FUSRAP and RFI data is graphically displayed in Fig. 5.7.1-3. The lateral extent of contamination at PRS 10-002(b) for both the FUSRAP and RFI data is graphically displayed in Fig. 5.7.1-4. In each figure, the FUSRAP and RFI borehole locations are labeled with the average concentration measured for all samples from that borehole. Because the FUSRAP investigation focused on laboratory analysis of gross beta counts, there are limited analytical data available from that investigation for strontium-90. As a result, a statistical model was developed to estimate strontium-90 activity for a particular location based on gross beta counts measured at that location. This statistical model is presented in Fig. 5.7.1-5, and the values presented in Figs. 5.7.1-3 and 5.7.1-4 are interpolated values of strontium-90 based on this model. These interpolated values were also used in the risk assessments presented previously in this report.

TA-10 Central Area. As discussed above, the maximum value in the RFI data is approximately 10 times higher than the FUSRAP maximum because the building debris landfill, PRS 10-007, was sampled in the RFI but not in the FUSRAP study. The RFI expanded the investigation area to include PRS 10-007 in order to more fully define the volume of subsurface material with elevated radionuclide activities. As shown in Fig. 5.7.1-3, PRS 10-007 yielded the highest strontium-90 activities measured in any Bayo Canyon investigation.

With one exception, the elevated strontium-90 activities are bounded laterally by boreholes with average values at or near instrument error levels (0 to 1 pCi/g). The single exception is borehole 10-2220, which has an average strontium-90 activity of 12 617 pCi/g. Borehole 10-2220 has no bounding value directly east. However, there are low values to the north, southeast, and south of this location. Therefore, the RFI boreholes adequately bound the lateral extent of elevated strontium-90 values.

In general, the collocated (or neighboring) boreholes from the FUSRAP study and the RFI show similar values. For example, RFI borehole 10-1201 averaged 5 775 pCi/g and collocated FUSRAP borehole 43e averaged 2 337 pCi/g. Thus, there are no gross or subtle indications of significant lateral movement of the elevated strontium-90 values.

PRS 10-002(b) Area. The strontium-90 activities in the area of PRS 10-002(b) are low relative to activities in the Central Area. In addition, the elevated values are limited to four borehole locations. Two of these locations were collocated FUSRAP boreholes (48bb and 49bb-5), and two were RFI boreholes (10-1257 and 10-1289). Borehole 10-1257 is a neighbor to the FUSRAP boreholes with elevated readings. Borehole 10-1289 is located 25 ft to the east-southeast of the FUSRAP boreholes with elevated readings. Thus, there are no gross or subtle indications of significant lateral movement of the elevated strontium-90 values.

The PRS 10-002(b) boreholes with elevated readings are generally bounded laterally by boreholes with averages at or near instrument error (0 to 1 pCi/g). The single exception is borehole 10-1289, which has an average strontium-90 activity of 38 pCi/g. Borehole 10-1289 has no bounding value directly north or south. However, there are low values to the west, northwest, southeast, and east of this location. Thus, the RFI boreholes adequately bound the lateral extent of elevated strontium-90 values.

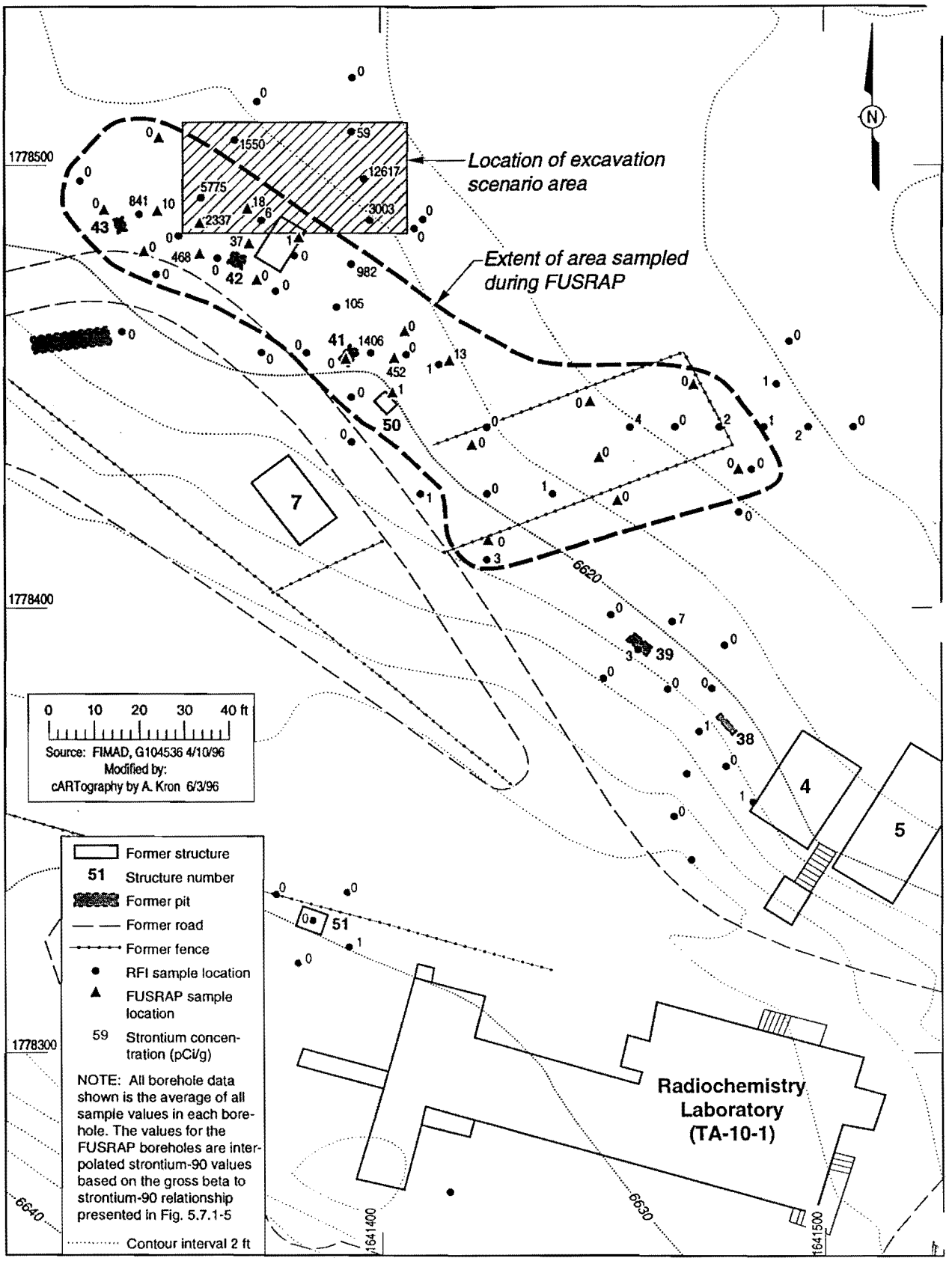


Fig. 5.7.1-3. Comparison of average strontium-90 concentrations for Central Area RFI and FUSRAP boreholes.

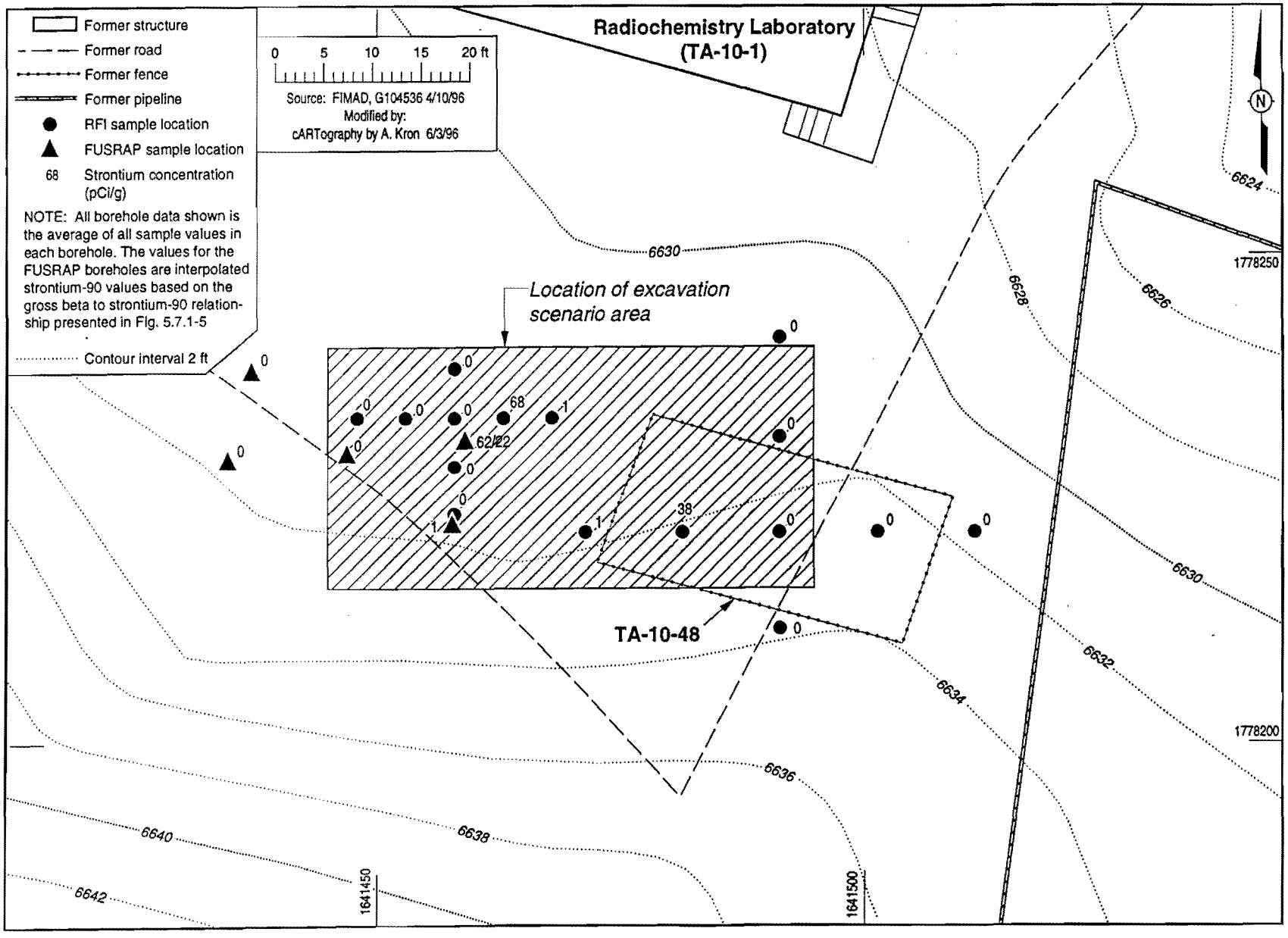
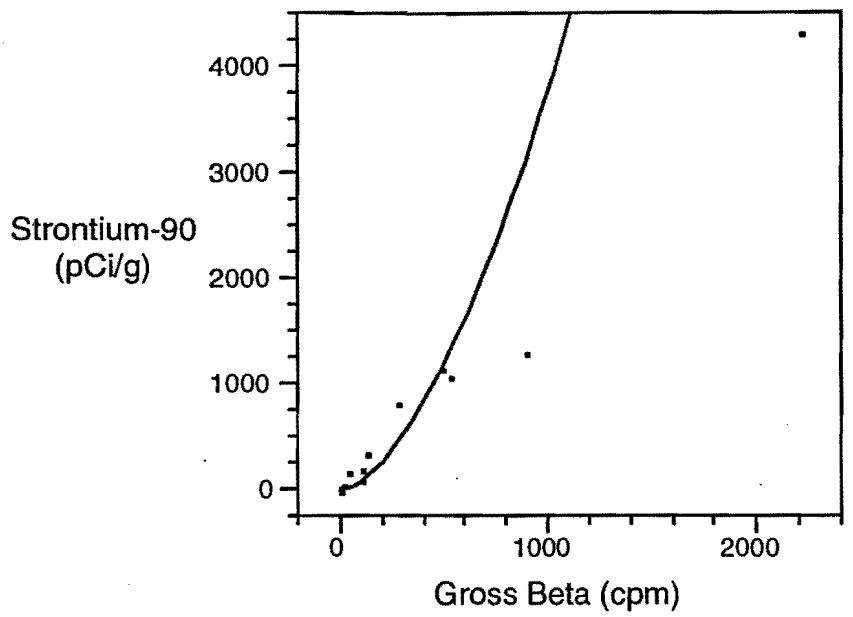


Fig. 5.7.1-4. Comparison of average strontium-90 concentrations for PRS 10-002(b) RFI and FUSRAP boreholes.



This relationship was used to estimate the activity of strontium-90 for FUSRAP samples where only gross beta was measured. The statistically fitted relationship was based on a natural log transformation of both variables, and yielded the following equation:

Log(90Sr (pCi/g)) = -3.3033 + 1.6683 Log(Gross-beta), where r^2=0.879 for 43 sample values.

The r^2 provides an assessment of the goodness of fit of this relationship, and suggests that approximately 90% of the variability in strontium-90 can be explained by this fitted relationship to gross beta counts. Thus, gross beta is an excellent predictor of strontium-90 activity.

Fig. 5.7.1-5. Relationship between FUSRAP strontium-90 laboratory data (in pCi/g) and gross beta data (in counts per minutes or CPM).

5.7.2 Site-Wide Risk Evaluation

In two of the six investigation areas, the Central Area [PRSs 10-003(a-o) and 10-007] and PRS 10-002(b), radionuclides were retained as COPCs as a result of the screening assessments. The risk assessments for these areas indicate that while these sites pose acceptable risk levels in a current recreational land-use scenario, they pose unacceptable risk levels in a future residential land-use scenario. Because these areas are located adjacent to each other, it is likely that recreational use of one area would also include recreational use of the other, creating additive exposures. Therefore, these two areas were considered together in a site-wide risk evaluation. In the site-wide risk evaluation, recreational use of Bayo Canyon was assumed to include not only the current use of Bayo Canyon, which is principally hiking, but also potential future uses, which could include camping, hunting, and ingestion of edible plants (although native edible plants such as pinon nuts and prickly pear fruit are not currently growing in the area).

Site-Wide Current Recreational Use

The exposure routes for the current recreational use scenario of hiking through the area include direct radiation, inhalation of resuspended dust, and incidental ingestion of soil. At PRS 10-002(b) these pathways are associated with a dose of 0.5 mrem/yr (see Section 5.2.5.3.2), while at PRSs 10-003(a-o) and 10-007 these pathways are associated with a dose of 0.4 mrem/yr (see Section 5.3.5.3.2). The combined exposure for these areas is 0.9 mrem/yr, which is well below the EPA dose guideline of 15 mrem/yr.

Site-Wide Future Recreational Use

The future recreational use scenario includes the additional pathways of edible plant ingestion and ingestion of meat obtained while hunting. The combined exposure for these areas is dominated by the high exposure potential of the Central Area [PRSs 10-003(a-o) and 10-007], which has subsurface strontium-90 activities of more than 100 times the subsurface activities at PRS 10-002(b). In addition, the area of contamination for the Central Area is more than 15 times that of PRS 10-002(b). Further, the exposure assumptions are conservative in nature, and any incremental time spent at PRS 10-002(b) will be covered by the assumptions for the Central Area. Therefore, only the Central Area was considered in this evaluation.

The exposure pathways for the future recreational use scenario include the following:

- Ingestion of edible plants,
- Ingestion of meat from hunting,
- Inhalation of resuspended dust,
- Direct ground radiation, and
- Incidental soil ingestion.

Evaluation of this scenario involves consideration of the contaminants found 10 ft below the surface (averaging 6 322 pCi/g of strontium-90 and 15 pCi/g of americium-241), as well as the elevated strontium-90 found at the surface (averaging 64 pCi/g strontium-90).

Ingestion of edible plants. The elevated strontium-90 found below the surface can be accessed by plants. Many plants that grow in Bayo Canyon have root depths of greater than 10 ft, including chamisa, pinon, juniper, oak, saltbush, sagebrush, and prickly pear (Wenzel et al. 1987, 0227). Highly elevated levels of strontium-90 (90 500 pCi/g dry weight and 5 930 pCi/g dry weight) were found in chamisa plants growing at PRSs 10-003(a-o) and 10-0((Fresquez 1995, 06-0142). Because the chamisa bushes in the area are known to have taken up strontium-90 from the subsurface, an interim action will be conducted to remove the chamisa containing elevated levels of strontium-90 from this area.

Several kinds of edible plants are known to grow in areas such as Bayo Canyon. These include pinon (which has edible nuts), prickly pear (which has edible fruit), sage (which is an herb), and juniper (which is an ash used in native American cooking). Currently, none of these edible plants are growing in the area of PRSs 10-002(b), 10-003(a-o), or 10-007. However, they could potentially grow in this area in the future. This risk assessment assumes that 4 kg per year of edible plants growing in this area would be consumed. The results for this exposure pathway indicate that plant consumption would be associated with a dose of 102 mrem/yr (entirely from strontium-90).

Ingestion of meat from hunting. Plant uptake also provides a route of exposure for foraging animals, which might then be hunted and consumed by humans. Deer are found in Bayo Canyon and are known to forage on chamisa and other deep rooted plants (such as perennial grasses). In this assessment, it is assumed that a foraging deer would consume 1 kg of plants per day from the Central Area. It is further assumed that a human would consume 34 kg of th deer meat throughout a year. Meat ingestion under these and other RESRAD assumptions would lead to dose of 13 mrem/yr (entirely from strontium-90).

Remaining pathways. The remaining pathways (inhalation of resuspended dust, direct ground radiation, and incidental soil ingestion) are associated with contamination found at the surface. The four surface soil samples collected near chamisa bushes known to have taken up strontium-90 from the subsurface were used to evaluate exposure from these pathways. The average strontium-90 activity of these four samples is 64 pCi/g. The direct radiation pathway is associated with a dose of 0.1 mrem/yr, inhalation is associated with a dose of 0.004 mrem/yr, and incidental soil ingestion is associated with a dose of 0.03 mrem/yr.

The total dose associated with all pathways in the site-wide future recreational scenario is 115 mrem/yr. This is equivalent to an excess cancer risk of 8 in 10 000 per year or 8 in 1 000 if all of these activities were conducted for ten years throughout a lifetime. The doses associated with the pathways of inhalation of resuspended dust, direct ground radiation, and incidental soil ingestionare all well below the 15 mrem/yr guideline and contribute very little to the total dose. Inhalation of resuspended dust and incidental soil ingestion are each associated with an excess cancer risk level below 1 in 1 000 000 per year of exposure, and direct ground radiation has an excess cancer risk level of 2 in 1 000 000 per year of exposure. The dose associated with ingestion of meat from hunting, 13 mrem/yr, is also below the EPA guideline of 15 mrem/yr. Ingestion of edible plants is the primary contributor to the total dose at 102 mrem/yr. Combined, the meat and plant ingestion exposure pathways are associated with a lifetime excess cancer risk greater than 1 in 10 000. For details of the RESRAD calculations for this scenario, refer to Appendix C, section C-5.

5.7.3 Site-Wide Conclusions

The results of the individual risk assessments for PRS 10-002(b) and the Central Area indicate that these sites pose acceptable risk levels in a current recreational land-use scenario, assuming that the primary activity in this area of Bayo Canyon is hiking. In the site-wide risk evaluation for the current recreational use scenario, the combined exposure for these areas is 0.9 mrem/yr, which is well below the EPA dose guideline of 15 mrem/yr. Therefore, current use of the area for hiking is not associated with an unacceptable health risk level.

The site-wide risk evaluation also considered a future recreational use scenario that included the exposure pathways of ingestion of meat from hunting and ingestion of edible plants. The total dose associated with all pathways in the site-wide future recreational scenario is 115 mrem/yr. Of this total dose, 102 mrem/yr were associated with ingestion of edible plants, and 13 mrem/yr were associated with ingestion of meat from hunting (assuming that a deer had

consumed contaminated plants in the area). It is important to note that edible plants such as pinon, prickly pear, sage, and juniper are not currently growing at PRS 10-002(b) or the Central Area. However, chamisa bushes, which are edible by deer, do grow in the area. An interim action will be conducted to remove the chamisa containing elevated levels of strontium-90 from this area. In addition, the potential for future surface contamination from plant uptake will be evaluated and, if necessary, remedial alternatives will be considered.

In addition to recreational use of the canyon, future residential use was evaluated individually for PRS 10-002(b) and the Central Area. The results for the residential use scenario indicate unacceptable risk levels, due primarily to ingestion of garden produce. If Bayo Canyon is developed for residential or agricultural purposes, remedial action may be warranted.

6.0 REFERENCES

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APPENDIX A ANALYTICAL DATA

All analytical data, including data from the mobile chemistry analytical laboratory (MCAL) and mobile radiological analytical laboratory (MRAL), are available in the Facility for Information Management, Analysis, and Display (FIMAD) database. If the FIMAD database is not accessible, data will be provided upon request. A hard copy of the data is available from the Records Processing Facility (RPF) under "Analytical Data for the Subsurface Investigation of TA-10."

TABLE B-1 (CONTINUED)

DATA QUALITY EVALUATION FOR TA-10 SUBSURFACE AGGREGATE RADIONUCLIDE ANALYSES

REQUEST NUMBER	SAMPLE ID	STRONTIUM-90	GAMMA SPECTROS-COPY	ISOTOPIC URANIUM	TOTAL URANIUM	COMMENTS
18725	AAB3062	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB6304	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB6306	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
18727	AAB3069	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB3072	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB3073	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
18729	AAB3074	X			KPA	Uranium data qualified R[e] for recovery of <1% in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB3080	X			KPA	Uranium data qualified R for recovery of <1% in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB3085	X			KPA	Uranium data qualified R for recovery of <1% in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB3086	X			KPA	Uranium data qualified R for recovery of <1% in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB6308	X			KPA	Uranium data qualified R for recovery of <1% in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
18731	AAB6421	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB6422	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB6423	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB6428	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB6432	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB6433	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB6434	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB6439	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.

APPENDIX B DATA QUALITY EVALUATION TABLES

TABLE B-1

DATA QUALITY EVALUATION FOR TA-10 SUBSURFACE AGGREGATE RADIONUCLIDE ANALYSES

REQUEST NUMBER	SAMPLE ID	STRONTIUM-90	GAMMA SPECTROS-COPY	ISOTOPIC URANIUM	TOTAL URANIUM	COMMENTS
18323	AAB6299	X[a]	X	X	ICP/MS[b]	All data are valid without qualification.
	AAB6307	X	X	X	ICP/MS	All data are valid without qualification.
18709	AAB2944	X			KPA[c]	Uranium data qualified J[d] for low recovery in quality control (QC) sample.
	AAB2946	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB2947	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB6126	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB6151	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB6152	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB6155	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB6157	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB6162	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB6166	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB6168	X			KPA	Uranium data qualified J for low recovery in QC sample.
18710	AAB3004	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB3005	X			KPA	Uranium data qualified J for low recovery in QC sample.
18713	AAB3016	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB3017	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB3018	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB6244	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB6251	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB6256	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB6257	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
18716	AAB3019	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB3020	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB3030	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB3031	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB3032	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB3033	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.

TABLE B-1 (CONTINUED)

DATA QUALITY EVALUATION FOR TA-10 SUBSURFACE AGGREGATE RADIONUCLIDE ANALYSES

REQUEST NUMBER	SAMPLE ID	STRONTIUM-90	GAMMA SPECTROS-COPY	ISOTOPIC URANIUM	TOTAL URANIUM	COMMENTS
18898 continued	AAB6205	X			ICP/MS	Uranium and strontium-90 data qualified J for low recovery in QC and matrix spike samples, respectively.
	AAB6206	X			ICP/MS	Uranium and strontium-90 data qualified J for low recovery in QC and matrix spike samples, respectively.
	AAB6207	X			ICP/MS	Uranium and strontium-90 data qualified J for low recovery in QC and matrix spike samples, respectively.
	AAB6211	X			ICP/MS	Uranium and strontium-90 data qualified J for low recovery in QC and matrix spike samples, respectively.
	AAB6214	X			ICP/MS	Uranium and strontium-90 data qualified J for low recovery in QC and matrix spike samples, respectively.
18900	AAB6282	X			ICP/MS	All data are valid without qualification.
	AAB6283	X			ICP/MS	All data are valid without qualification.
18932	AAB2988	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB2989	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB2990	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB2991	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB3001	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB3002	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB3003	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB6228	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB6231	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB6232	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB6241	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB6243	X			KPA	Uranium data qualified J for low recovery in QC sample.
18990	AAB2845	X			ICP/MS	All data are valid without qualification.
	AAB2851	X			ICP/MS	All data are valid without qualification.
	AAB2856	X			ICP/MS	All data are valid without qualification.
	AAB2857	X			ICP/MS	All data are valid without qualification.
18994	AAB2906	X			ICP/MS	All data are valid without qualification.
	AAB2915	X			ICP/MS	All data are valid without qualification.
	AAB2916	X			ICP/MS	All data are valid without qualification.
	AAB2917	X			ICP/MS	All data are valid without qualification.
	AAB6124	X			ICP/MS	All data are valid without qualification.
	AAB6125	X			ICP/MS	All data are valid without qualification.
	AAB6129	X			ICP/MS	All data are valid without qualification.
	AAB6139	X			ICP/MS	All data are valid without qualification.
	AAB6141	X			ICP/MS	All data are valid without qualification.
	AAB6143	X			ICP/MS	All data are valid without qualification.
19014	AAB6583	X			ICP/MS	All data are valid without qualification.
	AAB6584	X	X		ICP/MS	All data are valid without qualification.
19101	AAB3046	X			KPA	Strontium-90 data qualified R for recovery of <10% in QC sample. Uranium data qualified J for low recovery in QC sample.
	AAB3047	X			KPA	Strontium-90 data qualified R for recovery of <10% in QC sample. Uranium data qualified J for low recovery in QC sample.
	AAB3057	X			KPA	Strontium-90 data qualified R for recovery of <10% in QC sample. Uranium data qualified J for low recovery in QC sample.

TABLE B-1 (CONTINUED)

DATA QUALITY EVALUATION FOR TA-10 SUBSURFACE AGGREGATE RADIONUCLIDE ANALYSES

REQUEST NUMBER	SAMPLE ID	STRONTIUM-90	GAMMA SPECTROSCOPY	ISOTOPIC URANIUM	TOTAL URANIUM	COMMENTS
18731 continued	AAB6444	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB6445	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB6446	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
18741	AAB6321	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB6322	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB6330	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB6335	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
	AAB6336	X			KPA	Uranium data qualified J for low recovery in QC sample. Strontium-90 data qualified J for high recovery in QC sample.
18742	AAB6447	X			KPA	All data are valid without qualification.
18743	AAB6338	X	X		ICP/MS	Uranium data qualified J for low recovery in QC sample.
	AAB6343	X	X		ICP/MS	Uranium data qualified J for low recovery in QC sample.
	AAB6348	X	X		ICP/MS	Uranium data qualified J for low recovery in QC sample.
	AAB6349	X	X		ICP/MS	Uranium data qualified J for low recovery in QC sample.
	AAB6461	X	X		ICP/MS	Uranium data qualified J for low recovery in QC sample.
	AAB6465	X	X		ICP/MS	Uranium data qualified J for low recovery in QC sample.
	AAB6471	X	X		ICP/MS	Uranium data qualified J for low recovery in QC sample.
	AAB6472	X	X		ICP/MS	Uranium data qualified J for low recovery in QC sample.
18782	AAB6581	X	X	X	ICP/MS	All data are valid without qualification.
	AAB6585	X	X	X	ICP/MS	All data are valid without qualification.
18898	AAB2963	X			ICP/MS	Uranium and strontium-90 data qualified J for low recovery in QC and matrix spike samples, respectively.
	AAB2964	X			ICP/MS	Uranium and strontium-90 data qualified J for low recovery in QC and matrix spike samples, respectively.
	AAB2977	X			ICP/MS	Uranium and strontium-90 data qualified J for low recovery in QC and matrix spike samples, respectively.
	AAB2978	X			ICP/MS	Uranium and strontium-90 data qualified J for low recovery in QC and matrix spike samples, respectively.
	AAB6182	X			ICP/MS	Uranium and strontium-90 data qualified J for low recovery in QC and matrix spike samples, respectively.
	AAB6186	X			ICP/MS	Uranium and strontium-90 data qualified J for low recovery in QC and matrix spike samples, respectively.
	AAB6193	X			ICP/MS	Uranium and strontium-90 data qualified J for low recovery in QC and matrix spike samples, respectively.
	AAB6194	X			ICP/MS	Uranium and strontium-90 data qualified J for low recovery in QC and matrix spike samples, respectively.
	AAB6197	X			ICP/MS	Uranium and strontium-90 data qualified J for low recovery in QC and matrix spike samples, respectively.
	AAB6198	X			ICP/MS	Uranium and strontium-90 data qualified J for low recovery in QC and matrix spike samples, respectively.

TABLE B-1 (CONTINUED)

DATA QUALITY EVALUATION FOR TA-10 SUBSURFACE AGGREGATE RADIONUCLIDE ANALYSES

REQUEST NUMBER	SAMPLE ID	STRONTIUM-90	GAMMA SPECTROS-COPY	ISOTOPIC URANIUM	TOTAL URANIUM	COMMENTS
19106 continued	AAB6492	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.
	AAB6493	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.
	AAB6494	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.
	AAB6498	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.
	AAB6500	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.
19574	AAB6569	X	X	X	KPA	Gamma spectroscopy and total uranium data qualified J. The analytical laboratory used a sample amount that was too small for proper quantitation.
	AAB6580	X	X	X	KPA	Gamma spectroscopy and total uranium data qualified J. The analytical laboratory used a sample amount that was too small for proper quantitation.
	AAB9309	X	X	X	KPA	Gamma spectroscopy and total uranium data qualified J. The analytical laboratory used a sample amount that was too small for proper quantitation.
	AAB9428	X	X	X	KPA	Gamma spectroscopy and total uranium data qualified J. The analytical laboratory used a sample amount that was too small for proper quantitation.
19604	AAB6363	X			KPA	Strontium-90 data qualified J for low recovery in QC and laboratory control samples.
	AAB6364	X			KPA	Strontium-90 data qualified J for low recovery in QC and laboratory control samples.
	AAB6371	X			KPA	Strontium-90 data qualified J for low recovery in QC and laboratory control samples.
	AAB6376	X			KPA	Strontium-90 data qualified J for low recovery in QC and laboratory control samples.
	AAB6378	X			KPA	Strontium-90 data qualified J for low recovery in QC and laboratory control samples.
19695	AAB6379	X			KPA	Strontium-90 data qualified J for low recovery in QC sample. Uranium data qualified J for internal standards outside control limits.
	AAB6384	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB6390	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB6501	X			KPA	Strontium-90 data qualified J for low recovery in QC sample. Uranium data qualified J for internal standards outside control limits.
	AAB6507	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB6510	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB6511	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB6512	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
19706	AAB2882	X	X		KPA	All data are valid without qualification.
	AAB2883	X	X		KPA	All data are valid without qualification.
	AAB2884	X	X		KPA	All data are valid without qualification.
	AAB2893	X	X		KPA	All data are valid without qualification.

TABLE B-1 (CONTINUED)

DATA QUALITY EVALUATION FOR TA-10 SUBSURFACE AGGREGATE RADIONUCLIDE ANALYSES

REQUEST NUMBER	SAMPLE ID	STRONTIUM-90	GAMMA SPECTROS-COPY	ISOTOPIC URANIUM	TOTAL URANIUM	COMMENTS
19101 continued	AAB3059	X			KPA	Strontium-90 data qualified R for recovery of <10% in QC sample. Uranium data qualified J for low recovery in QC sample.
	AAB3060	X			KPA	Strontium-90 data qualified R for recovery of <10% in QC sample. Uranium data qualified J for low recovery in QC sample.
	AAB6292	X			KPA	Strontium-90 data qualified R for recovery of <10% in QC sample. Uranium data qualified J for low recovery in QC sample.
19102	AAB6454	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.
	AAB6455	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.
	AAB6459	X			KPA	Strontium-90 data qualified R for recovery of <10% in QC sample. Uranium data qualified J for low recovery in QC sample.
	AAB6460	X			KPA	Strontium-90 data qualified R for recovery of <10% in QC sample.
19104	AAB3087	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB6313	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB6317	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB6320	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB6414	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB6415	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB6416	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB6420	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
19106	AAB6350	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.
	AAB6353	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.
	AAB6354	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.
	AAB6355	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.
	AAB6360	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.
	AAB6362	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.
	AAB6473	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.
	AAB6478	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.
	AAB6483	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.
	AAB6484	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.
	AAB6485	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.

TABLE B-1 (CONTINUED)

DATA QUALITY EVALUATION FOR TA-10 SUBSURFACE AGGREGATE RADIONUCLIDE ANALYSES

REQUEST NUMBER	SAMPLE ID	STRONTIUM-90	GAMMA SPECTROS-COPY	ISOTOPIC URANIUM	TOTAL URANIUM	COMMENTS
19805	AAB6405	X			KPA	Uranium and strontium-90 data qualified J for low matrix spike recoveries.
	AAB6526	X			KPA	Uranium and strontium-90 data qualified J for low matrix spike recoveries.
	AAB6527	X			KPA	Uranium and strontium-90 data qualified J for low matrix spike recoveries.
	AAB6532	X			KPA	Uranium and strontium-90 data qualified J for low matrix spike recoveries.
	AAB6535	X			KPA	Uranium and strontium-90 data qualified J for low matrix spike recoveries.
	AAB6536	X			KPA	Uranium and strontium-90 data qualified J for low matrix spike recoveries.
19807	AAB6409	X	X	X	KPA	Strontium-90 and isotopic uranium data qualified J for high recovery in laboratory control sample. Total uranium data qualified J for internal standards outside control limits.
	AAB6410	X	X	X	KPA	Strontium-90 and isotopic uranium data qualified J for high recovery in laboratory control sample. Total uranium data qualified J for internal standards outside control limits.
	AAB6579	X			KPA	Strontium-90 and isotopic uranium data qualified J for high recovery in laboratory control sample. Total uranium data qualified J for internal standards outside control limits.
19808	AAB6537	X			KPA	Strontium-90 data qualified J for low recovery in QC sample. Total uranium data qualified J for high recovery in laboratory control sample.
	AAB6538	X			KPA	Strontium-90 data qualified J for low recovery in QC sample. Total uranium data qualified J for high recovery in laboratory control sample.
	AAB6539	X			KPA	Strontium-90 data qualified J for low recovery in QC sample. Total uranium data qualified J for high recovery in laboratory control sample.
	AAB6546	X			KPA	Strontium-90 data qualified J for low recovery in QC sample. Total uranium data qualified J for high recovery in laboratory control sample.
	AAB6550	X			KPA	Strontium-90 data qualified J for low recovery in QC sample. Total uranium data qualified J for high recovery in laboratory control sample.
	AAB6551	X			KPA	Strontium-90 data qualified J for low recovery in QC sample. Total uranium data qualified J for high recovery in laboratory control sample.
19809	AAB6552	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample. Total uranium data qualified J for high recovery in laboratory control sample and a low recovery in QC sample.
	AAB6558	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample. Total uranium data qualified J for high recovery in laboratory control sample and a low recovery in QC sample.
	AAB6562	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample. Total uranium data qualified J for high recovery in laboratory control sample and a low recovery in QC sample.
	AAB6563	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample. Total uranium data qualified J for high recovery in laboratory control sample and a low recovery in QC sample.

TABLE B-1 (CONTINUED)

DATA QUALITY EVALUATION FOR TA-10 SUBSURFACE AGGREGATE RADIONUCLIDE ANALYSES

REQUEST NUMBER	SAMPLE ID	STRONTIUM-90	GAMMA SPECTROS-COPY	ISOTOPIC URANIUM	TOTAL URANIUM	COMMENTS
19760	AAB3034	X			KPA	All data are valid without qualification.
	AAB3042	X			KPA	All data are valid without qualification.
	AAB3044	X			KPA	All data are valid without qualification.
	AAB3045	X			KPA	Strontium-90 data qualified J for high matrix spike recovery.
	AAB6258	X			KPA	All data are valid without qualification.
	AAB6264	X			KPA	All data are valid without qualification.
	AAB6268	X			KPA	All data are valid without qualification.
	AAB6270	X			KPA	All data are valid without qualification.
	AAB6271	X			KPA	All data are valid without qualification.
	AAB6272	X			KPA	All data are valid without qualification.
	AAB6281	X			KPA	All data are valid without qualification.
	AAB6288	X			KPA	All data are valid without qualification.
	AAB6289	X			KPA	All data are valid without qualification.
19763	AAB2861	X			KPA	All data are valid without qualification.
19764	AAB6169	X			KPA	All data are valid without qualification.
	AAB6180	X			KPA	All data are valid without qualification.
	AAB6181	X			KPA	All data are valid without qualification.
19770	AAB2933	X			KPA	All data are valid without qualification.
	AAB2934	X			KPA	All data are valid without qualification.
	AAB2935	X			KPA	All data are valid without qualification.
19771	AAB2920	X	X		KPA	All data are valid without qualification.
	AAB2928	X	X		KPA	All data are valid without qualification.
	AAB2929	X	X		KPA	All data are valid without qualification.
19773	AAB2839	X			KPA	All data are valid without qualification.
	AAB2843	X			KPA	All data are valid without qualification.
	AAB2844	X			KPA	All data are valid without qualification.
19789	AAB2949	X			KPA	Uranium data qualified J for low recoveries in QC sample.
	AAB2958	X			KPA	Uranium data qualified J for low recoveries in QC sample.
	AAB2959	X			KPA	Uranium data qualified J for low recoveries in QC sample.
	AAB2962	X			KPA	Uranium data qualified J for low recoveries in QC sample.
	AAB2979	X			KPA	Uranium data qualified J for low recoveries in QC sample.
19794	AAB2960	X			KPA	All data are valid without qualification.
	AAB2961	X			KPA	All data are valid without qualification.
19804	AAB6392	X			KPA	Uranium and strontium-90 data qualified J for low matrix spike recoveries.
	AAB6395	X			KPA	Uranium and strontium-90 data qualified J for low matrix spike recoveries.
	AAB6403	X			KPA	Uranium and strontium-90 data qualified J for low matrix spike recoveries.
	AAB6404	X			KPA	Uranium and strontium-90 data qualified J for low matrix spike recoveries.
	AAB6520	X			KPA	Uranium and strontium-90 data qualified J for low matrix spike recoveries.
	AAB6524	X			KPA	Uranium and strontium-90 data qualified J for low matrix spike recoveries.
	AAB6525	X			KPA	Uranium and strontium-90 data qualified J for low matrix spike recoveries.

TABLE B-1 (CONTINUED)

DATA QUALITY EVALUATION FOR TA-10 SUBSURFACE AGGREGATE RADIONUCLIDE ANALYSES

REQUEST NUMBER	SAMPLE ID	STRONTIUM-90	GAMMA SPECTROS-COPY	ISOTOPIC URANIUM	TOTAL URANIUM	COMMENTS
19878	AAB9257	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB9260	X			KPA	All data are valid without qualification.
	AAB9265	X			KPA	All data are valid without qualification.
	AAB9267	X			KPA	All data are valid without qualification.
	AAB9448	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB9451	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB9454	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
19880	AAB9248	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB9251	X			KPA	All data are valid without qualification.
	AAB9253	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB9254	X			KPA	Uranium data qualified J for low matrix spike recovery.
	AAB9255	X			KPA	All data are valid without qualification.
	AAB9256	X			KPA	All data are valid without qualification.
	AAB9438	X			KPA	All data are valid without qualification.
	AAB9439	X			KPA	All data are valid without qualification.
	AAB9440	X			KPA	Uranium data qualified J for low spike recovery.
	AAB9441	X			KPA	All data are valid without qualification.
19884	AAB6600	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB8701	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample. Uranium data qualified J for low recovery in QC sample.
	AAB8709	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample. Uranium data qualified J for low recovery in QC sample.
19886	AAB9422	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample. Uranium data qualified J for low recovery in matrix spike sample.
	AAB9424	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample. Uranium data qualified J for low recovery in matrix spike sample.
	AAB9427	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample. Uranium data qualified J for low recovery in matrix spike sample.
19887	AAB9235	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample. Uranium data qualified J for low recovery in matrix spike sample.
	AAB9236	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample. Uranium data qualified J for low recovery in matrix spike sample.
	AAB9242	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample. Uranium data qualified J for low recovery in matrix spike sample.
	AAB9246	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample. Uranium data qualified J for low recovery in matrix spike sample.
	AAB9247	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample. Uranium data qualified J for low recovery in matrix spike sample.

TABLE B-1 (CONTINUED)

DATA QUALITY EVALUATION FOR TA-10 SUBSURFACE AGGREGATE RADIONUCLIDE ANALYSES

REQUEST NUMBER	SAMPLE ID	STRONTIUM-90	GAMMA SPECTROSCOPY	ISOTOPIC URANIUM	TOTAL URANIUM	COMMENTS
19809 continued	AAB6565	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample. Total uranium data qualified J for high recovery in laboratory control sample and a low recovery in QC sample.
	AAB6566	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample. Total uranium data qualified J for high recovery in laboratory control sample and a low recovery in QC sample.
	AAB8647	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample. Total uranium data qualified J for high recovery in laboratory control sample and a low recovery in QC sample.
	AAB8651	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample. Total uranium data qualified J for high recovery in laboratory control sample and a low recovery in QC sample.
	AAB8652	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample. Total uranium data qualified J for high recovery in laboratory control sample and a low recovery in QC sample.
19811	AAB6587	X			KPA	All data are valid without qualification.
	AAB6588	X			KPA	All data are valid without qualification.
	AAB6589	X			KPA	All data are valid without qualification.
	AAB6594	X			KPA	All data are valid without qualification.
	AAB8653	X			KPA	All data are valid without qualification.
	AAB8661	X			KPA	All data are valid without qualification.
	AAB8665	X			KPA	All data are valid without qualification.
	AAB8666	X			KPA	All data are valid without qualification.
19812	AAB8668	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample.
	AAB8674	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample.
	AAB8678	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample.
	AAB8679	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample.
19814	AAB8680	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample.
	AAB8685	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample.
	AAB8686	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample. Total uranium data qualified J for internal standards outside control limits.
	AAB8687	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample. Total uranium data qualified J for internal standards outside control limits.
	AAB8688	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample.
19815	AAB8691	X			KPA	Strontium-90 and uranium data qualified J for low recovery in QC samples.
	AAB8697	X			KPA	Strontium-90 and uranium data qualified J for low recovery in QC samples.
	AAB8719	X			KPA	Strontium-90 and uranium data qualified J for low recovery in QC samples.
	AAB8722	X			KPA	Strontium-90 and uranium data qualified J for low recovery in QC samples.
	AAB8727	X			KPA	Strontium-90 and uranium data qualified J for low recovery in QC samples.
	AAB8728	X			KPA	Strontium-90 and uranium data qualified J for low recovery in QC samples.

TABLE B-1 (CONTINUED)

DATA QUALITY EVALUATION FOR TA-10 SUBSURFACE AGGREGATE RADIONUCLIDE ANALYSES

REQUEST NUMBER	SAMPLE ID	STRONTIUM-90	GAMMA SPECTROS-COPY	ISOTOPIC URANIUM	TOTAL URANIUM	COMMENTS
19964	AAB2885	X			KPA	All data are valid without qualification.
	AAB2903	X			KPA	All data are valid without qualification.
	AAB2904	X			KPA	All data are valid without qualification.
	AAB2905	X			KPA	All data are valid without qualification.
20012	AAB9337	X	X	X	ICP/MS	Strontium-90 data qualified J for heterogeneity shown in duplicate analysis.
	AAB9341	X	X	X	ICP/MS	Strontium-90 data qualified J for heterogeneity shown in duplicate analysis.
	AAB9342	X	X	X	ICP/MS	Strontium-90 data qualified J for heterogeneity shown in duplicate analysis.
20068	AAB9455	X			KPA	All data are valid without qualification.
	AAB9461	X			KPA	All data are valid without qualification.
	AAB9464	X			KPA	All data are valid without qualification.
	AAB9465	X			KPA	All data are valid without qualification.
20070	AAB9269	X			KPA	All data are valid without qualification.
	AAB9271	X			KPA	All data are valid without qualification.
	AAB9272	X			KPA	All data are valid without qualification.
	AAB9274	X			KPA	All data are valid without qualification.
	AAB9277	X			KPA	All data are valid without qualification.
20073	AAB9498	X			KPA	All data are valid without qualification.
	AAB9506	X			KPA	All data are valid without qualification.
	AAB9509	X			KPA	All data are valid without qualification.
	AAB9511	X			KPA	All data are valid without qualification.
20077	AAB9278	X			KPA	All data are valid without qualification.
	AAB9281	X			KPA	All data are valid without qualification.
	AAB9283	X			KPA	All data are valid without qualification.
	AAB9286	X			KPA	All data are valid without qualification.
	AAB9287	X			KPA	All data are valid without qualification.
	AAB9289	X			KPA	All data are valid without qualification.
	AAB9293	X			KPA	All data are valid without qualification.
	AAB9296	X			KPA	All data are valid without qualification.
	AAB9466	X			KPA	All data are valid without qualification.
	AAB9469	X			KPA	All data are valid without qualification.
	AAB9474	X			KPA	All data are valid without qualification.
	AAB9476	X			KPA	All data are valid without qualification.
	AAB9477	X			KPA	All data are valid without qualification.
	AAB9480	X			KPA	All data are valid without qualification.
	AAB9481	X			KPA	All data are valid without qualification.
	AAB9484	X			KPA	All data are valid without qualification.
	AAB9487	X			KPA	All data are valid without qualification.
	AAB9488	X			KPA	All data are valid without qualification.
	AAB9489	X			KPA	All data are valid without qualification.
	AAB9494	X			KPA	All data are valid without qualification.
	AAB9497	X			KPA	All data are valid without qualification.
20080	AAB9297	X			KPA	All data are valid without qualification.
	AAB9300	X			KPA	All data are valid without qualification.
	AAB9301	X			KPA	All data are valid without qualification.
	AAB9302	X			KPA	All data are valid without qualification.

TABLE B-1 (CONTINUED)

DATA QUALITY EVALUATION FOR TA-10 SUBSURFACE AGGREGATE RADIONUCLIDE ANALYSES

REQUEST NUMBER	SAMPLE ID	STRONTIUM-90	GAMMA SPECTROS-COPY	ISOTOPIC URANIUM	TOTAL URANIUM	COMMENTS
19887 continued	AAB9429	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample. Uranium data qualified J for low recovery in matrix spike sample.
	AAB9433	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike sample. Uranium data qualified J for low recovery in matrix spike sample.
19888	AAB6615	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike and QC samples.
	AAB6617	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike and QC samples.
	AAB6618	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike and QC samples.
	AAB6623	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike and QC samples.
	AAB8641	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike and QC samples.
	AAB8642	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike and QC samples.
19890	AAB8712	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike and QC samples.
	AAB8714	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike and QC samples.
	AAB8715	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike and QC samples.
	AAB9204	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike and QC samples.
	AAB9205	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike and QC samples.
	AAB9209	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike and QC samples.
	AAB9210	X			KPA	Strontium-90 data qualified J for low recovery in matrix spike and QC samples.
19892	AAB6603	X			KPA	Total uranium and strontium-90 data qualified J for low matrix spike recoveries.
	AAB6604	X	X	X	KPA	Total uranium and strontium-90 data qualified J for low matrix spike recoveries.
	AAB6610	X			KPA	Total uranium and strontium-90 data qualified J for low matrix spike recoveries.
	AAB6612	X			KPA	Total uranium and strontium-90 data qualified J for low matrix spike recoveries.
	AAB6614	X			KPA	Total uranium and strontium-90 data qualified J for low matrix spike recoveries.
	AAB9211	X			KPA	Total uranium and strontium-90 data qualified J for low matrix spike recoveries.
	AAB9216	X			KPA	Total uranium and strontium-90 data qualified J for low matrix spike recoveries.
	AAB9222	X			KPA	Total uranium and strontium-90 data qualified J for low matrix spike recoveries.
	AAB9223	X			KPA	Total uranium and strontium-90 data qualified J for low matrix spike recoveries.
	AAB9224	X			KPA	Total uranium and strontium-90 data qualified J for low matrix spike recoveries.
	AAB9227	X	X	X	KPA	Total uranium and strontium-90 data qualified J for low matrix spike recoveries.
	AAB9231	X			KPA	Total uranium and strontium-90 data qualified J for low matrix spike recoveries.
	AAB9234	X			KPA	Total uranium and strontium-90 data qualified J for low matrix spike recoveries.

TABLE B-1 (CONTINUED)

DATA QUALITY EVALUATION FOR TA-10 SUBSURFACE AGGREGATE RADIONUCLIDE ANALYSES

REQUEST NUMBER	SAMPLE ID	STRONTIUM-90	GAMMA SPECTROSCOPY	ISOTOPIC URANIUM	TOTAL URANIUM	COMMENTS
20113	AAB9327	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in laboratory control and QC samples, respectively.
	AAB9330	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in laboratory control and QC samples, respectively.
	AAB9333	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in laboratory control and QC samples, respectively.
	AAB9336	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in laboratory control and QC samples, respectively.
	AAB9382	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in laboratory control and QC samples, respectively.
	AAB9384	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in laboratory control and QC samples, respectively.
	AAB9539	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in laboratory control and QC samples, respectively.
	AAB9543	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in laboratory control and QC samples, respectively.
20232	AAB9361	X	X	X		Isotopic uranium data qualified J for high recovery in laboratory control sample.
	AAB9364	X	X	X		Isotopic uranium data qualified J for high recovery in laboratory control sample.
20315	AAB2833	X			KPA	All data are valid without qualification.
20325	AAB9360	X			KPA	Strontium-90 and uranium data qualified J for low recoveries in matrix spike and laboratory control samples, respectively.
	AAB9363	X			KPA	Strontium-90 and uranium data qualified J for low recoveries in matrix spike and laboratory control samples, respectively.
20328	AAB9368	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB9397	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB9399	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB9568	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB9571	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB9572	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB9573	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB9576	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
	AAB9580	X			KPA	Strontium-90 data qualified J for low recovery in QC sample.
20332	AAB9351	X			KPA	Strontium-90 and uranium data qualified J for low recoveries in QC sample.
	AAB9354	X			KPA	Strontium-90 and uranium data qualified J for low recoveries in QC sample.

TABLE B-1 (CONTINUED)

DATA QUALITY EVALUATION FOR TA-10 SUBSURFACE AGGREGATE RADIONUCLIDE ANALYSES

REQUEST NUMBER	SAMPLE ID	STRONTIUM-90	GAMMA SPECTROS-COPY	ISOTOPIC URANIUM	TOTAL URANIUM	COMMENTS
20080 continued	AAB9303	X			KPA	All data are valid without qualification.
	AAB9304	X			KPA	All data are valid without qualification.
	AAB9308	X			KPA	All data are valid without qualification.
20082	AAB9310	X			KPA	Uranium data qualified J for low internal standards.
	AAB9313	X			KPA	Uranium data qualified J for low internal standards.
	AAB9315	X			KPA	Uranium data qualified J for low internal standards.
	AAB9512	X			KPA	Uranium data qualified J for low internal standards.
	AAB9513	X			KPA	Uranium data qualified J for low internal standards.
	AAB9514	X			KPA	Uranium data qualified J for low internal standards.
	AAB9517	X			KPA	Uranium data qualified J for low internal standards.
	AAB9520	X			KPA	Uranium data qualified J for low internal standards.
	AAB9523	X			KPA	Uranium data qualified J for low internal standards.
20083	AAB9524	X			KPA	All data are valid without qualification.
	AAB9527	X			KPA	All data are valid without qualification.
	AAB9528	X			KPA	All data are valid without qualification.
	AAB9533	X			KPA	All data are valid without qualification.
	AAB9535	X			KPA	All data are valid without qualification.
20084	AAB9317	X			KPA	All data are valid without qualification.
	AAB9322	X			KPA	All data are valid without qualification.
	AAB9324	X			KPA	All data are valid without qualification.
	AAB9326	X			KPA	All data are valid without qualification.
20086	AAB9369	X			KPA	All data are valid without qualification.
	AAB9375	X			KPA	All data are valid without qualification.
20087	AAB9380	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB9381	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB9385	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB9389	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB9390	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB9392	X			KPA	Uranium data qualified J for low recovery in QC sample.
	AAB9394	X			KPA	Uranium data qualified J for low recovery in QC sample.
20109	AAB9338	X			KPA	Strontium-90 data qualified J for a low recovery in laboratory control sample.
	AAB9339	X			KPA	Strontium-90 data qualified J for a low recovery in laboratory control sample.
20111	AAB9347	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.
	AAB9350	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.
	AAB9544	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.
	AAB9546	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.
	AAB9549	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.
	AAB9554	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.
	AAB9555	X			KPA	Uranium and strontium-90 data qualified J for low recoveries in QC sample.

TABLE B-2

DATA QUALITY EVALUATION FOR ADDITIONAL TA-10 SAMPLES COLLECTED TO FURTHER ASSESS THE PRESENCE OF AMERICIUM-241

REQUEST NUMBER	SAMPLE ID	GAMMA SPECTROSCOPY	ISOTOPIC PLUTONIUM	COMMENTS
2010	0110-96-0001	X	X	All data are valid without qualification.
	0110-96-0002	X	X	All data are valid without qualification.

TABLE B-1 (CONTINUED)

DATA QUALITY EVALUATION FOR TA-10 SUBSURFACE AGGREGATE RADIONUCLIDE ANALYSES

REQUEST NUMBER	SAMPLE ID	STRONTIUM-90	GAMMA SPECTROS-COPY	ISOTOPIC URANIUM	TOTAL URANIUM	COMMENTS
20332 continued	AAB9357	X			KPA	Strontium-90 and uranium data qualified J for low recoveries in QC sample.
	AAB9359	X			KPA	Strontium-90 and uranium data qualified J for low recoveries in QC sample.
	AAB9556	X			KPA	Strontium-90 and uranium data qualified J for low recoveries in QC sample.
	AAB9558	X			KPA	Strontium-90 and uranium data qualified J for low recoveries in QC sample.
	AAB9563	X			KPA	Strontium-90 and uranium data qualified J for low recoveries in QC sample.
	AAB9567	X			KPA	Strontium-90 and uranium data qualified J for low recoveries in QC sample.
20343	AAB6142	X			KPA	All data are valid without qualification.
	AAB6144	X			KPA	All data are valid without qualification.
20370	AAB2973	X			KPA	All data are valid without qualification.
	AAB6215	X			KPA	All data are valid without qualification.
	AAB6222	X			KPA	All data are valid without qualification.
	AAB6226	X	X	X	KPA	All data are valid without qualification.
	AAB6227	X			KPA	All data are valid without qualification.
20438	AAB6122	X			KPA	All data are valid without qualification.

[a] X = Analysis performed. A blank indicates that the sample was not submitted for this analysis.
[b] ICP/MS = Sample was analyzed for total uranium using inductively coupled plasma/mass spectroscopy.
[c] KPA = Sample was analyzed for total uranium using kinetic phosphorescence analysis.
[d] J = Estimated detected quantity.
[e] R = Rejected quantity.

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APPENDIX C RISK ASSESSMENT CALCULATIONS

This appendix contains the risk assessment calculations for all of the risk assessments performed for the TA-10 Subsurface Aggregate. The following sections are included:

- Section C-1: RESRAD Summary Report for the PRS 10-002(b) Current Recreational Scenario
- Section C-2: RESRAD Summary Report for the PRS 10-002(b) Future Residential Scenario
- Section C-3: RESRAD Summary Report for the PRSs 10-003(a-o) and 10-007 Current Recreational Scenario
- Section C-4: RESRAD Summary Report for the PRSs 10-003(a-o) and 10-007 Future Residential Scenario
- Section C-5: RESRAD Summary Report for the Site-Wide Future Recreational Scenario

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SECTION C-1 RESRAD SUMMARY REPORT FOR THE PRS 10-002(B) CURRENT RECREATIONAL SCENARIO

Dose Conversion Factor (and Related) Parameter Summary
File: DOSFAC.BIN

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Sr-90+D	1.310E-03	1.310E-03	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Sr-90+D	1.530E-04	1.530E-04	DCF3(1)
D-34	Food transfer factors:			
D-34	Sr-90+D , plant/soil concentration ratio, dimensionless	3.000E-01	3.000E-01	RTF(1,1)
D-34	Sr-90+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,2)
D-34	Sr-90+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Sr-90+D , fish	6.000E+01	6.000E+01	BIOFAC(1,1)
D-5	Sr-90+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	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, 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)
R015	Unsat. zone 2, thickness (m)	not used	0.000E+00	---	H(2)
R015	Unsat. zone 2, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(2)
R015	Unsat. zone 2, total porosity	not used	4.000E-01	---	TPUZ(2)
R015	Unsat. zone 2, effective porosity	not used	2.000E-01	---	EPUZ(2)
R015	Unsat. zone 2, soil-specific b parameter	not used	5.300E+00	---	BUZ(2)
R015	Unsat. zone 2, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(2)
R016	Distribution coefficients for Sr-90				
R016	Contaminated zone (cm**3/g)	3.600E+01	3.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	3.000E+01	---	DCNUCU(1,1)
R016	Unsaturated zone 2 (cm**3/g)	not used	3.000E+01	---	DCNUCU(1,2)
R016	Saturated zone (cm**3/g)	not used	3.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.071E-06	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	2.000E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	2.000E-03	2.000E-04	---	MLINH
R017	Dilution length for airborne dust, inhalation (m)	3.000E+00	3.000E+00	---	LM
R017	Exposure duration	9.000E+00	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	not used	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)	3.900E-02	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	not used	1.000E+00	1 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

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	3.000E+01	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.300E+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)	1.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E-03	1.000E+00	---	T(2)
R011	Times for calculations (yr)	1.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	5.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	5.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	5.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	1.000E+04	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Sr-90	3.400E+02	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Sr-90	not used	0.000E+00	---	W1(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSC
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 effective porosity	2.000E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	4.400E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	4.050E+00	5.300E+00	---	BCZ
R013	Humidity in air (g/cm**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.990E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	4.800E-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	Zero shows Simpson's rule.	EPS
R014	Density of saturated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	3.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.050E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	3.000E-01	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Paramete Name
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
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	not used	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	not used	1.000E+00	---	STOR_T(2)
STOR	Milk	not used	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	not used	2.000E+01	---	STOR_T(4)
STOR	Fish	not used	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	not used	7.000E+00	---	STOR_T(6)
STOR	Well water	not used	1.000E+00	---	STOR_T(7)
STOR	Surface water	not used	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	not used	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
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	---	D'
R021	in foundation material	not used	3.000E-07	---	D1
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 annual wind speed (m/sec)	not used	2.000E+00	---	WIND
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)

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	suppressed
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

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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)
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)	3.650E+01	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	1.000E+00	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
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	---	C12
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
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

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
Sr-90	0.000E+00	0.0000	4.489E-01	0.9951	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.222E-03
Total	0.000E+00	0.0000	4.489E-01	0.9951	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.222E-03

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 Path
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.512E-01
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	4.512E-01

*Sum of all water independent and dependent pathways.

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	30.00 square meters	Sr-90	3.400E+02
Thickness:	1.30 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 15 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E-03	1.000E+00	1.000E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	5.000E+03	1.000E+04
TDOSE(t):	4.512E-01	4.511E-01	4.405E-01	3.556E-01	1.372E-01	4.173E-02	3.054E-06	2.067E-11	0.000E+00	0.000E+00
M(t):	3.008E-02	3.008E-02	2.937E-02	2.371E-02	9.147E-03	2.782E-03	2.036E-07	1.378E-12	0.000E+00	0.000E+00

Maximum TDOSE(t): 4.512E-01 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 = 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
Sr-90	0.000E+00	0.0000	4.384E-01	0.9951	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.169E-03	0.004
Total	0.000E+00	0.0000	4.384E-01	0.9951	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.169E-03	0.004

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
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.405E-01	1.000
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	4.405E-01	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-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	fra
Sr-90	0.000E+00	0.0000	4.489E-01	0.9951	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.221E-03	0.0
Total	0.000E+00	0.0000	4.489E-01	0.9951	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.221E-03	0.0

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathway	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fra
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.511E-01	1.0
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	4.511E-01	1.0

*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 = 5.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Sc
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr
Sr-90	0.000E+00	0.0000	1.365E-01	0.9951	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.756E-0
Total	0.000E+00	0.0000	1.365E-01	0.9951	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.756E-0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pa
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.372E-0
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	1.372E-0

*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	fra
Sr-90	0.000E+00	0.0000	3.538E-01	0.9951	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.751E-03	0.0
Total	0.000E+00	0.0000	3.538E-01	0.9951	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.751E-03	0.0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathway	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fra
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.556E-01	1.0
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	3.556E-01	1.0

*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 = 5.000E+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	fr
Sr-90	0.000E+00	0.0000	3.039E-06	0.9951	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.504E-08	0.
Total	0.000E+00	0.0000	3.039E-06	0.9951	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.504E-08	0.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathwa	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fr
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.054E-06	1.
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	3.05[illegible]6	1.

*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		Soi
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr
Sr-90	0.000E+00	0.0000	4.152E-02	0.9951	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.055E-04
Total	0.000E+00	0.0000	4.152E-02	0.9951	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.055E-04

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pa
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.173E-0
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	4.173E-0

*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	f
Sr-90	0.000E+00	0.0000	2.057E-11	0.9951	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.018E-13	0
Total	0.000E+00	0.0000	2.057E-11	0.9951	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.018E-13	0

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Path
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.067E-11
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.0

*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 = 5.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soi
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00
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

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pat
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00
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

*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+04 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	frac
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
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	0.00

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+04 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	frac
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
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

*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-03	1.000E+00	1.000E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	5.000E+03	1.000E+
Sr-90	Sr-90	1.000E+00	1.327E-03	1.327E-03	1.296E-03	1.046E-03	4.036E-04	1.227E-04	8.982E-09	6.081E-14	0.000E+00	0.000E+

Branch Fraction is the cumulative factor for the j'th 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 = 15 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E-03	1.000E+00	1.000E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	5.000E+03	1.000E
Sr-90	1.130E+04	1.130E+04	1.158E+04	1.434E+04	3.717E+04	1.222E+05	1.670E+09	*1.365E+14	*1.365E+14	*1.365E

*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)
Sr-90	3.400E+02	0.000E+00	1.327E-03	1.130E+04	1.327E-03	1.130E+04

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-03	1.000E+00	1.000E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	5.000E+03	1.000E-
ááááááá	ááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	áááááá
Sr-90	Sr-90	1.000E+00	4.512E-01	4.511E-01	4.405E-01	3.556E-01	1.372E-01	4.173E-02	3.054E-06	2.067E-11	0.000E+00	0.000E-
ëëëëëëë	ëëëëëëë	ëëëëëëëëë	ëëëëëëëëë	ëëëëëëëëë	ëëëëëëëëë	ëëëëëëëëë	ëëëëëëëëë	ëëëëëëëëë	ëëëëëëëëë	ëëëëëëëëë	ëëëëëëëëë	ëëëëëë

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-03	1.000E+00	1.000E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	5.000E+03	1.000E+
ááááááá	ááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	ááááááááá	áááááá
Sr-90	Sr-90	1.000E+00	3.400E+02	3.400E+02	3.320E+02	2.680E+02	1.034E+02	3.145E+01	2.302E-03	1.558E-08	0.000E+00	0.000E+
ëëëëëëë	ëëëëëëë	ëëëëëëëëë	ëëëëëëëëë	ëëëëëëëëë	ëëëëëëëëë	ëëëëëëëëë	ëëëëëëëëë	ëëëëëëëëë	ëëëëëëëëë	ëëëëëëëëë	ëëëëëëëëë	ëëëëëë

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

TA-10-002(b)

CURRENT RECREATIONAL SCENARIO

HEALTH RISK REPORT

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Part III: Intake Quantities and Health Risk Factors

Cancer Risk Slope Factors 2
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Time= 5.000E+01 11
Time= 1.000E+02 13
Time= 5.000E+02 15
Time= 1.000E+03 17
Time= 5.000E+03 19
Time= 1.000E+04 21

Cancer Risk Slope Factors Summary Table
File: DOSFAC.BIN

Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Sr-90+D	1.90E-08	1.90E-08*	SLPF(1,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Sr-90+D	6.90E-11	6.90E-11	SLPF(1,2)
Sf-3	Ingestion, slope factors, 1/(pCi):			
Sf-3	Sr-90+D	5.60E-11	5.60E-11	SLPF(1,3)

Note: Default values followed by '*' were derived by multiplying the dose conversion factors with 7.6E-7 (risk/mrem). For external radiation, the dose conversion factors used for this derivation were obtained from the EPA's Federal Guidance Report No.12, and for inhalation and ingestion, the dose conversion factors were the ones used in RESRAD default database.

Default values followed by '$' were obtained from 'Estimating Radiogenic Cancer Risks', EPA 402-R-93-076, June, 1994.

Default values followed by '#' were taken from individual radionuclides given in HEAST.

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Sr-90	3.427E+02	0.000E+00	0.000E+00	0.000E+00	1.452E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.452E+01

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Sr-90	0.000E+00	0.0000	2.128E-07	0.9668	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.318E-09	0.0332
Total	0.000E+00	0.0000	2.128E-07	0.9668	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.318E-09	0.0332

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.201E-07	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.201E-07	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	ri	fra
Sr-90	0.000E+00	0.0000	2.128E-07	0.9668	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.318E-09	0.0
Total	0.000E+00	0.0000	2.128E-07	0.9668	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.318E-09	0.0

SECTION C-2 RESRAD SUMMARY REPORT FOR THE PRS 10-002(B) FUTURE RESIDENTIAL SCENARIO

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Dose Conversion Factor (and Related) Parameter Summary
File: DOSFAC.BIN

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Sr-90+D	1.310E-03	1.310E-03	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Sr-90+D	1.530E-04	1.530E-04	DCF3(1)
D-34	Food transfer factors:			
D-34	Sr-90+D , plant/soil concentration ratio, dimensionless	3.000E-01	3.000E-01	RTF(1,1)
D-34	Sr-90+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,2)
D-34	Sr-90+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Sr-90+D , fish	6.000E+01	6.000E+01	BIOFAC(1,1)
D-5	Sr-90+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

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)	1.400E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	6.600E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.500E+01	3.000E+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): Sr-90	3.710E+01	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Sr-90	not used	0.000E+00	---	W1(1)
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 effective porosity	2.000E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	4.400E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	4.050E+00	5.300E+00	---	BCZ
R013	Humidity in air (g/cm**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.990E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	4.800E-01	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)	2.700E+07	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	3.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.050E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	3.000E-01	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parame Name
R015	Unsat. zone 1, thickness (m)	2.000E+02	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.600E+00	1.500E+00	---	DENSUZ(
R015	Unsat. zone 1, total porosity	5.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	4.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	4.050E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	3.000E+00	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Sr-90				
R016	Contaminated zone (cm**3/g)	3.600E+01	3.000E+01	---	DCNUCC(
R016	Unsaturated zone 1 (cm**3/g)	3.600E+01	3.000E+01	---	DCNUCU(
R016	Saturated zone (cm**3/g)	3.600E+01	3.000E+01	---	DCNUCS(
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.130E-06	ALEACH(
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(
R017	Inhalation rate (m**3/yr)	7.300E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	9.000E-05	2.000E-04	---	MLINH
R017	Dilution length for airborne dust, inhalation (m)	3.000E+00	3.000E+00	---	LM
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	not used	7.000E-01	---	SHF[illegible]
R017	Fraction of time spent indoors	8.000E-01	5.000E-01	---	F
R017	Fraction of time spent outdoors (on site)	8.000E-02	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	not used	1.000E+00	1 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_SHAI
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAI
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAI
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAI
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAI
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAI
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAI
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAI
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAI
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAI
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAI
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAI
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	---	F[illegible]
R017	Ring 9	not used	0.000E+00	---	F[illegible]
R017	Ring 10	not used	0.000E+00	---	FRACA(1
R017	Ring 11	not used	0.000E+00	---	FRACA(1
R017	Ring 12	not used	0.000E+00	---	FRACA(1

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Fruits, vegetables and grain consumption (kg/yr)	1.240E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	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)	3.650E+01	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	0.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	0.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	7.000E-02	-1	---	FPLANT
R018	Contamination fraction of meat	7.000E-03	-1	---	FMEAT
R018	Contamination fraction of milk	7.000E-03	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	5.000E+00	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	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	1.000E+00	1.000E+00	---	FGWIR
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
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
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	not used	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	not used	7.000E+00	---	STOR
STOR	Well water	1.000E+00	1.000E+00	---	STOR_
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
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 annual wind speed (m/sec)	not used	2.000E+00	---	WIND
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)

Summary of Pathway Selections

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

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	140.00 square meters	Sr-90	3.710E+01
Thickness:	6.60 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 15 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):	1.701E+01	1.661E+01	1.584E+01	1.341E+01	8.330E+00	1.574E+00	1.347E-02	7.811E-10
M(t):	1.134E+00	1.108E+00	1.056E+00	8.939E-01	5.553E-01	1.049E-01	8.980E-04	5.208E-11

Maximum TDOSE(t): 1.701E+01 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	f
Sr-90	0.000E+00	0.0000	1.019E-02	0.0006	0.000E+00	0.0000	1.644E+01	0.9661	4.168E-01	0.0245	1.239E-01	0.0073	2.553E-02	0
Total	0.000E+00	0.0000	1.019E-02	0.0006	0.000E+00	0.0000	1.644E+01	0.9661	4.168E-01	0.0245	1.239E-01	0.0073	2.553E-02	0

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathw	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	f
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.701E+01	1
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	1.7C l	1

*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	f
Sr-90	0.000E+00	0.0000	9.949E-03	0.0006	0.000E+00	0.0000	1.605E+01	0.9661	4.070E-01	0.0245	1.210E-01	0.0073	2.492E-02	0
Total	0.000E+00	0.0000	9.949E-03	0.0006	0.000E+00	0.0000	1.605E+01	0.9661	4.070E-01	0.0245	1.210E-01	0.0073	2.492E-02	0

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathw	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	f
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.661E+01	1
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	1.6[illegible]1	1

*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	fr
Sr-90	0.000E+00	0.0000	9.487E-03	0.0006	0.000E+00	0.0000	1.530E+01	0.9661	3.881E-01	0.0245	1.154E-01	0.0073	2.377E-02	0.
Total	0.000E+00	0.0000	9.487E-03	0.0006	0.000E+00	0.0000	1.530E+01	0.9661	3.881E-01	0.0245	1.154E-01	0.0073	2.377E-02	0.

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathwa	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fr
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.584E+01	1.
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	1.58	1.

*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	fr
Sr-90	0.000E+00	0.0000	8.031E-03	0.0006	0.000E+00	0.0000	1.295E+01	0.9661	3.285E-01	0.0245	9.768E-02	0.0073	2.012E-02	0.
Total	0.000E+00	0.0000	8.031E-03	0.0006	0.000E+00	0.0000	1.295E+01	0.9661	3.285E-01	0.0245	9.768E-02	0.0073	2.012E-02	0.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathw	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fr
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.341E+01	1.
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	1.34	1.

*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	f
Sr-90	0.000E+00	0.0000	4.989E-03	0.0006	0.000E+00	0.0000	8.048E+00	0.9661	2.041E-01	0.0245	6.068E-02	0.0073	1.250E-02	0
Total	0.000E+00	0.0000	4.989E-03	0.0006	0.000E+00	0.0000	8.048E+00	0.9661	2.041E-01	0.0245	6.068E-02	0.0073	1.250E-02	0

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathw	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	f
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.330E+00	1
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.33[illegible]	1

*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	fra
Sr-90	0.000E+00	0.0000	9.426E-04	0.0006	0.000E+00	0.0000	1.521E+00	0.9661	3.856E-02	0.0245	1.147E-02	0.0073	2.361E-03	0.0
Total	0.000E+00	0.0000	9.426E-04	0.0006	0.000E+00	0.0000	1.521E+00	0.9661	3.856E-02	0.0245	1.147E-02	0.0073	2.361E-03	0.0

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathway	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fra
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.574E+00	1.0
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	1.574E[illegible]	1.0

*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	fr
Sr-90	0.000E+00	0.0000	8.067E-06	0.0006	0.000E+00	0.0000	1.301E-02	0.9661	3.300E-04	0.0245	9.813E-05	0.0073	2.021E-05	0.
Total	0.000E+00	0.0000	8.067E-06	0.0006	0.000E+00	0.0000	1.301E-02	0.9661	3.300E-04	0.0245	9.813E-05	0.0073	2.021E-05	0.

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathwa	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fr
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.347E-02	1.
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	1.3 2	1.

*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	fra
Sr-90	0.000E+00	0.0000	4.678E-13	0.0006	0.000E+00	0.0000	7.547E-10	0.9661	1.914E-11	0.0245	5.690E-12	0.0073	1.172E-12	0.0
Total	0.000E+00	0.0000	4.678E-13	0.0006	0.000E+00	0.0000	7.547E-10	0.9661	1.914E-11	0.0245	5.690E-12	0.0073	1.172E-12	0.0

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathway	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fra
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.811E-10	1.0
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.811E	.0

*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
Sr-90	Sr-90	1.000E+00	4.586E-01	4.478E-01	4.270E-01	3.614E-01	2.245E-01	4.242E-02	3.631E-04	2.105E-11

Branch Fraction is the cumulative factor for the j'th 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 = 15 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
Sr-90	3.271E+01	3.350E+01	3.513E+01	4.150E+01	6.681E+01	3.536E+02	4.131E+04	7.124E+11

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)
Sr-90	3.710E+01	0.000E+00	4.586E-01	3.271E+01	4.586E-01	3.271E+01

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
Sr-90	Sr-90	1.000E+00	1.701E+01	1.661E+01	1.584E+01	1.341E+01	8.330E+00	1.574E+00	1.347E-02	7.811E-10

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
Sr-90	Sr-90	1.000E+00	3.710E+01	3.623E+01	3.454E+01	2.924E+01	1.816E+01	3.432E+00	2.937E-02	1.703E-09

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

TA-10-002(b)

FUTURE RESIDENTIAL SCENARIO

HEALTH RISK REPORT

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Time= 3.000E+01 11
Time= 1.000E+02 13
Time= 3.000E+02 15
Time= 1.000E+03 17

Cancer Risk Slope Factors Summary Table
File: DOSFAC.BIN

Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Sr-90+D	1.90E-08	1.90E-08*	SLPF(1,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Sr-90+D	6.90E-11	6.90E-11	SLPF(1,2)
Sf-3	Ingestion, slope factors, 1/(pCi):			
Sf-3	Sr-90+D	5.60E-11	5.60E-11	SLPF(1,3)

Note: Default values followed by '*' were derived by multiplying the dose conversion factors with 7.6E-7 (risk/mrem). For external radiation, the dose conversion factors used for this derivation were obtained from the EPA's Federal Guidance Report No.12, and for inhalation and ingestion, the dose conversion factors were the ones used in RESRAD default database.

Default values followed by '$' were obtained from 'Estimating Radiogenic Cancer Risks', EPA 402-R-93-076, June, 1994.

Default values followed by '#' were taken from individual radionuclides given in HEAST.

TA-10-003(a-o) and 10-007

CURRENT RECREATIONAL SCENARIO

HEALTH RISK REPORT

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Part III: Intake Quantities and Health Risk Factors

Cancer Risk Slope Factors 2
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Time= 3.000E+01 11
Time= 1.000E+02 13
Time= 3.000E+02 15
Time= 1.000E+03 17

Cancer Risk Slope Factors Summary Table
File: DOSFAC.BIN

Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Sr-90+D	1.90E-08	1.90E-08*	SLPF(1,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Sr-90+D	6.90E-11	6.90E-11	SLPF(1,2)
Sf-3	Ingestion, slope factors, 1/(pCi):			
Sf-3	Sr-90+D	5.60E-11	5.60E-11	SLPF(1,3)

Note: Default values followed by '*' were derived by multiplying the dose conversion factors with 7.6E-7 (risk/mrem). For external radiation, the dose conversion factors used for this derivation were obtained from the EPA's Federal Guidance Report No.12, and for inhalation and ingestion, the dose conversion factors were the ones used in RESRAD default database.

Default values followed by '$' were obtained from 'Estimating Radiogenic Cancer Risks', EPA 402-R-93-076, June, 1994.

Default values followed by '#' were taken from individual radionuclides given in HEAST.

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion
Sr-90	4.821E+01	0.000E+00	0.000E+00	0.000E+00	4.531E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.531E+0

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Sr-90	1.863E-06	0.9137	9.980E-08	0.0490	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.613E-08	0.0373
Total	1.863E-06	0.9137	9.980E-08	0.0490	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.613E-08	0.0373

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.038E-06	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.038E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soi
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk
Sr-90	1.863E-06	0.9137	9.980E-08	0.0490	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.613E-08
Total	1.863E-06	0.9137	9.980E-08	0.0490	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.613E-0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

	Water		Fish		Radon		Plant		Meat		Milk		All pathwa	
Radio-														
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fr
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.038E-06	1.
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.038E-06	1.

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion
Sr-90	4.519E+01	0.000E+00	0.000E+00	0.000E+00	4.247E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.247E+0

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Sr-90	1.773E-06	0.9149	9.354E-08	0.0483	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.135E-08	0.0368
Total	1.773E-06	0.9149	9.354E-08	0.0483	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.135E-08	0.0368

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.938E-06	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.938E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	f
Sr-90	1.773E-06	0.9149	9.354E-08	0.0483	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.135E-08	0
Total	1.773E-06	0.9149	9.354E-08	0.0483	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.135E-08	0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathway:	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	frac
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.938E-06	1.0
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	1.938E-06	1.0

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion
Sr-90	3.948E+01	0.000E+00	0.000E+00	0.000E+00	3.711E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.711E+0

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Sr-90	1.601E-06	0.9175	8.173E-08	0.0468	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.235E-08	0.0357
Total	1.601E-06	0.9175	8.173E-08	0.0468	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.235E-08	0.0357

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.745E-06	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.745E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	[illegible]	f
Sr-90	1.601E-06	0.9175	8.173E-08	0.0468	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.235E-08	0
Total	1.601E-06	0.9175	8.173E-08	0.0468	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.235E-08	0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risi
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.745E-
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	1.745E-

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingest
Sr-90	2.276E+01	0.000E+00	0.000E+00	0.000E+00	2.140E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.140E
Total											

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Sr-90	1.064E-06	0.9276	4.712E-08	0.0411	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.594E-08	0.0313
Total	1.064E-06	0.9276	4.712E-08	0.0411	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.594E-08	0.0313

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.147E-06	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.147E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		So
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk
Sr-90	1.064E-06	0.9276	4.712E-08	0.0411	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.594E-0
Total	1.064E-06	0.9276	4.712E-08	0.0411	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.594E-0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathway	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fra
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.147E-06	1.0
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	1.147E-06	1.0

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestio
Sr-90	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Sr-90	0.000E+00	0.0000	0.000E+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

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Sr-90	0.000E+00	0.0000	0.000E+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

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	r
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00
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

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pat
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00
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

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingesti
Sr-90	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E-

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Sr-90	0.000E+00	0.0000	0.000E+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

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Sr-90	0.000E+00	0.0000	0.000E+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

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soi
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00
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

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathway	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	frac
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
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	0.00

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion
Sr-90	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+0
Total											

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Sr-90	0.000E+00	0.0000	0.000E+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

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Sr-90	0.000E+00	0.0000	0.000E+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

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	f
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00 0
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

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.000
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	0.000

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingesti
Sr-90	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Sr-90	0.000E+00	0.0000	0.000E+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

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Sr-90	0.000E+00	0.0000	0.000E+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

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soi
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00
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

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathway	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fra
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0
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	0.0

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

SECTION C-4 RESRAD SUMMARY REPORT FOR THE PRSS 10-003(A-O) AND 10-007 FUTURE RESIDENTIAL SCENARIO

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Dose Conversion Factor (and Related) Parameter Summary
File: DOSFAC.BIN

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Am-241	4.440E-01	4.440E-01	DCF2(1)
B-1	Np-237+D	5.400E-01	5.400E-01	DCF2(2)
B-1	Sr-90+D	1.310E-03	1.310E-03	DCF2(3)
B-1	Th-229+D	2.160E+00	2.160E+00	DCF2(4)
B-1	U-233	1.350E-01	1.350E-01	DCF2(5)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Am-241	3.640E-03	3.640E-03	DCF3(1)
D-1	Np-237+D	4.440E-03	4.440E-03	DCF3(2)
D-1	Sr-90+D	1.530E-04	1.530E-04	DCF3(3)
D-1	Th-229+D	4.030E-03	4.030E-03	DCF3(4)
D-1	U-233	2.890E-04	2.890E-04	DCF3(5)
D-34	Food transfer factors:			
D-34	Am-241 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(1,1)
D-34	Am-241 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-05	5.000E-05	RTF(1,2)
D-34	Am-241 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-06	2.000E-06	RTF(1,3)
D-34	Np-237+D , plant/soil concentration ratio, dimensionless	2.000E-02	2.000E-02	RTF(2,1)
D-34	Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,2)
D-34	Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(2,3)
D-34	Sr-90+D , plant/soil concentration ratio, dimensionless	3.000E-01	3.000E-01	RTF(3,1)
D-34	Sr-90+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-03	8.000E-03	RTF(3,2)
D-34	Sr-90+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(3,3)
D-34	Th-229+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(4,1)
D-34	Th-229+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(4,2)
D-34	Th-229+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(4,3)
D-34	U-233 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(5,1)
D-34	U-233 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(5,2)
D-34	U-233 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(5,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Am-241 , fish	3.000E+01	3.000E+01	BIOFAC(1,1)
D-5	Am-241 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5	Np-237+D , fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Np-237+D , crustacea and mollusks	4.000E+02	4.000E+02	BIOFAC(2,2)
D-5	Sr-90+D , fish	6.000E+01	6.000E+01	BIOFAC(3,1)
D-5	Sr-90+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)
D-5	Th-229+D , fish	1.000E+02	1.000E+02	BIOFAC(4,1)
D-5	Th-229+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(4,2)
D-5	U-233 , fish	1.000E+01	1.000E+01	BIOFAC(5,1)
D-5	U-233 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(5,2)

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)	1.400E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	6.600E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.500E+01	3.000E+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	1.500E+01	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Sr-90	5.419E+03	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Am-241	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Sr-90	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSC
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 effective porosity	2.000E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	4.400E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	4.050E+00	5.300E+00	---	BCZ
R013	Humidity in air (g/cm**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.990E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	4.800E-01	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)	2.700E+07	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	3.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.050E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	3.000E-01	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Paramet Name
R015	Unsat. zone 1, thickness (m)	2.000E+02	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.600E+00	1.500E+00	---	DENSUZ(1
R015	Unsat. zone 1, total porosity	5.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	4.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	4.050E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	3.000E+00	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Am-241				
R016	Contaminated zone (cm**3/g)	1.300E+02	2.000E+01	---	DCNUCC(1
R016	Unsaturated zone 1 (cm**3/g)	1.300E+02	2.000E+01	---	DCNUCU(1
R016	Saturated zone (cm**3/g)	1.300E+02	2.000E+01	---	DCNUCS(1
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.133E-07	ALEACH(1
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1
R016	Distribution coefficients for Sr-90				
R016	Contaminated zone (cm**3/g)	3.600E+01	3.000E+01	---	DCNUCC(3
R016	Unsaturated zone 1 (cm**3/g)	3.600E+01	3.000E+01	---	DCNUCU(3
R016	Saturated zone (cm**3/g)	3.600E+01	3.000E+01	---	DCNUCS(3
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.130E-06	ALEACH(3
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3
R016	Distribution coefficients for daughter Np-237				
R016	Contaminated zone (cm**3/g)	3.950E-01	-1.000E+00	---	DCNUCC(2
R016	Unsaturated zone 1 (cm**3/g)	3.950E-01	-1.000E+00	---	DCNUCU(2
R016	Saturated zone (cm**3/g)	3.950E-01	-1.000E+00	---	DCNUCS(2
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.730E-05	ALEACH(2
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2
R016	Distribution coefficients for daughter Th-229				
R016	Contaminated zone (cm**3/g)	5.000E+02	6.000E+04	---	DCNUCC(4
R016	Unsaturated zone 1 (cm**3/g)	5.000E+02	6.000E+04	---	DCNUCU(4
R016	Saturated zone (cm**3/g)	5.000E+02	6.000E+04	---	DCNUCS(4
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.150E-08	ALEACH(4
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4
R016	Distribution coefficients for daughter U-233				
R016	Contaminated zone (cm**3/g)	7.290E+00	5.000E+01	---	DCNUCC(5
R016	Unsaturated zone 1 (cm**3/g)	7.290E+00	5.000E+01	---	DCNUCU(5
R016	Saturated zone (cm**3/g)	7.290E+00	5.000E+01	---	DCNUCS(5
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.536E-06	ALEACH(5
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5
R017	Inhalation rate (m**3/yr)	7.300E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	9.000E-05	2.000E-04	---	MLINH
R017	Dilution length for airborne dust, inhalation (m)	3.000E+00	3.000E+00	---	LM
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	8.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	8.000E-02	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	1 shows circular AREA.	FS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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
R017	Ring 7	not used	0.000E+00	---	FRACA
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)	1.240E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	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)	3.650E+01	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	0.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	0.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	7.000E-02	-1	---	FPLANT
R018	Contamination fraction of meat	7.000E-03	-1	---	FMEAT
R018	Contamination fraction of milk	7.000E-03	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	5.000E+00	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	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	1.000E+00	1.000E+00	---	FGWIR
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
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
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_
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	not used	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	not used	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	---	FLOOR
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 annual wind speed (m/sec)	not used	2.000E+00	---	WIND
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)

Summary of Pathway Selections

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

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	140.00 square meters	Am-241	1.500E+01
Thickness:	6.60 meters	Sr-90	5.419E+03
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 15 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):	2.570E+03	2.509E+03	2.393E+03	2.026E+03	1.259E+03	2.396E+02	3.598E+00	5.124E-01
M(t):	1.713E+02	1.673E+02	1.595E+02	1.351E+02	8.396E+01	1.598E+01	2.399E-01	3.416E-02

Maximum TDOSE(t): 2.570E+03 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	f
Am-241	3.571E-01	0.0001	1.396E+00	0.0005	0.000E+00	0.0000	5.306E-01	0.0002	6.856E-04	0.0000	3.912E-05	0.0000	2.455E-01	0
Sr-90	8.216E+01	0.0320	1.488E+00	0.0006	0.000E+00	0.0000	2.401E+03	0.9343	6.088E+01	0.0237	1.810E+01	0.0070	3.728E+00	0
Total	8.252E+01	0.0321	2.884E+00	0.0011	0.000E+00	0.0000	2.401E+03	0.9345	6.089E+01	0.0237	1.810E+01	0.0070	3.974E+00	0

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathw	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	f
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	2.530E+00	0
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.567E+03	0
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.570E+03	1

*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	frac
Am-241	3.565E-01	0.0001	1.394E+00	0.0006	0.000E+00	0.0000	5.297E-01	0.0002	6.845E-04	0.0000	3.906E-05	0.0000	2.451E-01	0.00
Sr-90	8.023E+01	0.0320	1.453E+00	0.0006	0.000E+00	0.0000	2.344E+03	0.9343	5.945E+01	0.0237	1.768E+01	0.0070	3.641E+00	0.00
Total	8.058E+01	0.0321	2.847E+00	0.0011	0.000E+00	0.0000	2.345E+03	0.9345	5.945E+01	0.0237	1.768E+01	0.0070	3.886E+00	0.00

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	frac
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	2.526E+00	0.00
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.507E[illegible]	0.99
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.509E+03	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 = 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	fra
Am-241	3.554E-01	0.0001	1.390E+00	0.0006	0.000E+00	0.0000	5.281E-01	0.0002	6.824E-04	0.0000	3.893E-05	0.0000	2.443E-01	0.0
Sr-90	7.650E+01	0.0320	1.386E+00	0.0006	0.000E+00	0.0000	2.235E+03	0.9342	5.669E+01	0.0237	1.686E+01	0.0070	3.471E+00	0.0
Total	7.685E+01	0.0321	2.775E+00	0.0012	0.000E+00	0.0000	2.236E+03	0.9344	5.669E+01	0.0237	1.686E+01	0.0070	3.716E+00	0.0

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathway	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fra
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	2.518E+00	0.0
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.390E+03	0.9
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.393E+03	1.0

*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	3.514E-01	0.0002	1.374E+00	0.0007	0.000E+00	0.0000	5.222E-01	0.0003	6.749E-04	0.0000	3.850E-05	0.0000	2.416E-01	0.0001
Sr-90	6.475E+01	0.0320	1.173E+00	0.0006	0.000E+00	0.0000	1.892E+03	0.9340	4.799E+01	0.0237	1.427E+01	0.0070	2.939E+00	0.0015
Total	6.511E+01	0.0321	2.547E+00	0.0013	0.000E+00	0.0000	1.893E+03	0.9343	4.799E+01	0.0237	1.427E+01	0.0070	3.180E+00	0.0016

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	2.490E+00	0.0012
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.023E+03	88
tal	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.026E+03	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	fra
Am-241	3.404E-01	0.0003	1.331E+00	0.0011	0.000E+00	0.0000	5.058E-01	0.0004	6.539E-04	0.0000	3.728E-05	0.0000	2.340E-01	0.0
Sr-90	4.023E+01	0.0319	7.287E-01	0.0006	0.000E+00	0.0000	1.175E+03	0.9334	2.981E+01	0.0237	8.863E+00	0.0070	1.825E+00	0.0
Total	4.057E+01	0.0322	2.059E+00	0.0016	0.000E+00	0.0000	1.176E+03	0.9338	2.981E+01	0.0237	8.863E+00	0.0070	2.059E+00	0.0

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathway	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fra
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	2.412E+00	0.0
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.257E[illegible]	0.9
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	1.259E+03	1.0

*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	f
Am-241	3.044E-01	0.0013	1.189E+00	0.0050	0.000E+00	0.0000	4.523E-01	0.0019	5.856E-04	0.0000	3.333E-05	0.0000	2.091E-01	0
Sr-90	7.601E+00	0.0317	1.377E-01	0.0006	0.000E+00	0.0000	2.221E+02	0.9268	5.633E+00	0.0235	1.675E+00	0.0070	3.449E-01	0
Total	7.905E+00	0.0330	1.327E+00	0.0055	0.000E+00	0.0000	2.226E+02	0.9287	5.633E+00	0.0235	1.675E+00	0.0070	5.541E-01	0

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathw	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	f
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	2.156E+00	0
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.3[illegible]02	0
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.396E+02	1

*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	fr
Am-241	2.214E-01	0.0615	8.630E-01	0.2399	0.000E+00	0.0000	3.289E-01	0.0914	4.279E-04	0.0001	2.420E-05	0.0000	1.518E-01	0.
Sr-90	6.505E-02	0.0181	1.178E-03	0.0003	0.000E+00	0.0000	1.901E+00	0.5283	4.820E-02	0.0134	1.433E-02	0.0040	2.952E-03	0.
Total	2.864E-01	0.0796	8.642E-01	0.2402	0.000E+00	0.0000	2.230E+00	0.6197	4.863E-02	0.0135	1.436E-02	0.0040	1.547E-01	0.

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathwa	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fr
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	1.566E+00	0.
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.033[illegible]	0.
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	3.598E+00	1.

*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	frac
Am-241	7.314E-02	0.1428	2.810E-01	0.5484	0.000E+00	0.0000	1.087E-01	0.2121	1.462E-04	0.0003	7.918E-06	0.0000	4.941E-02	0.09
Sr-90	3.772E-09	0.0000	6.833E-11	0.0000	0.000E+00	0.0000	1.102E-07	0.0000	2.795E-09	0.0000	8.312E-10	0.0000	1.712E-10	0.00
Total	7.314E-02	0.1428	2.810E-01	0.5484	0.000E+00	0.0000	1.087E-01	0.2121	1.462E-04	0.0003	7.919E-06	0.0000	4.941E-02	0.09

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	frac
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	5.124E-01	1.00
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.179E-	.00
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	5.124E-01	1.00

*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	1.687E-01	1.684E-01	1.679E-01	1.660E-01	1.608E-01	1.437E-01	1.042E-01	3.392E-02
Am-241	Np-237	1.000E+00	0.000E+00	5.117E-07	1.531E-06	5.073E-06	1.497E-05	4.706E-05	1.201E-04	2.412E-04
Am-241	U-233	1.000E+00	0.000E+00	2.931E-14	2.467E-13	2.666E-12	2.356E-11	2.511E-10	2.027E-09	1.601E-08
Am-241	Th-229	1.000E+00	0.000E+00	3.056E-17	8.185E-16	3.016E-14	8.067E-13	2.896E-11	7.172E-10	2.013E-08
Am-241	dDSR(j)		1.687E-01	1.684E-01	1.679E-01	1.660E-01	1.608E-01	1.437E-01	1.044E-01	3.416E-02
Sr-90	Sr-90	1.000E+00	4.737E-01	4.626E-01	4.411E-01	3.734E-01	2.320E-01	4.383E-02	3.751E-04	2.175E-11

Branch Fraction is the cumulative factor for the j'th 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 = 15 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	8.893E+01	8.907E+01	8.936E+01	9.036E+01	9.330E+01	1.044E+02	1.437E+02	4.391E+02
Sr-90	3.166E+01	3.243E+01	3.401E+01	4.017E+01	6.467E+01	3.423E+02	3.999E+04	6.896E+11

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	1.500E+01	0.000E+00	1.687E-01	8.893E+01	1.687E-01	8.893E+01
Sr-90	5.419E+03	0.000E+00	4.737E-01	3.166E+01	4.737E-01	3.166E+01

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	2.530E+00	2.526E+00	2.518E+00	2.490E+00	2.411E+00	2.155E+00	1.564E+00	5.088E-01
Np-237	Am-241	1.000E+00	0.000E+00	7.675E-06	2.297E-05	7.610E-05	2.245E-04	7.058E-04	1.802E-03	3.618E-03
U-233	Am-241	1.000E+00	0.000E+00	4.397E-13	3.701E-12	3.999E-11	3.534E-10	3.766E-09	3.040E-08	2.402E-07
Th-229	Am-241	1.000E+00	0.000E+00	4.585E-16	1.228E-14	4.524E-13	1.210E-11	4.344E-10	1.076E-08	3.019E-07
Sr-90	Sr-90	1.000E+00	2.567E+03	2.507E+03	2.390E+03	2.023E+03	1.257E+03	2.375E+02	2.033E+00	1.179E-07

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	1.500E+01	1.498E+01	1.493E+01	1.476E+01	1.430E+01	1.278E+01	9.270E+00	3.016E+00
Np-237	Am-241	1.000E+00	0.000E+00	4.854E-06	1.454E-05	4.818E-05	1.421E-04	4.469E-04	1.141E-03	2.291E-03
U-233	Am-241	1.000E+00	0.000E+00	1.062E-11	9.545E-11	1.056E-09	9.400E-09	1.004E-07	8.113E-07	6.412E-06
Th-229	Am-241	1.000E+00	0.000E+00	3.344E-16	9.017E-15	3.329E-13	8.909E-12	3.199E-10	7.922E-09	2.223E-07
Sr-90	Sr-90	1.000E+00	5.419E+03	5.292E+03	5.046E+03	4.271E+03	2.653E+03	5.013E+02	4.290E+00	2.488E-07

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

TA-10-003(a-o) and 10-007

FUTURE RESIDENTIAL SCENARIO

HEALTH RISK REPORT

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Cancer Risk Slope Factors Summary Table
File: DOSFAC.BIN

Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Am-241	4.60E-09	4.60E-09	SLPF(1,1)
Sf-1	Np-237+D	4.60E-07	4.60E-07	SLPF(2,1)
Sf-1	Sr-90+D	1.90E-08	1.90E-08*	SLPF(3,1)
Sf-1	Th-229+D	6.00E-07	6.00E-07	SLPF(4,1)
Sf-1	U-233	3.50E-11	3.50E-11	SLPF(5,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Am-241	3.90E-08	3.90E-08	SLPF(1,2)
Sf-2	Np-237+D	3.50E-08	3.50E-08	SLPF(2,2)
Sf-2	Sr-90+D	6.90E-11	6.90E-11	SLPF(3,2)
Sf-2	Th-229+D	8.30E-08	8.30E-08	SLPF(4,2)
Sf-2	U-233	1.40E-08	1.40E-08	SLPF(5,2)
Sf-3	Ingestion, slope factors, 1/(pCi):			
Sf-3	Am-241	3.30E-10	3.30E-10	SLPF(1,3)
Sf-3	Np-237+D	3.00E-10	3.00E-10	SLPF(2,3)
Sf-3	Sr-90+D	5.60E-11	5.60E-11	SLPF(3,3)
Sf-3	Th-229+D	3.60E-10	3.60E-10	SLPF(4,3)
Sf-3	U-233	4.50E-11	4.50E-11	SLPF(5,3)

Note: Default values followed by '*' were derived by multiplying the dose conversion factors with 7.6E-7 (risk/mrem). For external radiation, the dose conversion factors used for this derivation were obtained from the EPA's Federal Guidance Report No.12, and for inhalation and ingestion, the dose conversion factors were the ones used in RESRAD default database.

Default values followed by '$' were obtained from 'Estimating Radiogenic Cancer Risks', EPA 402-R-93-076, June, 1994.

Default values followed by '#' were taken from individual radionuclides given in HEAST.

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion
Am-241	3.145E+00	1.458E+02	1.884E-01	1.075E-02	6.745E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.134E+0
Np-237	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+0
Sr-90	1.136E+03	1.569E+07	3.979E+05	1.183E+05	2.437E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.623E+0
Th-229	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+0
U-233	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+0

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Am-241	1.128E-06	0.0000	3.679E-06	0.0001	1.443E-06	0.0000	1.865E-09	0.0000	1.064E-10	0.0000	6.678E-07	0.0000
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	1.904E-03	0.0652	2.352E-06	0.0001	2.636E-02	0.9033	6.685E-04	0.0229	1.988E-04	0.0068	4.094E-05	0.0014
Th-229	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-233	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.905E-03	0.0653	6.031E-06	0.0002	2.636E-02	0.9034	6.685E-04	0.0229	1.988E-04	0.0068	4.161E-05	0.0014

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	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	6.920E-06	0.0002
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.918E-02	0.9998
Th-229	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-233	0.000E+00	0.0000	0.000E+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	2.918E-02	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	f
Am-241	1.128E-06	0.0000	3.679E-06	0.0001	0.000E+00	0.0000	1.443E-06	0.0000	1.865E-09	0.0000	1.064E-10	0.0000	6.678E-07	0
Sr-90	1.904E-03	0.0652	2.352E-06	0.0001	0.000E+00	0.0000	2.636E-02	0.9033	6.685E-04	0.0229	1.988E-04	0.0068	4.094E-05	0
Total	1.905E-03	0.0653	6.031E-06	0.0002	0.000E+00	0.0000	2.636E-02	0.9034	6.685E-04	0.0229	1.988E-04	0.0068	4.161E-05	0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathw	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	f
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	6.920E-06	0
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.91[illegible]2	0
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.918E-02	1

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Am-241	3.140E+00	1.455E+02	1.881E-01	1.073E-02	6.734E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.131E+02
Np-237	1.018E-06	9.398E-04	4.007E-06	2.515E-08	2.183E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.656E-04
Sr-90	1.109E+03	1.532E+07	3.886E+05	1.155E+05	2.379E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.585E+07
Th-229	7.010E-17	4.340E-15	1.854E-17	7.080E-19	1.504E-15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.863E-15
U-233	2.226E-12	3.996E-10	2.564E-12	3.737E-12	4.774E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.536E-10

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Am-241	1.126E-06	0.0000	3.673E-06	0.0001	1.441E-06	0.0001	1.862E-09	0.0000	1.062E-10	0.0000	6.667E-07	0.0000
Np-237	3.560E-11	0.0000	1.069E-12	0.0000	8.458E-12	0.0000	3.606E-14	0.0000	2.263E-16	0.0000	1.965E-13	0.0000
Sr-90	1.859E-03	0.0652	2.296E-06	0.0001	2.574E-02	0.9033	6.528E-04	0.0229	1.941E-04	0.0068	3.998E-05	0.0014
Th-229	3.189E-21	0.0000	1.745E-22	0.0000	4.688E-23	0.0000	2.003E-25	0.0000	7.647E-27	0.0000	1.624E-23	0.0000
U-233	6.052E-21	0.0000	9.349E-19	0.0000	5.395E-19	0.0000	3.461E-21	0.0000	5.045E-21	0.0000	6.446E-20	0.0000
Total	1.860E-03	0.0653	5.970E-06	0.0002	2.574E-02	0.9034	6.528E-04	0.0229	1.941E-04	0.0068	4.064E-05	0.0014

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	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	6.909E-06	0.0002
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.536E-11	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.849E-02	0.9998
Th-229	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.426E-21	0.0000
U-233	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.553E-18	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	2.850E-02	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk
Am-241	1.126E-06	0.0000	3.673E-06	0.0001	0.000E+00	0.0000	1.441E-06	0.0001	1.862E-09	0.0000	1.062E-10	0.0000	6.667E-07
Sr-90	1.859E-03	0.0652	2.296E-06	0.0001	0.000E+00	0.0000	2.574E-02	0.9033	6.528E-04	0.0229	1.941E-04	0.0068	3.998E-05
Total	1.860E-03	0.0653	5.970E-06	0.0002	0.000E+00	0.0000	2.574E-02	0.9034	6.528E-04	0.0229	1.941E-04	0.0068	4.064E-05

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All path
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk
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	6.909E-06
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2. [illegible] -02
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.850E-02

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion
Am-241	3.130E+00	1.451E+02	1.875E-01	1.070E-02	6.713E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.124E+0
Np-237	3.048E-06	2.811E-03	1.196E-05	7.508E-08	6.538E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.889E-0
Sr-90	1.058E+03	1.461E+07	3.705E+05	1.102E+05	2.269E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.511E+0
Th-229	1.890E-15	9.596E-14	3.030E-16	2.376E-17	4.055E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.368E-1
U-233	2.001E-11	2.737E-09	1.407E-11	2.690E-11	4.292E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.208E-0

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Am-241	1.122E-06	0.0000	3.662E-06	0.0001	1.436E-06	0.0001	1.856E-09	0.0000	1.059E-10	0.0000	6.646E-07	0.0000
Np-237	1.066E-10	0.0000	3.200E-12	0.0000	2.530E-11	0.0000	1.076E-13	0.0000	6.757E-16	0.0000	5.884E-13	0.0000
Sr-90	1.772E-03	0.0652	2.190E-06	0.0001	2.454E-02	0.9033	6.225E-04	0.0229	1.851E-04	0.0068	3.812E-05	0.0014
Th-229	8.599E-20	0.0000	4.707E-21	0.0000	1.036E-21	0.0000	3.272E-24	0.0000	2.566E-25	0.0000	4.379E-22	0.0000
U-233	5.440E-20	0.0000	8.404E-18	0.0000	3.695E-18	0.0000	1.900E-20	0.0000	3.631E-20	0.0000	5.794E-19	0.0000
Total	1.774E-03	0.0653	5.851E-06	0.0002	2.455E-02	0.9034	6.225E-04	0.0229	1.851E-04	0.0068	3.878E-05	0.0014

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	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	6.887E-06	0.0003
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.358E-10	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.717E-02	0.9997
Th-229	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.217E-20	0.0000
U-233	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.279E-17	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	2.717E-02	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk
Am-241	1.122E-06	0.0000	3.662E-06	0.0001	0.000E+00	0.0000	1.436E-06	0.0001	1.856E-09	0.0000	1.059E-10	0.0000	6.646E-07
Sr-90	1.772E-03	0.0652	2.190E-06	0.0001	0.000E+00	0.0000	2.454E-02	0.9033	6.225E-04	0.0229	1.851E-04	0.0068	3.812E-05
Total	1.774E-03	0.0653	5.851E-06	0.0002	0.000E+00	0.0000	2.455E-02	0.9034	6.225E-04	0.0229	1.851E-04	0.0068	3.878E-05

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All path
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk
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	6.887E-06
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.7[illegible]2
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.717E-02

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestio
Am-241	3.095E+00	1.434E+02	1.854E-01	1.058E-02	6.638E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.100E+
Np-237	1.010E-05	9.312E-03	3.957E-05	2.485E-07	2.166E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.569E-
Sr-90	8.954E+02	1.237E+07	3.136E+05	9.325E+04	1.921E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.279E+
Th-229	6.979E-14	3.322E-12	9.066E-15	6.726E-16	1.497E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.828E-
U-233	2.215E-10	2.699E-08	1.211E-10	2.718E-10	4.750E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.213E-

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Am-241	1.110E-06	0.0000	3.621E-06	0.0002	1.420E-06	0.0001	1.835E-09	0.0000	1.047E-10	0.0000	6.571E-07	0.0000
Np-237	3.533E-10	0.0000	1.060E-11	0.0000	8.381E-11	0.0000	3.561E-13	0.0000	2.237E-15	0.0000	1.950E-12	0.0000
Sr-90	1.500E-03	0.0652	1.854E-06	0.0001	2.078E-02	0.9033	5.269E-04	0.0229	1.567E-04	0.0068	3.227E-05	0.0014
Th-229	3.175E-18	0.0000	1.738E-19	0.0000	3.587E-20	0.0000	9.791E-23	0.0000	7.264E-24	0.0000	1.617E-20	0.0000
U-233	6.021E-19	0.0000	9.301E-17	0.0000	3.643E-17	0.0000	1.635E-19	0.0000	3.669E-19	0.0000	6.413E-18	0.0000
Total	1.502E-03	0.0653	5.474E-06	0.0002	2.078E-02	0.9033	5.269E-04	0.0229	1.567E-04	0.0068	3.292E-05	0.0014

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	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	6.810E-06	0.0003
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.501E-10	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.300E-02	0.9997
Th-229	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.401E-18	0.0000
U-233	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.370E-16	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	2.300E-02	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		S
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk
Am-241	1.110E-06	0.0000	3.621E-06	0.0002	0.000E+00	0.0000	1.420E-06	0.0001	1.835E-09	0.0000	1.047E-10	0.0000	6.572E-
Sr-90	1.500E-03	0.0652	1.854E-06	0.0001	0.000E+00	0.0000	2.078E-02	0.9033	5.269E-04	0.0229	1.567E-04	0.0068	3.227E-
Total	1.502E-03	0.0653	5.474E-06	0.0002	0.000E+00	0.0000	2.078E-02	0.9033	5.269E-04	0.0229	1.567E-04	0.0068	3.292E-

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All p
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk
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	6.810E-
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	[illegible]00E-
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.300E-

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+01 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingesti
Am-241	2.997E+00	1.389E+02	1.795E-01	1.024E-02	6.428E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.034E
Np-237	2.979E-05	2.747E-02	1.167E-04	7.329E-07	6.391E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.822E
Sr-90	5.562E+02	7.683E+06	1.948E+05	5.793E+04	1.193E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.948E
Th-229	1.868E-12	8.733E-11	2.297E-13	1.662E-14	4.006E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.276E
U-233	1.971E-09	2.317E-07	9.901E-10	2.353E-09	4.227E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.774E

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Am-241	1.075E-06	0.0001	3.506E-06	0.0002	1.375E-06	0.0001	1.777E-09	0.0000	1.014E-10	0.0000	6.364E-07	0.0000
Np-237	1.042E-09	0.0000	3.128E-11	0.0000	2.472E-10	0.0000	1.050E-12	0.0000	6.596E-15	0.0000	5.752E-12	0.0000
Sr-90	9.321E-04	0.0652	1.151E-06	0.0001	1.291E-02	0.9031	3.273E-04	0.0229	9.732E-05	0.0068	2.004E-05	0.0014
Th-229	8.496E-17	0.0000	4.650E-18	0.0000	9.431E-19	0.0000	2.480E-21	0.0000	1.794E-22	0.0000	4.326E-19	0.0000
U-233	5.358E-18	0.0000	8.277E-16	0.0000	3.128E-16	0.0000	1.337E-18	0.0000	3.176E-18	0.0000	5.707E-17	0.0000
Total	9.332E-04	0.0653	4.658E-06	0.0003	1.291E-02	0.9032	3.273E-04	0.0229	9.732E-05	0.0068	2.068E-05	0.0014

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	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	6.595E-06	0.0005
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.328E-09	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.429E-02	0.9995
Th-229	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.098E-17	0.0000
U-233	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.208E-15	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	1.429E-02	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	f
Am-241	1.076E-06	0.0001	3.506E-06	0.0002	0.000E+00	0.0000	1.376E-06	0.0001	1.778E-09	0.0000	1.014E-10	0.0000	6.364E-07	0
Sr-90	9.321E-04	0.0652	1.151E-06	0.0001	0.000E+00	0.0000	1.291E-02	0.9031	3.273E-04	0.0229	9.732E-05	0.0068	2.004E-05	0
Total	9.332E-04	0.0653	4.658E-06	0.0003	0.000E+00	0.0000	1.291E-02	0.9032	3.273E-04	0.0229	9.732E-05	0.0068	2.068E-05	0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathw	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fi
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	6.596E-06	0
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.42[illegible]	0.
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	1.429E-02	1.

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Am-241	2.679E+00	1.242E+02	1.604E-01	9.154E-03	5.746E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.818E+02
Np-237	9.368E-05	8.636E-02	3.669E-04	2.304E-06	2.009E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.874E-02
Sr-90	1.051E+02	1.452E+06	3.681E+04	1.095E+04	2.254E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.502E+06
Th-229	6.706E-11	3.117E-09	8.096E-12	5.799E-13	1.438E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.564E-09
U-233	2.106E-08	2.445E-06	1.025E-08	2.489E-08	4.517E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.932E-06

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Am-241	9.605E-07	0.0004	3.134E-06	0.0012	1.229E-06	0.0005	1.588E-09	0.0000	9.062E-11	0.0000	5.688E-07	0.0002
Np-237	3.277E-09	0.0000	9.837E-11	0.0000	7.773E-10	0.0000	3.302E-12	0.0000	2.074E-14	0.0000	1.809E-11	0.0000
Sr-90	1.761E-04	0.0651	2.176E-07	0.0001	2.439E-03	0.9016	6.185E-05	0.0229	1.839E-05	0.0068	3.787E-06	0.0014
Th-229	3.050E-15	0.0000	1.670E-16	0.0000	3.366E-17	0.0000	8.744E-20	0.0000	6.263E-21	0.0000	1.553E-17	0.0000
U-233	5.725E-17	0.0000	8.844E-15	0.0000	3.300E-15	0.0000	1.384E-17	0.0000	3.361E-17	0.0000	6.098E-16	0.0000
Total	1.771E-04	0.0655	3.352E-06	0.0012	2.440E-03	0.9020	6.185E-05	0.0229	1.839E-05	0.0068	4.356E-06	0.0016

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	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	5.894E-06	0.0022
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.174E-09	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.699E-03	0.9978
Th-229	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.267E-15	0.0000
U-233	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.286E-14	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	2.705E-03	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fra
Am-241	9.638E-07	0.0004	3.134E-06	0.0012	0.000E+00	0.0000	1.230E-06	0.0005	1.592E-09	0.0000	9.064E-11	0.0000	5.688E-07	0.0
Sr-90	1.761E-04	0.0651	2.176E-07	0.0001	0.000E+00	0.0000	2.439E-03	0.9016	6.185E-05	0.0229	1.839E-05	0.0068	3.787E-06	0.0
Total	1.771E-04	0.0655	3.352E-06	0.0012	0.000E+00	0.0000	2.440E-03	0.9020	6.185E-05	0.0229	1.839E-05	0.0068	4.356E-06	0.0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathway	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fra
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	5.898E-06	0.0
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.699[illegible]	0.99
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.705E-03	1.0

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 3.000E+02 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestic
Am-241	1.943E+00	9.009E+01	1.164E-01	6.642E-03	4.169E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.319E+
Np-237	2.391E-04	2.204E-01	9.364E-04	5.881E-06	5.129E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.265E-
Sr-90	8.995E-01	1.242E+04	3.151E+02	9.368E+01	1.929E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.285E+
Th-229	1.661E-09	7.705E-08	1.995E-10	1.425E-11	3.562E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.129E-
U-233	1.701E-07	1.967E-05	8.204E-08	2.005E-07	3.648E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.360E-

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Am-241	6.969E-07	0.0254	2.274E-06	0.0830	8.919E-07	0.0326	1.152E-09	0.0000	6.575E-11	0.0000	4.127E-07	0.0151
Np-237	8.366E-09	0.0003	2.511E-10	0.0000	1.984E-09	0.0001	8.428E-12	0.0000	5.293E-14	0.0000	4.616E-11	0.0000
Sr-90	1.507E-06	0.0550	1.862E-09	0.0001	2.087E-05	0.7621	5.293E-07	0.0193	1.574E-07	0.0057	3.241E-08	0.0012
Th-229	7.555E-14	0.0000	4.135E-15	0.0000	8.322E-16	0.0000	2.154E-18	0.0000	1.539E-19	0.0000	3.847E-16	0.0000
U-233	4.624E-16	0.0000	7.144E-14	0.0000	2.656E-14	0.0000	1.108E-16	0.0000	2.707E-16	0.0000	4.925E-15	0.0000
Total	2.213E-06	0.0808	2.276E-06	0.0831	2.177E-05	0.7947	5.305E-07	0.0194	1.574E-07	0.0057	4.452E-07	0.0163

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	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	4.277E-06	0.1562
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.066E-08	0.0004
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.310E-05	0.8435
Th-229	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.090E-14	0.0000
U-233	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.038E-13	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	2.739E-05	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fra
Am-241	7.053E-07	0.0258	2.274E-06	0.0830	0.000E+00	0.0000	8.938E-07	0.0326	1.161E-09	0.0000	6.581E-11	0.0000	4.127E-07	0.0
Sr-90	1.507E-06	0.0550	1.862E-09	0.0001	0.000E+00	0.0000	2.087E-05	0.7621	5.293E-07	0.0193	1.574E-07	0.0057	3.241E-08	0.0
Total	2.213E-06	0.0808	2.276E-06	0.0831	0.000E+00	0.0000	2.177E-05	0.7947	5.305E-07	0.0194	1.574E-07	0.0057	4.452E-07	0.0

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathway	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fra
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	4.287E-06	0.1
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.310E-	.8
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.739E-05	1.0

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 1.000E+03 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Am-241	6.323E-01	2.931E+01	3.787E-02	2.161E-03	1.356E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.291E+0
Np-237	4.803E-04	4.427E-01	1.881E-03	1.181E-05	1.030E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.549E-0
Sr-90	5.216E-08	7.205E-04	1.827E-05	5.432E-06	1.119E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.453E-0
Th-229	4.661E-08	2.161E-06	5.588E-09	3.987E-10	9.998E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.167E-0
U-233	1.344E-06	1.553E-04	6.464E-07	1.583E-06	2.884E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.864E-0

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Am-241	2.267E-07	0.1605	7.398E-07	0.5237	2.902E-07	0.2054	3.750E-10	0.0003	2.139E-11	0.0000	1.343E-07	0.0950
Np-237	1.680E-08	0.0119	5.043E-10	0.0004	3.985E-09	0.0028	1.693E-11	0.0000	1.063E-13	0.0000	9.271E-11	0.0001
Sr-90	8.740E-14	0.0000	1.080E-16	0.0000	1.210E-12	0.0000	3.070E-14	0.0000	9.126E-15	0.0000	1.880E-15	0.0000
Th-229	2.120E-12	0.0000	1.161E-13	0.0000	2.334E-14	0.0000	6.035E-17	0.0000	4.306E-18	0.0000	1.080E-14	0.0000
U-233	3.655E-15	0.0000	5.646E-13	0.0000	2.097E-13	0.0000	8.726E-16	0.0000	2.137E-15	0.0000	3.893E-14	0.0000
Total	2.435E-07	0.1724	7.403E-07	0.5240	2.942E-07	0.2082	3.919E-10	0.0003	2.151E-11	0.0000	1.344E-07	0.0951

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	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	1.391E-06	0.9848
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.140E-08	0.0151
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.340E-12	0.0000
Th-229	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.271E-12	0.0000
U-233	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.199E-13	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	1.413E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fr
Am-241	2.435E-07	0.1724	7.403E-07	0.5240	0.000E+00	0.0000	2.942E-07	0.2082	3.919E-10	0.0003	2.150E-11	0.0000	1.344E-07	0.
Sr-90	8.740E-14	0.0000	1.080E-16	0.0000	0.000E+00	0.0000	1.210E-12	0.0000	3.070E-14	0.0000	9.126E-15	0.0000	1.880E-15	0.
Total	2.435E-07	0.1724	7.403E-07	0.5240	0.000E+00	0.0000	2.942E-07	0.2082	3.919E-10	0.0003	2.151E-11	0.0000	1.344E-07	0.

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathwa	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fr
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	1.413E-06	1.
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.34[illegible]2	0.
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	1.413E-06	1.

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

SECTION C-5 RESRAD SUMMARY REPORT FOR THE SITE-WIDE FUTURE RECREATIONAL SCENARIO

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Dose Conversion Factor (and Related) Parameter Summary
File: DOSFAC.BIN

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Am-241	4.440E-01	4.440E-01	DCF2(1)
B-1	Np-237+D	5.400E-01	5.400E-01	DCF2(2)
B-1	Sr-90+D	1.310E-03	1.310E-03	DCF2(3)
B-1	Th-229+D	2.160E+00	2.160E+00	DCF2(4)
B-1	U-233	1.350E-01	1.350E-01	DCF2(5)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Am-241	3.640E-03	3.640E-03	DCF3(1)
D-1	Np-237+D	4.440E-03	4.440E-03	DCF3(2)
D-1	Sr-90+D	1.530E-04	1.530E-04	DCF3(3)
D-1	Th-229+D	4.030E-03	4.030E-03	DCF3(4)
D-1	U-233	2.890E-04	2.890E-04	DCF3(5)
D-34	Food transfer factors:			
D-34	Am-241 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(1,1)
D-34	Am-241 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-05	5.000E-05	RTF(1,2)
D-34	Am-241 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-06	2.000E-06	RTF(1,3)
D-34	Np-237+D , plant/soil concentration ratio, dimensionless	2.000E-02	2.000E-02	RTF(2,1)
D-34	Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,2)
D-34	Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(2,3)
D-34	Sr-90+D , plant/soil concentration ratio, dimensionless	3.000E-01	3.000E-01	RTF(3,1)
D-34	Sr-90+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-03	8.000E-03	RTF(3,2)
D-34	Sr-90+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(3,3)
D-34	Th-229+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(4,1)
D-34	Th-229+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(4,2)
D-34	Th-229+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(4,3)
D-34	U-233 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(5,1)
D-34	U-233 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(5,2)
D-34	U-233 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(5,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Am-241 , fish	3.000E+01	3.000E+01	BIOFAC(1,1)
D-5	Am-241 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5	Np-237+D , fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Np-237+D , crustacea and mollusks	4.000E+02	4.000E+02	BIOFAC(2,2)
D-5	Sr-90+D , fish	6.000E+01	6.000E+01	BIOFAC(3,1)
D-5	Sr-90+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)
D-5	Th-229+D , fish	1.000E+02	1.000E+02	BIOFAC(4,1)
D-5	Th-229+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(4,2)
D-5	U-233 , fish	1.000E+01	1.000E+01	BIOFAC(5,1)
D-5	U-233 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(5,2)

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)	3.300E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E-03	1.000E+00	---	T(2)
R011	Times for calculations (yr)	1.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	5.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	5.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	5.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	1.000E+04	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Am-241	1.500E+01	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Sr-90	6.322E+03	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Am-241	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Sr-90	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	3.300E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.600E+00	1.500E+00	---	DENSC
R013	Cover depth erosion rate (m/yr)	1.000E-03	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 effective porosity	2.000E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	4.400E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	4.050E+00	5.300E+00	---	BCZ
R013	Humidity in air (g/cm**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.990E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	4.800E-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)	2.700E+07	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	3.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.050E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	3.000E-01	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	2	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	2.600E+02	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.600E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	5.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	4.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	4.050E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	3.000E+00	1.000E+01	---	HCUZ(1)
R015	Unsat. zone 2, thickness (m)	1.000E+02	0.000E+00	---	H(2)
R015	Unsat. zone 2, soil density (g/cm**3)	1.600E+00	1.500E+00	---	DENSUZ(2)
R015	Unsat. zone 2, total porosity	5.000E-01	4.000E-01	---	TPUZ(2)
R015	Unsat. zone 2, effective porosity	4.000E-01	2.000E-01	---	EPUZ(2)
R015	Unsat. zone 2, soil-specific b parameter	4.050E+00	5.300E+00	---	BUZ(2)
R015	Unsat. zone 2, hydraulic conductivity (m/yr)	3.700E+02	1.000E+01	---	HCUZ(2)
R016	Distribution coefficients for Am-241				
R016	Contaminated zone (cm**3/g)	1.300E+02	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	1.300E+02	2.000E+01	---	DCNUCU(1,1)
R016	Unsaturated zone 2 (cm**3/g)	1.300E+02	2.000E+01	---	DCNUCU(1,2)
R016	Saturated zone (cm**3/g)	0.000E+00	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.355E-07	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(
R016	Distribution coefficients for Sr-90				
R016	Contaminated zone (cm**3/g)	3.600E+01	3.000E+01	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	3.600E+01	3.000E+01	---	DCNUCU(3,1)
R016	Unsaturated zone 2 (cm**3/g)	3.600E+01	3.000E+01	---	DCNUCU(3,2)
R016	Saturated zone (cm**3/g)	0.000E+00	3.000E+01	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.210E-06	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Np-237				
R016	Contaminated zone (cm**3/g)	3.950E-01	-1.000E+00	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	3.950E-01	-1.000E+00	---	DCNUCU(2,1)
R016	Unsaturated zone 2 (cm**3/g)	3.950E-01	-1.000E+00	---	DCNUCU(2,2)
R016	Saturated zone (cm**3/g)	0.000E+00	-1.000E+00	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.426E-05	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for daughter Th-229				
R016	Contaminated zone (cm**3/g)	5.000E+02	6.000E+04	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+02	6.000E+04	---	DCNUCU(4,1)
R016	Unsaturated zone 2 (cm**3/g)	5.000E+02	6.000E+04	---	DCNUCU(4,2)
R016	Saturated zone (cm**3/g)	0.000E+00	6.000E+04	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.726E-08	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)

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 U-233				
R016	Contaminated zone (cm**3/g)	7.290E+00	5.000E+01	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	7.290E+00	5.000E+01	---	DCNUCU(5,1)
R016	Unsaturated zone 2 (cm**3/g)	7.290E+00	5.000E+01	---	DCNUCU(5,2)
R016	Saturated zone (cm**3/g)	0.000E+00	5.000E+01	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.930E-06	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R017	Inhalation rate (m**3/yr)	7.300E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	9.000E-05	2.000E-04	---	MLINH
R017	Dilution length for airborne dust, inhalation (m)	3.000E+00	3.000E+00	---	LM
R017	Exposure duration	2.000E+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)	7.700E-02	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	1 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_[illegible] 4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_S[illegible]E(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)	4.000E+00	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	0.000E+00	1.400E+01	---	DIET[illegible]
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DI[illegible]
R018	Meat and poultry consumption (kg/yr)	6.300E+01	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)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Soil ingestion rate (g/yr)	3.650E+01	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	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	5.000E-01	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	1.000E+00	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)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	4.000E+00	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	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	1.000E+00	1.000E+00	---	FGWIR
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
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
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	not used	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	not used	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	not used	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	---	FLOOR
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

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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 annual wind speed (m/sec)	not used	2.000E+00	---	WIND
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)

Summary of Pathway Selections

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

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	10000.00 square meters	Am-241	1.500E+01
Thickness:	3.30 meters	Sr-90	6.322E+03
Cover Depth:	3.30 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 15 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E-03	1.000E+00	1.000E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	5.000E+03	1.000E+04
TDOSE(t):	1.142E+02	1.142E+02	1.117E+02	9.132E+01	3.724E+01	1.209E+01	1.612E-02	9.513E-03	7.294E-04	0.000E+00
M(t):	7.615E+00	7.615E+00	7.447E+00	6.088E+00	2.483E+00	8.063E-01	1.074E-03	6.342E-04	4.863E-05	0.000E+00

Maximum TDOSE(t): 1.142E+02 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		Sc
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.911E-02	0.0002	1.504E-05	0.0000	0.000E+00	0.0000	0.000E+0
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.015E+02	0.8883	1.274E+01	0.1116	0.000E+00	0.0000	0.000E+0
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.015E+02	0.8884	1.274E+01	0.1116	0.000E+00	0.0000	0.000E+0

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pa
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr
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	1.912E-(
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.142E+(
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	1.142E+(

*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	fra
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.911E-02	0.0002	1.504E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.015E+02	0.8883	1.274E+01	0.1116	0.000E+00	0.0000	0.000E+00	0.0
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.015E+02	0.8884	1.274E+01	0.1116	0.000E+00	0.0000	0.000E+00	0.0

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathway	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fra
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	1.912E-02	0.0
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.142E[illegible]	0.9
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	1.142E+02	1.0

*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	fr
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.911E-02	0.0002	1.504E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.922E+01	0.8883	1.246E+01	0.1116	0.000E+00	0.0000	0.000E+00	0.
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.924E+01	0.8884	1.246E+01	0.1116	0.000E+00	0.0000	0.000E+00	0.

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathwa	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fr
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	1.912E-02	0.
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.117E+02	0.
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	1.117E+02	1.

*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	f
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.907E-02	0.0002	1.504E-05	0.0000	0.000E+00	0.0000	0.000E+00	0
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.112E+01	0.8882	1.019E+01	0.1115	0.000E+00	0.0000	0.000E+00	0
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.114E+01	0.8885	1.019E+01	0.1115	0.000E+00	0.0000	0.000E+00	0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathw	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	f
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	1.909E-02	0
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.[illegible]01	0
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.132E+01	1

*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 = 5.000E+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	fr
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.890E-02	0.0005	1.500E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.307E+01	0.8880	4.153E+00	0.1115	0.000E+00	0.0000	0.000E+00	0.
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.309E+01	0.8885	4.153E+00	0.1115	0.000E+00	0.0000	0.000E+00	0.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathw	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fr
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	1.892E-02	0.
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.722[illegible]	0.
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	3.724E+01	1.

*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	f
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.862E-02	0.0015	1.490E-05	0.0000	0.000E+00	0.0000	0.000E+00	0
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.073E+01	0.8871	1.347E+00	0.1114	0.000E+00	0.0000	0.000E+00	0
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.075E+01	0.8886	1.347E+00	0.1114	0.000E+00	0.0000	0.000E+00	0

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathw	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	f
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	1.863E-02	0
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.20[illegible]	0
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	1.209E+01	1

*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 = 5.000E+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	fra
Am-241	1.494E-28	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.478E-02	0.9169	1.293E-05	0.0008	0.000E+00	0.0000	0.000E+00	0.0
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.179E-03	0.0731	1.480E-04	0.0092	0.000E+00	0.0000	0.000E+00	0.0
Total	1.494E-28	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.595E-02	0.9900	1.609E-04	0.0100	0.000E+00	0.0000	0.000E+00	0.0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathway	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fra
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	1.479E-02	0.9
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.327E-03	0.0
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	1.612E-02	1.0

*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	fr
Am-241	3.955E-24	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.503E-03	0.9989	1.006E-05	0.0011	0.000E+00	0.0000	0.000E+00	0.
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.131E-08	0.0000	1.421E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.
Total	3.955E-24	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.503E-03	0.9989	1.006E-05	0.0011	0.000E+00	0.0000	0.000E+00	0.

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathwa	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fr
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	9.513E-03	1.
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.27[illegible]3	0.
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.513E-03	1.

*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 = 5.000E+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	f
Am-241	1.780E-04	0.2441	1.619E-04	0.2220	0.000E+00	0.0000	1.571E-04	0.2154	1.567E-04	0.2149	0.000E+00	0.0000	7.559E-05	0
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Total	1.780E-04	0.2441	1.619E-04	0.2220	0.000E+00	0.0000	1.571E-04	0.2154	1.567E-04	0.2149	0.000E+00	0.0000	7.559E-05	0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Path	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	f
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	7.294E-04	1
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.294E-04	1

*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+04 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	fra
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	0.0
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0
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	0.0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+04 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathway	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fra
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	0.0
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0
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	0.0

*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-03	1.000E+00	1.000E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	5.000E+03	1.000E+04
Am-241	Am-241	1.000E+00	1.275E-03	1.275E-03	1.275E-03	1.273E-03	1.261E-03	1.241E-03	9.800E-04	6.226E-04	1.351E-05	0.000E+00
Am-241	Np-237	1.000E+00	0.000E+00	3.052E-11	1.025E-08	1.029E-07	5.252E-07	1.074E-06	5.869E-06	1.166E-05	3.493E-05	0.000E+00
Am-241	U-233	1.000E+00	0.000E+00	1.800E-22	2.946E-16	1.931E-14	4.747E-13	1.957E-12	5.905E-11	2.634E-10	2.978E-08	0.000E+00
Am-241	Th-229	1.000E+00	0.000E+00	0.000E+00	3.577E-20	3.274E-17	4.148E-15	3.452E-14	5.447E-12	5.077E-11	1.476E-07	0.000E+00
Am-241	dDSR(j)		1.275E-03	1.275E-03	1.275E-03	1.273E-03	1.261E-03	1.242E-03	9.859E-04	6.342E-04	4.863E-05	0.000E+00
Sr-90	Sr-90	1.000E+00	1.807E-02	1.807E-02	1.767E-02	1.444E-02	5.887E-03	1.910E-03	2.098E-07	2.014E-12	0.000E+00	0.000E+00

Branch Fraction is the cumulative factor for the j'th 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 = 15 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E-03	1.000E+00	1.000E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	5.000E+03	1.000E+0
Am-241	1.177E+04	1.177E+04	1.177E+04	1.179E+04	1.189E+04	1.208E+04	1.521E+04	2.365E+04	3.085E+05	*3.430E+1
Sr-90	8.303E+02	8.303E+02	8.491E+02	1.039E+03	2.548E+03	7.853E+03	7.148E+07	7.447E+12	*1.365E+14	*1.365E+1

*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	1.500E+01	0.000E+00	1.275E-03	1.177E+04	1.275E-03	1.177E+04
Sr-90	6.322E+03	0.000E+00	1.807E-02	8.303E+02	1.807E-02	8.303E+02

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-03	1.000E+00	1.000E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	5.000E+03	1.000
Am-241	Am-241	1.000E+00	1.912E-02	1.912E-02	1.912E-02	1.909E-02	1.891E-02	1.862E-02	1.470E-02	9.338E-03	2.027E-04	0.000
Np-237	Am-241	1.000E+00	0.000E+00	4.577E-10	1.538E-07	1.543E-06	7.877E-06	1.612E-05	8.803E-05	1.749E-04	5.240E-04	0.000
U-233	Am-241	1.000E+00	0.000E+00	2.700E-21	4.419E-15	2.896E-13	7.120E-12	2.936E-11	8.858E-10	3.950E-09	4.467E-07	0.000
Th-229	Am-241	1.000E+00	0.000E+00	0.000E+00	5.366E-19	4.911E-16	6.223E-14	5.178E-13	8.171E-11	7.615E-10	2.214E-06	0.000
Sr-90	Sr-90	1.000E+00	1.142E+02	1.142E+02	1.117E+02	9.131E+01	3.722E+01	1.208E+01	1.327E-03	1.273E-08	0.000E+00	0.000

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-03	1.000E+00	1.000E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	5.000E+03	1.000
Am-241	Am-241	1.000E+00	1.500E+01	1.500E+01	1.498E+01	1.476E+01	1.384E+01	1.278E+01	6.726E+00	3.016E+00	4.930E-	.620
Np-237	Am-241	1.000E+00	0.000E+00	4.859E-09	4.854E-06	4.817E-05	2.329E-04	4.467E-04	1.627E-03	2.281E-03	2.005E-03	1.250
U-233	Am-241	1.000E+00	0.000E+00	1.062E-17	1.062E-11	1.056E-09	2.582E-08	1.004E-07	2.030E-06	6.395E-06	4.616E-05	7.783
Th-229	Am-241	1.000E+00	0.000E+00	0.000E+00	2.824E-16	3.329E-13	4.087E-11	3.198E-10	3.372E-08	2.219E-07	9.089E-06	3.002
Sr-90	Sr-90	1.000E+00	6.322E+03	6.322E+03	6.173E+03	4.983E+03	1.923E+03	5.849E+02	4.284E-02	2.902E-07	0.000E+00	0.000

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

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FUTURE RECREATIONAL SCENARIO

HEALTH RISK REPORT

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Cancer Risk Slope Factors Summary Table
File: DOSFAC.BIN

Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Am-241	4.60E-09	4.60E-09	SLPF(1,1)
Sf-1	Np-237+D	4.60E-07	4.60E-07	SLPF(2,1)
Sf-1	Sr-90+D	1.90E-08	1.90E-08*	SLPF(3,1)
Sf-1	Th-229+D	6.00E-07	6.00E-07	SLPF(4,1)
Sf-1	U-233	3.50E-11	3.50E-11	SLPF(5,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Am-241	3.90E-08	3.90E-08	SLPF(1,2)
Sf-2	Np-237+D	3.50E-08	3.50E-08	SLPF(2,2)
Sf-2	Sr-90+D	6.90E-11	6.90E-11	SLPF(3,2)
Sf-2	Th-229+D	8.30E-08	8.30E-08	SLPF(4,2)
Sf-2	U-233	1.40E-08	1.40E-08	SLPF(5,2)
Sf-3	Ingestion, slope factors, 1/(pCi):			
Sf-3	Am-241	3.30E-10	3.30E-10	SLPF(1,3)
Sf-3	Np-237+D	3.00E-10	3.00E-10	SLPF(2,3)
Sf-3	Sr-90+D	5.60E-11	5.60E-11	SLPF(3,3)
Sf-3	Th-229+D	3.60E-10	3.60E-10	SLPF(4,3)
Sf-3	U-233	4.50E-11	4.50E-11	SLPF(5,3)

Note: Default values followed by '*' were derived by multiplying the dose conversion factors with 7.6E-7 (risk/mrem). For external radiation, the dose conversion factors used for this derivation were obtained from the EPA's Federal Guidance Report No.12, and for inhalation and ingestion, the dose conversion factors were the ones used in RESRAD default database.

Default values followed by '$' were obtained from 'Estimating Radiogenic Cancer Risks', EPA 402-R-93-076, June, 1994.

Default values followed by '#' were taken from individual radionuclides given in HEAST.

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Tota
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Inges*
Am-241	0.000E+00	5.250E+00	4.133E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.25
Np-237	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.00
Sr-90	0.000E+00	6.632E+05	8.329E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.46
Th-229	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.00
U-233	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.00

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	3.465E-08	0.0000	2.728E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	7.428E-04	0.8884	9.328E-05	0.1116	0.000E+00	0.0000	0.000E+00	0.0000
Th-229	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-233	0.000E+00	0.0000	0.000E+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	7.428E-04	0.8884	9.328E-05	0.1116	0.000E+00	0.0000	0.000E+00	0.0000

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	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	3.468E-08	0.0000
Np-237	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.361E-04	1.0000
Th-229	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-233	0.000E+00	0.0000	0.000E+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	8.361E-04	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		S
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.465E-08	0.0000	2.728E-11	0.0000	0.000E+00	0.0000	0.000E+
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.428E-04	0.8884	9.328E-05	0.1116	0.000E+00	0.0000	0.000E+
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.428E-04	0.8884	9.328E-05	0.1116	0.000E+00	0.0000	0.000E+

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All p
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk
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	3.468E-
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.361E-
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.361E-

***CNRSI(i,p,t) includes contribution from decay daughter radionuclides

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FUTURE RECREATIONAL SCENARIO

SURFACE COMPONENT

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Dose Conversion Factor (and Related) Parameter Summary
File: DOSFAC.BIN

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Sr-90+D	1.310E-03	1.310E-03	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Sr-90+D	1.530E-04	1.530E-04	DCF3(1)
D-34	Food transfer factors:			
D-34	Sr-90+D , plant/soil concentration ratio, dimensionless	3.000E-01	3.000E-01	RTF(1,1)
D-34	Sr-90+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,2)
D-34	Sr-90+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Sr-90+D , fish	6.000E+01	6.000E+01	BIOFAC(1,1)
D-5	Sr-90+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

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)	3.000E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E-03	1.000E+00	---	T(2)
R011	Times for calculations (yr)	1.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	5.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	5.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	5.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	1.000E+04	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Sr-90	6.400E+01	0.000E+00	---	S1(1)
R012	Concentration in groundwater (pCi/L): Sr-90	not used	0.000E+00	---	W1(1)
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	---	DENSC
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 effective porosity	2.000E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	4.400E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	4.050E+00	5.300E+00	---	BCZ
R013	Humidity in air (g/cm**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.990E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	4.800E-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)	1.600E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	3.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.050E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	3.000E-01	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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, 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)
R015	Unsat. zone 2, thickness (m)	not used	0.000E+00	---	H(2)
R015	Unsat. zone 2, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(2)
R015	Unsat. zone 2, total porosity	not used	4.000E-01	---	TPUZ(2)
R015	Unsat. zone 2, effective porosity	not used	2.000E-01	---	EPUZ(2)
R015	Unsat. zone 2, soil-specific b parameter	not used	5.300E+00	---	BUZ(2)
R015	Unsat. zone 2, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(2)
R016	Distribution coefficients for Sr-90				
R016	Contaminated zone (cm**3/g)	3.600E+01	3.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	3.000E+01	---	DCNUCU(1,1)
R016	Unsaturated zone 2 (cm**3/g)	not used	3.000E+01	---	DCNUCU(1,2)
R016	Saturated zone (cm**3/g)	not used	3.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.331E-05	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	7.300E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	9.000E-05	2.000E-04	---	MLINH
R017	Dilution length for airborne dust, inhalation (m)	3.000E+00	3.000E+00	---	LM
R017	Exposure duration	2.000E+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)	7.700E-02	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	1 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)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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)
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)	3.650E+01	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	1.000E+00	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
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
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

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	not used	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	not used	1.000E+00	---	STOR_T(2)
STOR	Milk	not used	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	not used	2.000E+01	---	STOR_T(4)
STOR	Fish	not used	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	not used	7.000E+00	---	STOR_T(6)
STOR	Well water	not used	1.000E+00	---	STOR_T(7)
STOR	Surface water	not used	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	not used	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
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 annual wind speed (m/sec)	not used	2.000E+00	---	WIND
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)

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

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	10000.00 square meters	Sr-90	6.400E+01
Thickness:	0.30 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 15 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E-03	1.000E+00	1.000E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	5.000E+03	1.000E+04
TDOSE(t):	1.525E-01	1.525E-01	1.489E-01	1.201E-01	4.619E-02	1.391E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
M(t):	1.017E-02	1.017E-02	9.928E-03	8.009E-03	3.079E-03	9.271E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Maximum TDOSE(t): 1.525E-01 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	fra
Sr-90	1.209E-01	0.7926	4.118E-03	0.0270	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.752E-02	0.1
Total	1.209E-01	0.7926	4.118E-03	0.0270	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.752E-02	0.1

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 Pathway	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fra
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.525E-01	1.0
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	1.52[illegible]	1.0

*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	f
Sr-90	1.209E-01	0.7926	4.118E-03	0.0270	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.752E-02	0
Total	1.209E-01	0.7926	4.118E-03	0.0270	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.752E-02	0

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathw	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	f
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.525E-01	1
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	1.525E-01	1

*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)

	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Radio-														
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	f
Sr-90	1.180E-01	0.7926	4.021E-03	0.0270	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.687E-02	0
Total	1.180E-01	0.7926	4.021E-03	0.0270	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.687E-02	0

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

Water Dependent Pathways

	Water		Fish		Radon		Plant		Meat		Milk		All Pathw	
Radio-														
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	f
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.489E-01	1.
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	1.489	1.

*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	f
Sr-90	9.521E-02	0.7925	3.245E-03	0.0270	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.169E-02	0
Total	9.521E-02	0.7925	3.245E-03	0.0270	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.169E-02	0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Path	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	f
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.201E-01	1
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	1.2[illegible]01	1

*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 = 5.000E+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	frac
Sr-90	3.658E-02	0.7918	1.252E-03	0.0271	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.365E-03	0.18
Total	3.658E-02	0.7918	1.252E-03	0.0271	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.365E-03	0.18

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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	frac
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.619E-02	1.00
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	4.619E	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+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	fra
Sr-90	1.098E-02	0.7898	3.805E-04	0.0274	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.543E-03	0.1
Total	1.098E-02	0.7898	3.805E-04	0.0274	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.543E-03	0.1

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 Pathway	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fra
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.391E-02	1.0
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	1.391E-02	1.0

*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 = 5.000E+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	fra
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0
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	0.0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathway	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fra
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0
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	0.0

*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	fra
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0
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	0.0

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathwa	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fra
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0
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	0.000	0.0

*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 = 5.000E+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	frac
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
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	0.00

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+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
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
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[illegible]	0.00

*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+04 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
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
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	0.00

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+04 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
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.00
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	0.00

*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	t= 0.000E+00	1.000E-03	1.000E+00	1.000E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	5.000E+03	1.000E+04
			DSR(j,t) (mrem/yr)/(pCi/g)									
Sr-90	Sr-90	1.000E+00	2.383E-03	2.383E-03	2.327E-03	1.877E-03	7.218E-04	2.173E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Branch Fraction is the cumulative factor for the j'th 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 = 15 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E-03	1.000E+00	1.000E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	5.000E+03	1.000E+0
Sr-90	6.294E+03	6.294E+03	6.446E+03	7.991E+03	2.078E+04	6.903E+04	*1.365E+14	*1.365E+14	*1.365E+14	*1.365E+1

*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)
Sr-90	6.400E+01	0.000E+00	2.383E-03	6.294E+03	2.383E-03	6.294E+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-03	1.000E+00	1.000E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	5.000E+03	1.000E+04
Sr-90	Sr-90	1.000E+00	1.525E-01	1.525E-01	1.489E-01	1.201E-01	4.619E-02	1.391E-02	0.000E+00	0.000E+00	0.000E+00	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-03	1.000E+00	1.000E+01	5.000E+01	1.000E+02	5.000E+02	1.000E+03	5.000E+03	1.000E+04
Sr-90	Sr-90	1.000E+00	6.400E+01	6.400E+01	6.249E+01	5.044E+01	1.945E+01	5.914E+00	4.310E-04	2.903E-09	0.000E+00	0.000E+00

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

TA-10-003(a-o) and 10-007

FUTURE RECREATIONAL SCENARIO

SURFACE COMPONENT

HEALTH RISK REPORT

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Cancer Risk Slope Factors Summary Table
File: DOSFAC.BIN

Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Sr-90+D	1.90E-08	1.90E-08*	SLPF(1,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			
Sf-2	Sr-90+D	6.90E-11	6.90E-11	SLPF(1,2)
Sf-3	Ingestion, slope factors, 1/(pCi):			
Sf-3	Sr-90+D	5.60E-11	5.60E-11	SLPF(1,3)

Note: Default values followed by '*' were derived by multiplying the dose conversion factors with 7.6E-7 (risk/mrem). For external radiation, the dose conversion factors used for this derivation were obtained from the EPA's Federal Guidance Report No.12, and for inhalation and ingestion, the dose conversion factors were the ones used in RESRAD default database.

Default values followed by '$' were obtained from 'Estimating Radiogenic Cancer Risks', EPA 402-R-93-076, June, 1994.

Default values followed by '#' were taken from individual radionuclides given in HEAST.

Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As pCi/yr at t= 0.000E+00 years

Radio-	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total
Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Ingestion*
Sr-90	3.143E+00	0.000E+00	0.000E+00	0.000E+00	1.799E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.799E+02

* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil
and water-dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Plant		Meat		Milk		Soil	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Sr-90	1.867E-06	0.9007	4.338E-09	0.0021	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.015E-07	0.0972
Total	1.867E-06	0.9007	4.338E-09	0.0021	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.015E-07	0.0972

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Plant		Meat		Milk		All Pathways**	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.073E-06	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.073E-06	1.0000

** Sum of water independent ground, inhalation, plant, meat, milk, soil
and water dependent water, fish, plant, meat, milk pathways

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

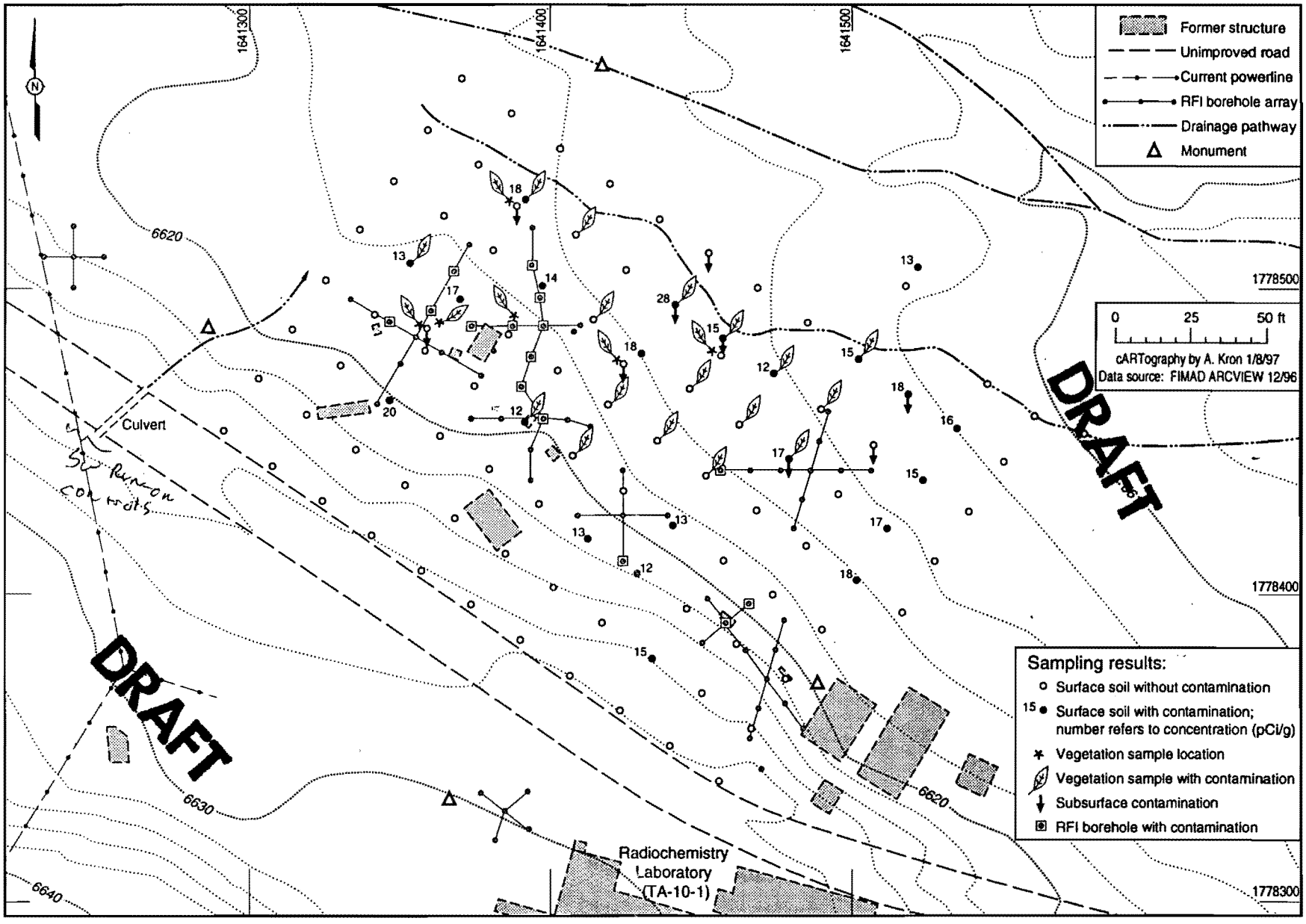
Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
uclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract
Sr-90	1.867E-06	0.9007	4.338E-09	0.0021	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.015E-07	0.09
Total	1.867E-06	0.9007	4.338E-09	0.0021	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.015E-07	0.09

Total Excess Cancer Risk CNRSI(i,p,t)*** for Initially Existent Radionuclides (i) and Pathways (p)
and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.073E-06	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.073E-06	1.0000

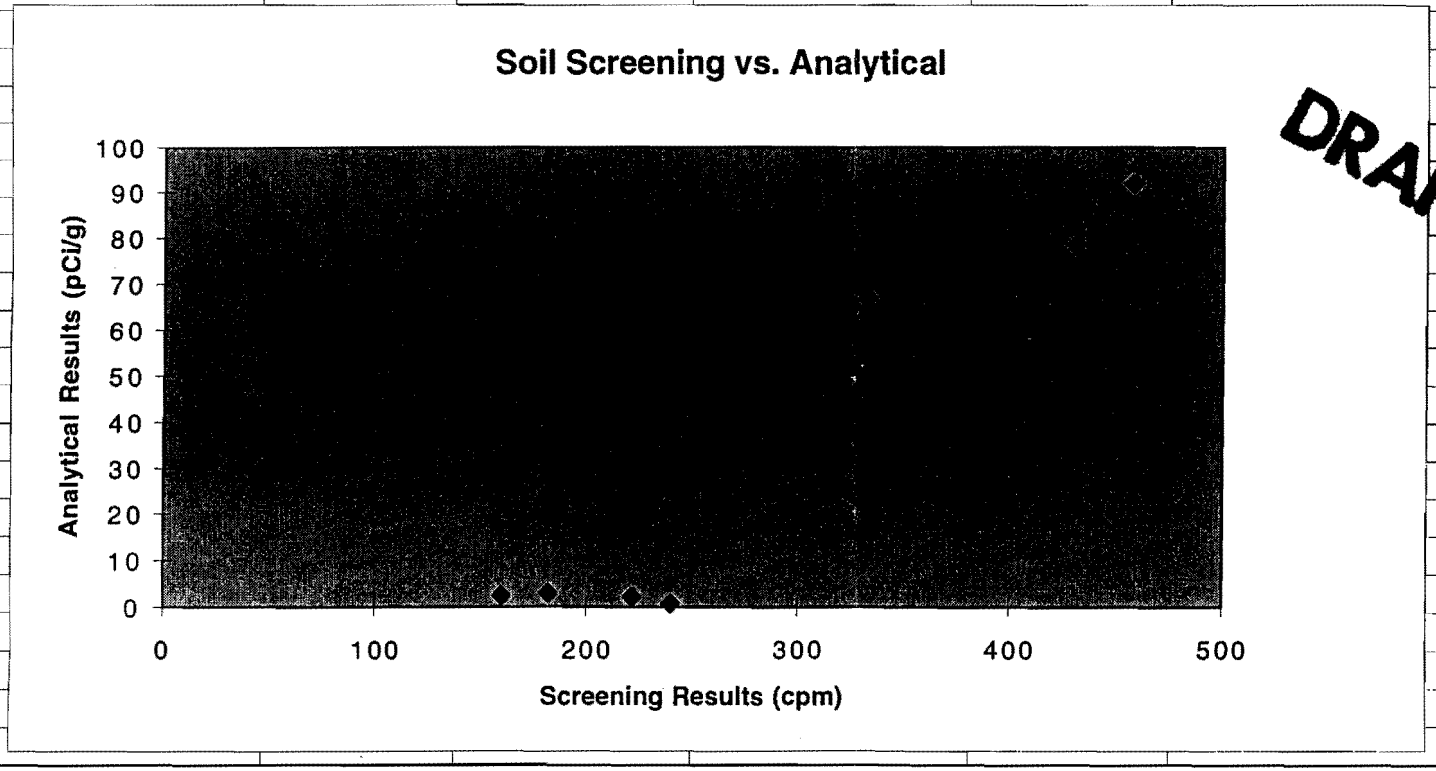
***CNRSI(i,p,t) includes contribution from decay daughter radionuclides



Central Area grid sampling results.

Screening vs. Analytical Results for Soil Samples - TA-10

DRAFT

Sample ID	Location ID	Sample Results: Screening Measurements (cpm) [1]	Sample Results: Estimated Sr-90 (pCi/g)	Sample Results: Analytical Results (pCi/g)	Description
0110-96-0062	10-10040	182	<11.5	2.9	Surface Soil Sample
0110-96-0066	10-10044	160	<11.5	2.4	Surface Soil Sample
0110-96-0097	10-10064	222	<11.5	2.1	Surface Soil Sample
0110-96-0098	10-10065	240	14.1	0.7	Surface Soil Sample
0110-96-0125	10-10104	333	28.5	67	Surface Soil Sample
0110-96-0144	10-10142	458	48.7	92	Subsurface Soil Sample
0110-96-0144(Dup)	10-10142	431	44.3	78.6	Subsurface Soil Sample

[1] Results on dry soil samples using shielding