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June 23, 2000

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Subject: Saxton Nuclear Experimental Corporation
Operating License No. DPR-4
Docket No. 50-146
License Termination Plan References

Gentlemen,

Attached are the following SNEC Facility License Termination Plan References as requested by the NRC Project Manager.

Reference 2-14: "SNEC Facility Historical Site Assessment"

Reference 2-19: CoPhysics Corp. Report, "Review Of The Final Release Survey Of The Reactor Support Buildings At The Saxton Nuclear Experimental Facility"

Reference 2-24: SNEC Procedure 6575-QAP-4220.01, "Quality Assurance Program For Radiological Instruments"

Sincerely,

G. A. Kuehn
Vice President SNEC

JJB/caw

Attachment: SNEC Facility License Termination Plan References

cc: Alexander Adams
Thomas Dragoun

A001

SAXTON NUCLEAR	Saxton Nuclear Experimental Corporation Facility Policy and Procedure Manual	Number **E900-QAP-4220.01**
Title **Quality Assurance Program for Radiological Instruments**		Revision No. **0**
Applicability/Scope This procedure applies to Radiological Controls and Radiological Instrument personnel.	Responsible Office E900	Effective Date 2-15-2000

This document is within QA plan scope	X	Yes		No
Safety Reviews Required	X	Yes		No

Document Control Stamps

	Signature	Date
Originator	WILLIAM STOWER / [signature]	2/3/00
RTR	[signature] AFPaynter	2/14/00
SNEC RSO	[signature] AFPaynter	2/14/00
SNEC Facility Site Supervisor	[signature] / PERRY CARMEL	2-14-00
Program Director, SNEC Facility	[signature] / G.A. KUEHN	02/14/00

1.0 PURPOSE

The purpose of this procedure is to establish quality assurance requirements for radiological instrumentation used at the Saxton Nuclear Experimental Corporation (SNEC) Facility.

2.0 APPLICABILITY/SCOPE

This procedure applies to Radiological Controls (Rad Con) and Radiological Instrument Department personnel assigned to the SNEC Facility.

3.0 DEFINITIONS

3.1 Final Status Survey (FSS) - The final survey process used to release the site from NRC licensing issues (unrestricted release).

3.2 Radiological Instrument Department - Any radiological instrument service under contract to GPU Nuclear or Company service for the purpose of calibrating, repairing, and supplying radiological instruments for the SNEC Facility Decommissioning Project.

3.3 Source Check - The verification of an instrument's response to a known source activity within acceptable and documented tolerances.

4.0 PROCEDURE

4.1 General Requirements

4.1.1 Radiological instruments shall be operated, maintained, repaired and calibrated in accordance with Reference 6.1. Those instruments not covered by Reference 6.1 require separate operating procedures.

4.1.2 Radiological instruments shall be calibrated on a regularly scheduled interval (when in use) which shall be defined in the appropriate instrument calibration procedure. Any instrument that does not satisfactorily meet the scheduled calibration frequency shall be removed from service until the calibration has been performed.

4.1.3 With the exception of the RM-14 and E-140N, radiological instruments shall only be operated using the detectors with which they have been calibrated. Measurements shall be made at the voltage specified for that instrument/detector, using the efficiency specified for that instrument/detector.

4.1.4 Radiological instrumentation should be kept as clean and dry as possible.

4.1.5 Personnel shall inspect the instrument for physical damage before use. Damaged instruments shall be returned to the Radiological Instrument Department.

4.1.6 Check sources and/or check source jigs shall be constructed or marked in such a manner to allow reproducible checks. Sources or source holders shall be labeled with the source accountability number and radionuclide(s). Acceptance criteria shall be established and posted for each type of instrument. Check sources need not be traceable to National Institute of Standards and Technology (NIST).

4.1.7 For select instrumentation, source checks shall be performed in accordance with applicable Final Status Survey (FSS) procedures instead of those outlined herein. When this is the case, complete applicable sections of the FSS source check procedure including any required documentation provided.

4.1.8 Quality assurance requirements, to ensure precision is maintained during the Count Room sample analytical process, are contained in Reference 6.2.

4.2 Daily Source Checks

4.2.1 At a minimum, all radiological instruments shall be source checked daily when in use unless otherwise noted in the applicable operation procedure or the instrument falls under the provisions of Section 4.3.

4.2.2 The performance of radiological instrument source checks shall be documented on Exhibit 3 or Exhibit 4, as applicable. Radiological Instrument Source Check Tags (Exhibit 1) or a similar mechanism approved by the Radiation Safety Officer (RSO) may also be used to identify instruments that have been source checked satisfactorily. Source check results for Counter Scaler instrumentation (e.g., SAC-4, LM 2000, etc.) shall be plotted on Exhibit 5.

4.3 Weekly Source Checks

4.3.1 Portal monitors, area monitors, and alarming dosimeters shall be source checked weekly when in use.

4.4 Calibration Sources

4.4.1 Sources used in the calibration of radiological instruments shall be traceable to the National Institute of Science and Technology (NIST) directly or by calibration via NIST traceable methods.

4.4.2 Calibrators shall be operated and maintained in accordance with applicable procedures.

4.5 Quality Assurance

4.5.1 During calibration, if an instrument is discovered to read low by 20% or high by 50% of its calibrated setting, the Radiological Instrument Department shall complete Exhibit 2. A copy of Exhibit 2 shall be submitted to the Group Radiological Controls Supervisor (GRCS).

4.5.1.1 The GRCS shall review source check records and attempt to determine the date(s) that the instrument may have been out of calibration, complete the applicable sections of Exhibit 2 and submit to the RSO.

4.5.1.2 The RSO shall review Exhibit 2 and determine if it is necessary to repeat any surveys that were previously performed with the faulty instrument. The results of the evaluation shall be recorded on Exhibit 2.

4.5.1.3 The completed form shall be returned to the Radiological Instrument Department for record purposes.

4.5.2 Out of service tags (Exhibit 6) shall be completed and affixed to all radiological instruments that have failed the daily or weekly source checks.

4.6 Records

4.6.1 The following records shall be maintained by the Radiological Instrument and Calibration Department.

❶ Inventory of Instruments

❷ Repair History of Instruments

❸ Calibration Data Certificates for Instruments

5.0 RESPONSIBILITIES

5.1 Responsibilities are as stated in Section 4.0 of this procedure.

6.0 REFERENCES

6.1 6610-INS-4200.01 - TMI Rad Con Instrument Operations Manual

6.2 E900-QAP-4220.02 - SNEC Count Room Quality Assurance Program

7.0 EXHIBITS

Exhibit 1 - Radiological Instrument Source Check Tag

Exhibit 2 - Quality Assurance Deficiency/Problem Report for Radiological Instruments

Exhibit 3 - Counter Scaler Source Check Log

Exhibit 4 - Portable Survey Instrument Source Check Log

Exhibit 5 - Counter Scaler Source Check Plot

Exhibit 6 - Out of Service Tag

EXHIBIT 1

Radiological Instrument Source Check Tag

INSTRUMENT						SERIAL NUMBER					
CHECK THE APPROPRIATE MONTH											
JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

INITIALS INDICATE SOURCE CHECK IS SATISFACTORY

DAY	INITIALS	DAY	INITIALS	DAY	INITIALS
1		11		21	
2		12		22	
3		13		23	
4		14		24	
5		15		25	
6		16		26	
7		17		27	
8		18		28	
9		19		29	
10		20		30	
				31	

Quality Assurance Deficiency/Problem Report for Radiological Instruments

Instrument ______________________ Serial No. ____________________ Date ____________

Date Instrument Returned ________________ Last Assigned User ____________________________

Last Successful Source Check Date ____

Deficiency/Problem and Cause (if identified) ________________________________

____

____

____

Corrective Action ____

____

____

____

Radiological Instrument Technician ______________________________ Date ____________

Radiological Instrument Supervisor ______________________________ Date ____________

Radiological Controls Field Operations

Review use during out-of-calibration period (attach records if necessary) ________________

____

____

____

SNEC RSO ____ Date ____________

EXHIBIT 3

Counter Scaler Source Check Log

Instrument ______________________ Serial Number ______________________

Detector ______________________ Serial Number ______________________

Source Type / Serial Number ______________________

Voltage Setting ______________________ Efficiency ______________________

Acceptance Criteria (± 2 Sigma Range in CPM) ______________________

DATE / TIME	BKG COUNT TIME (MIN)	BKG CPM	SOURCE COUNT TIME (MIN)	GROSS SOURCE CPM	NCPM	TECHNICIAN (PRINT/SIGN)	PASS	FAIL

SAXTON NUCLEAR	Saxton Nuclear Experimental Corporation Facility Policy and Procedure Manual	Number **E900-QAP-4220.01**
Title **Quality Assurance Program for Radiological Instruments**		Revision No. **0**

EXHIBIT 4

Portable Survey Instrument Source Check Log

Instrument ____________________ Detector / SN ____________________

Source Type / Serial Number ____________________

Acceptance Criteria ____________________

DATE	TIME	PASS	FAIL	TECHNICIAN

EXHIBIT 5

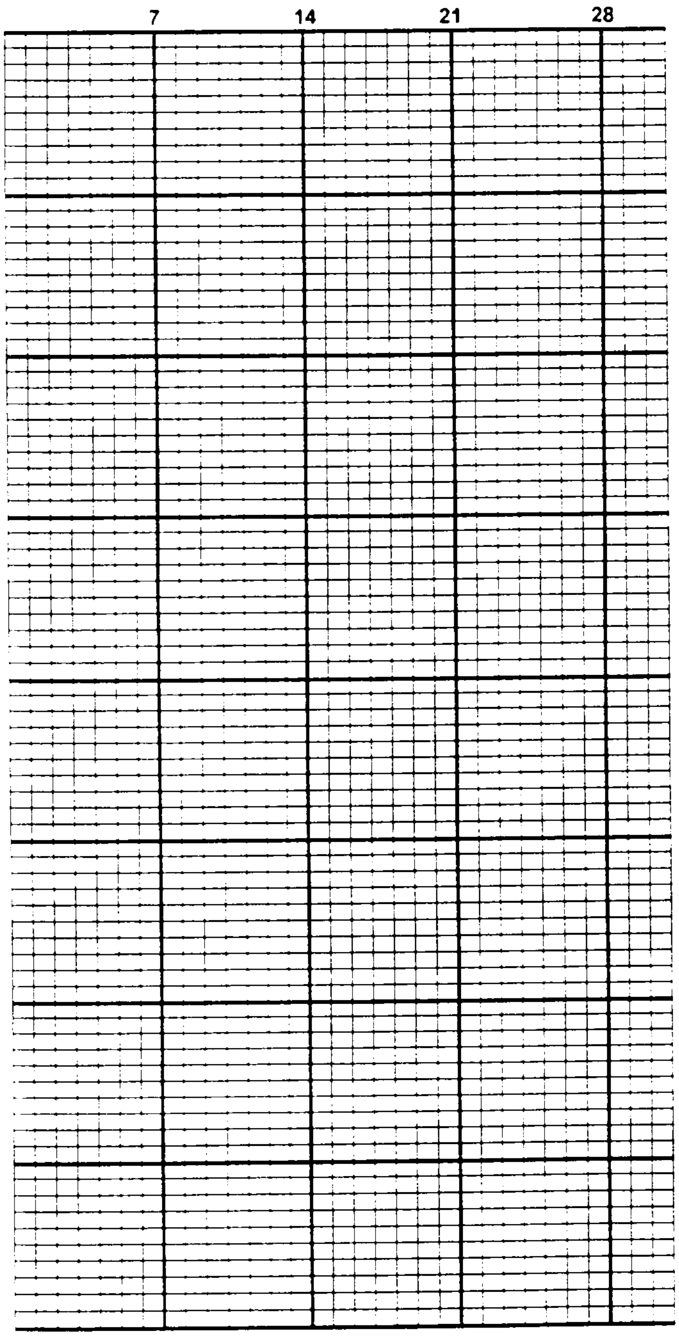
Counter Scaler Source Check Plot

Instrument / SN ______________________ Detector / SN ______________________

Source Type / Serial Number ______________________

Acceptance Criteria ______________________

Month/Year ______________________



Month/Year ______________________

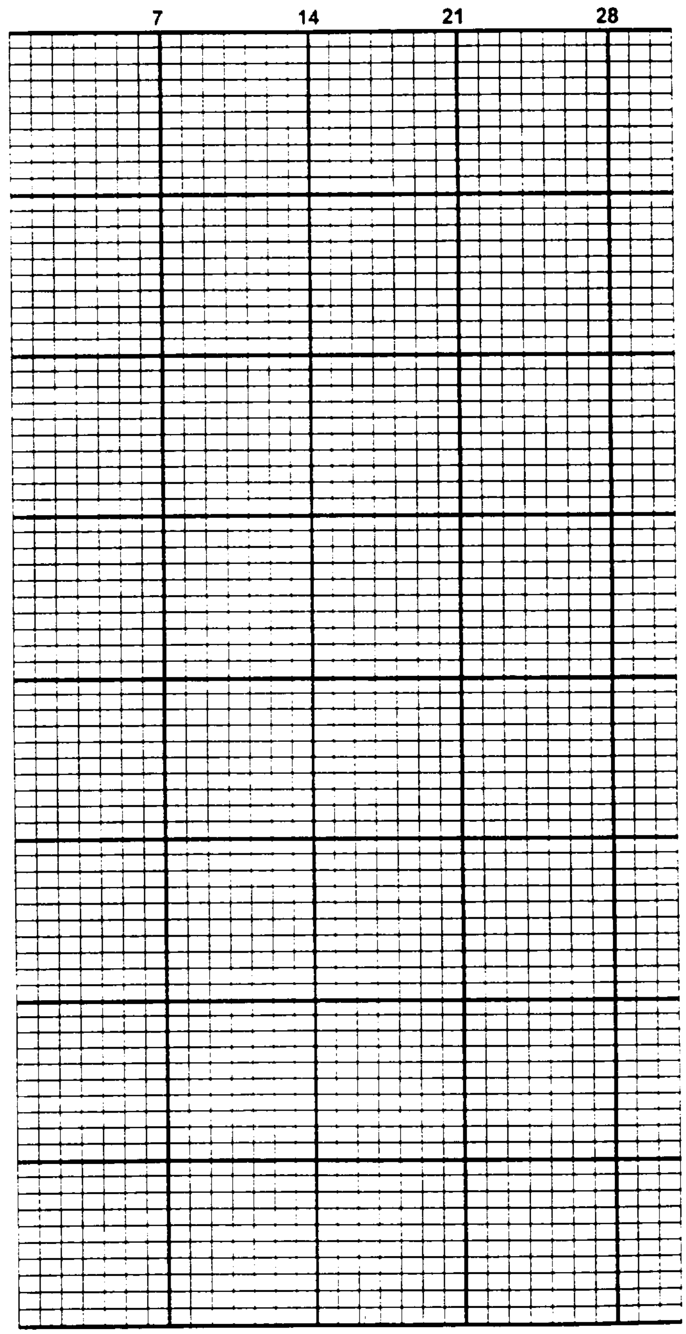


EXHIBIT 6

Out of Service Tag

OUT-OF-SERVICE

TO H.P CALIBRATION LAB

DO NOT USE

INST. MODEL	INSTRUMENT NO.	DATE

BUILDING/LOCATION OF INSTRUMENT USE

REASON FOR INSTRUMENT TAG OUT
(CHECK ALL APPLICABLE BOXES)

1		WILL NOT ZERO	11		DETECTOR DAMAGE
2		ERRATIC NEEDLE	12		CORD DAMAGE
3		NO RESPONSE	13		BROKEN HANDLE
4		METER FAILURE	14		LOW BATTERIES
5		LOW RESPONSE	15		MYLAR DAMAGE
6		HIGH RESPONSE	16		SWITCH BROKEN
7		INTERMITTENT RESPONSE	17		LOOSE/BROKEN CONNECTOR
8		LOOSE PARTS	18		MISSING PART:
9		BATTERY CHECK	19		FAILED PERFORMANCE CHECK
10		MECHANICAL ZERO	20		DUE FOR CALIBRATION
21		OTHER:			

REMARKS

TAGGED OUT BY:
NAME *DATE*

N6509B (02-91)

SAXTON NUCLEAR EXPERIMENTAL CORPORATION

HISTORICAL SITE ASSESSMENT REPORT

PREPARED BY

GPU NUCLEAR
DECONTAMINATION & DECOMMISSIONING
ENGINEERING

March 2000

SAXTON NUCLEAR EXPERIMENTAL CORPORATION

HISTORICAL SITE ASSESSMENT REPORT

REVISION-0

CONCURRENCE

TITLE	PRINT/SIGN	DATE
PREPARER	M.S. Williams/	2/14/00
INDEPENDENT REVIEWER	R.D. Holmes/	2/29/00
SNEC RSO	A.F. Paynter/	3/17/00
MGR-D&D ENGINEERING	J.J. Byrne/	3/1/00
SNEC SITE SUPERVISOR	P.G. Carmel/	3/21/00

APPROVAL

TITLE	PRINT/SIGN	DATE
PROGRAM DIRECTOR SNEC	G.A. Kuehn/	03/22/00

SAXTON NUCLEAR EXPERIMENTAL CORPORATION

HISTORICAL SITE ASSESSMENT REPORT

PREPARED BY

**GPU NUCLEAR
DECONTAMINATION & DECOMMISSIONING
ENGINEERING**

March 2000

TABLE OF CONTENTS

TABLE OF CONTENTS
[CONINUTED]

SECTION 1.0 GLOSSARY OF TERMS

This section provides definitions for all terms, acronyms, and abbreviations that are used in this report.

AEC – U.S. Atomic Energy Commission [forerunner of U.S. Nuclear Regulatory Commission]

AMSL – Above Mean Sea Level

C&A BUILDING – Control and Auxiliary Building

CV – Containment Vessel – Refers to the SNEC Reactor Containment Vessel

$DCGL_W$ – Derived Concentration Guideline Level – A derived, radionuclide-specific activity concentration within a survey unit corresponding to the release criterion.

DSF – Decommissioning Support Facility – Consists of a Decommissioning Support Building [DSB], a Material Handling Bay [MHB], and a Personnel Access Facility [PAF].

EPA – U.S. Environmental Protection Agency

FDSB – Filled Drum Storage Bunker

GPUN – GPU Nuclear

INSTITUTIONAL LORE – A body of knowledge, of indeterminate origin, that has passed between successive generations of employees. Generally associated with events that are believed to have occurred but for which no material proof is in evidence.

MARSSIM – Multi-Agency Radiation Survey and Site Investigation Manual – MARRISM is a multi-agency consensus document that was developed collaboratively by four Federal agencies having authority and control over radioactive materials: Department of Defense (DOD), Department of Energy (DOE), Environmental Protection Agency (EPA), and Nuclear Regulatory Commission (NRC).

MWt – Megawatt thermal

NRC - U. S. Nuclear Regulatory Commission

PaGS – Pennsylvania Geological Survey

PENELEC – Pennsylvania Electric Company doing business as GPU Energy

PWR - Pressurized Water Reactor

RWDF – Radioactive Waste Disposal Facility

RWST – Refueling Water Storage Tank

SNEC – Saxton Nuclear Experimental Corporation

SSGS – Saxton Steam Generating Station

SECTION 2.0 EXECUTIVE SUMMARY

The Saxton Nuclear Experimental Corporation [SNEC] Facility was built between 1960 to 1962 on a 1.148-acre plot immediately adjacent to the PENELEC owned SSGS. The SNEC Facility operated from 1962 until 1972 and provided steam to operate a turbine generator located in the SSGS.

The SNEC Facility has undergone several phases of partial decommissioning beginning in 1972 and continuing to the present time when final decommissioning operations are in progress. The SSGS was deactivated at the end of 1974 and was subsequently demolished between 1975 and 1977.

The SNEC Facility site property, portions of the adjacent PENELEC property and sections of the Raystown Branch of the Juniata River have been either actually or potentially radiologically impacted as a result of nuclear plant operations.

This HISTORICAL SITE ASSESSMENT [HSA] was undertaken and completed in accordance with the provisions of the Multi-Agency Radiation Survey and Site Investigation Manual [MARSSIM], NUREG-1575 [reference 9.22].

All areas of the SNEC site and the adjacent PENELEC site were classified as either *Impacted* or *Non-Impacted* in accordance with MARSSIM guidance. The reader may refer to Section 7.2 of this document for a more detailed explanation of these classifications.

A "Conceptual Model and Site Diagram showing Classifications" has been included as Appendix-A to this document. The purpose of this appendix is to provide users with a visual presentation of the major MARSSIM classifications that have been recommended for the SNEC Facility and adjacent PENELEC site property.

The information that was utilized to develop the classification recommendations depicted in Appendix-A, is contained in Section 7.0 of this document titled 'Findings'.

It should be noted that Section 7.0 develops MARSSIM Impacted Area classifications for each separate area under consideration. It is possible for a specific area to receive a classification base solely upon localized conditions and a larger area that contains the specific area, to receive a higher MARSSIM classification. In these cases, the higher classification will also apply to any contained areas of lower classification.

SECTION 3.0 PURPOSE OF THE HISTORICAL SITE ASSESSMENT

The purpose of the Saxton Nuclear Experimental Corporation – Historical Site Assessment [HSA] is to provide SNEC management with the current status of the SNEC Site as it relates to the sum total of the operations and events that have occurred over the full history of nuclear operations at the site.

The HSA process includes the following investigative reviews:

- Review of the Operational and Decommissioning History of the site
- Interviews with present and former employees of the facility
- Review of the types and quantities of radioactive materials that were stored, handled, moved, relocated, produced and dispositioned
- Radioactive material release and migration pathways

- Review of areas that were potentially affected by operation and decommissioning activities and likely to contain residual radioactivity resulting from such activities.
- Review of the types and quantities of radioactive materials likely to remain on the property.

This report will provide Final Status Survey personnel with a resource that will assist in the proper identification, categorization and classification of the various site areas and facilities in accordance with MARSSIM principles and other guidance documents.

This report will also address areas of the site property for which no evidence of impact from SNEC Facility operations and/or decommissioning activities can be found or inferred. This data is important in order to convey to users and reviewers of the report, the level of care that was employed during the investigative process.

SECTION 4.0 SNEC FACILITY PROPERTY IDENTIFICATION

This section of the report describes the SNEC Facility and adjoining Penelec properties in terms of their physical characteristics and the environmental setting within which they are situated. Information contained in this section was obtained from References 9.1, 9.2, 9.3, 9.4, 9.5 and 9.6.

SECTION 4.1 PHYSICAL CHARACTERISTICS

SECTION 4.1.1 NAME

The SNEC Facility Site is owned by GPU Incorporated and is maintained by GPU Nuclear, which is a wholly owned subsidiary of GPU INC. GPU Nuclear maintains the facility under a service agreement that became effective on May 21, 1982.

SECTION 4.1.2 LOCATION

The SNEC Facility Site is located about 100 miles east of Pittsburgh, Pa., and 90 miles west of Harrisburg, Pa., in the Allegheny Mountains, three fourths of a mile north of the Borough of Saxton in Liberty Township, Bedford County, Pennsylvania. The site is on the north side of Pennsylvania Route 913, approximately 17 miles south of U.S. Route 22, and about 15 miles north of the Breezewood Interchange of the Pennsylvania Turnpike.

The SNEC Facility Site was built on the east side of and adjacent to the SSGS of the Pennsylvania Electric Company [PENELEC]. This station was located on the east bank of the Raystown Branch of the Juniata River. The property comprises approximately 150 acres, 1.148 acres of which was deeded to SNEC by PENELEC for the nuclear facility.

SECTION 4.1.3 TOPOGRAPHY

The ridges immediately to the northwest of the site rise to 1300 feet [amsl] and to the southeast rise to 1500 feet [amsl] with the site elevation being about 811 feet [amsl].

SECTION 4.1.4 STRATIGRAPHY

Ash from the SSGS was deposited on the ground in the area of the former plant building and to the north.

Aerial photographs from 1951 indicate large areas of coal storage and/or ash disposal in the areas north and east of the former plant building.

In 1981 a hydrogeological investigation of the site was conducted (reference 9.2). Split-spoon samples and samples from hand dug pits indicate that the surficial soil, in the vicinity of the CV, is comprised of two types of construction backfill: 1) well graded reddish silty fine to coarse sand with some fine to medium gravel and, 2) a well graded mixture of ash and cinders. Both of these backfill materials were placed during station construction. The depth of fill generally ranges from three to six feet, although the fill may be deeper at locations where building construction excavation took place.

Underlying the fill materials is a boulder layer. This layer is generally four to six feet thick and separates the fill material from the top of the bedrock. The material making up the boulder matrix is a silty clay. The silt and clay were found to be localized in the boulder layer and did not appear to be present in the fractured bedrock below that zone.

The bedrock underlying the facility has been identified as "marine beds" of upper Devonian age per the Pennsylvania Geological Survey [PaGS]. The PaGS assigned this bedrock as the "Foreknobs Formation" but this unit has also been called a lower member of the "Catskill Formation".

The bedrock is composed of interlayered red and green siltstone and sandstone (also identified as gray to olive brown shales, graywackes and sandstones).

Depth to the bedrock on site is generally about 8 to 12 feet below the surface.

SECTION 4.2 ENVIRONMENTAL SETTING

SECTION 4.2.1 GEOLOGY

Section 4.1.4 above, contains additional information relating to the geology of the SNEC Site

The site lies in the Appalachian highlands in the Ridge and Valley physiographic province. This province comprises alternate successions of narrow ridges and broad or narrow valleys trending generally northeast.

This is a region of alternating hard and soft sedimentary rocks that have been folded by lateral compression into a series of anticlines and synclines.

The ridge is of Tuscarora quartzite and small amounts of Pleistocene gravel and recent alluvium are found along the river. Most of the area is underlain by strata of Upper Devonian age.

The SNEC facility is located on a major syncline that dips generally toward the east.

Although coal is mined in the general area of the site, no coal has been reported to lie beneath the site, nor has the site been undermined.

During the 1981 hydrogeological investigation many bedrock outcrops were examined throughout the region. These outcrops substantiate the premise that the plant site is located on the western limb of a major syncline which strikes (is aligned) generally N 25E – 42E E and dips (tilts) approximately 15E – 45E E. Some minor internal folding is present within various bedding members though the overall dip of the major structure is to the east. The bedrock orientations along with various fracture patterns of these Devonian rocks are important in understanding the groundwater flow directions in the bedrock as discussed in the following section.

SECTION 4.2.2 HYDROLOGY & HYDROGEOLOGY

SURFACE WATER

The primary water body in the vicinity of the facility is the Raystown Branch of the Juniata River, which meanders along its watercourse in an overall flow direction to the northeast and generally borders the northern and western edges of the property.

Approximately 34 miles downstream from the site, the Raystown Branch of the Juniata River is dammed, impounding the river to form Raystown Lake. The dam was built by the U.S. Army Corps of Engineers from 1968 to 1973 for flood control, recreation, and water quality purposes. At normal pool level the lake is 27 miles long and has an area of 8300 acres.

Normal elevation of the river near the site is about 794 feet [amsl] in comparison to the site, which lies at about 811 feet [amsl].

A small stream known as Shoup Run flows west and transects the PENELEC property to the south of the SNEC Facility emptying into the Raystown Branch of the Juniata River.

The watershed extending upstream from Saxton, Pennsylvania is about 756 square miles.

Because the vicinity of the site contains old field and forest vegetation and very little impervious cover, precipitation falling on the SNEC facility generally will percolate into the local soils and become incorporated into the groundwater regime as opposed to direct overland flow into the adjacent streams.

Significant precipitation will cause minor intermittent ponding in the immediate site area; further demonstrating that surface runoff from the site is minimal. Therefore, an understanding of groundwater hydrology at the SNEC facility is important.

Extensive groundwater monitoring in the site vicinity has been undertaken to ensure that groundwater degradation is not occurring.

A detailed description of the hydrology of the major surface water bodies in the vicinity of the site is contained in the SNEC Final Safeguards Report [reference 9.5]. This additional information is not specifically germane to this Historical Site Assessment and will not be directly included.

GROUNDWATER

Underlying the site are three distinct subsurface zones that have different water-bearing and transmitting properties.

As previously mentioned in this report, the site is immediately underlain by a fill layer comprised of fly-ash, cinders and/or silt and sand-sized sediment. A layer of boulders in a silty clay matrix underlies this fill layer. Bedrock lies beneath this boulder layer.

Field permeability tests have been conducted in selected bore holes and laboratory mechanical analyses were performed on construction fill material to obtain a relative indication of the ability of the various subsurface zones to transport water. These results are contained in the 1981 Preliminary Hydrogeological Investigation conducted by Groundwater Technology Inc [reference 9.2].

The red, silty sand fill material was well graded, containing about 45% passing a #200 sieve. The well-graded nature of the fill suggests a very low permeability, probably ranging between 1E-6 cm/sec to 1E-8 cm/sec.

The ash fill material, however, is believed to have substantially greater permeability than the red silty sand fill. Actual permeability values for the ash fill are unavailable since the friable particles may have been altered by the mechanical analysis technique that was used.

In general, the construction fill and boulder layers were less permeable than the bedrock. Tests indicated that the boulder layer acted as a barrier or confining layer to the flow of groundwater between the construction fill and the bedrock, essentially isolating the shallow groundwater from the deeper bedrock groundwater.

The permeability of bedrock varies with depth. Test results indicated rock permeability ranging from moderate values (about 1.06E-3 cm/sec), to negligible values (no flow recorded in the test sections). The highest permeability was at the boulder layer to bedrock interface. This probably was a function of the weathered, fractured nature of the top of the bedrock. Other zones of higher permeability may be present in the bedrock based on test borings.

Ground water has been measured at depths of about three to five feet below the surface in the immediate site vicinity. Groundwater level observations from test borings also indicate a groundwater gradient of 10 to 15 feet over a distance of 600 to 800 feet from the site to the river. An additional report issued by Haley and Aldrich in 1998 [reference 9.34] supports these values in that ground water was reported to depths ranging between 4 and 16 feet.

An additional hydrogeological investigation was conducted in 1992 by GEO Engineering Inc. [reference 9.3] to determine the actual groundwater flow direction in the shallow aquifer of the SNEC facility. Eight overburden wells (shallow) groundwater-monitoring wells were installed for this purpose.

Groundwater movement within the bedrock beneath the site is predominantly controlled by fractures in the bedrock. Groundwater also moves within the spaces (bedding planes) between the individual rock layers of the bedrock. The direction of groundwater is controlled by the orientation of these fractures and bedding planes.

The 1992 hydrogeologic investigation revealed specific orientations of the two dominant fracture patterns and of the bedding planes. One fracture pattern trended northeast-southwest, and dipped (tilted) moderately to the northwest. The second fracture pattern trended northwest-southeast, and dipped steeply toward the southwest. The bedding planes trended northeast-southwest, and dipped moderately southeast.

SECTION 4.2.3 METEOROLOGY

REGIONAL CLIMATE

The climate of the south-central Pennsylvania region can best be described as a region of contrast. During the late spring, summer and early fall, the region is dominated by air masses that originate from the southeastern United States.

Warm and humid conditions are normal during this time along with air mass thunderstorms and precipitation associated with cold fronts. These frontal boundaries are more active (weather-wise) during the spring and autumn, when the polar jet stream is over the region.

The winter season is cold and often times overcast. Air masses are generally cold and dry. Winds associated with these air masses are generally from the west-northwest. They originate from central Canada and move into the region behind active cold fronts and low pressure systems that move north along the Atlantic seaboard.

The region will experience a large percentage of cloud cover, in part, due to its close proximity to the Great Lakes. As the cold, polar air passes over the relatively warm lakes, condensation occurs along with lake-effect snows close to the shore of these large bodies of water.

Drying will occur as the distance increases from the lakes and a constant cloud cover will dominate in western Pennsylvania.

In addition, in this region of steep-sided valleys, mountain winds during the day will lead to an increase in clouds as daytime heating will cause rising air motions and subsequent condensation (clouds).

Precipitation in the region is mainly due to air mass thunderstorms, cold front passages from the west, and low pressure storms that move along the Appalachian Mountains through the St. Lawrence Valley region.

These storms will generally produce significant amounts of rain from a northeast direction. Annual amounts can range from 30 to 40 inches.

One quarter of the winter precipitation is from snowfall.

The major fall and winter coastal storms that produce large amounts of precipitation in the eastern half of the state have minimal effect on the site.

Topographic features influence winds in the Saxton region. The facility lies in the main valley formed by the Terrace and Saxton Mountains to the east and Tussey Mountain to the west.

The Allegrippis Ridge is also located to the west. The mountains and valley are generally southwest to northeast.

With the large-scale wind flow out of the west, "wind channeling" occurs at the lower levels, which give rise to a small-scale southwesterly flow up the valley. On a smaller scale, the varying topographic regime will cause valley-slope circulation patterns.

During the daytime, beginning in mid-morning and continuing until near sunset, the wind will cross the valley and blow up the sides of the mountain as daytime heating near the surface creates unstable, rising air and, as previously mentioned, an increase in clouds.

Beginning around midnight and continuing until shortly after sunrise, the wind tends to blow down the mountain slope as the land surface along the slopes cools more rapidly than at the base of the valley. This cooler, more dense, stable air will sink toward the valley and move down the canyon.

Wind speeds are generally light at the SNEC facility site (below ten miles per hour), primarily due to the wider valley around the site.

PAST METEOROLOGICAL FACILITY OPERATIONS

An onsite meteorological program at the SNEC facility was instituted in 1960 and operated for a period of one year.

Data from the program was used to establish estimates of dispersion and diffusion characteristics of the site.

The network contained three towers located east, west and north of the site. Instrumentation at each location included wind speed, wind direction and ambient temperature devices. Temperature probes were mounted at different vertical levels to try and obtain a better understanding and determination of the inversion stable layer that develops with valley flow at night. Other indications for the site, such as barometric pressure, river water temperature, relative humidity and rainfall, were available.

METEOROLOGICAL DISPERSION ASSESSMENT

Due to steep mountain slopes in the Saxton region, direct heating that leads to unstable meteorological conditions and strong mixing (dispersion) are minimal. In fact, conditions of strong mixing occur only 3 percent of the time. Air dispersion in the region is either neutral or stable. The former condition is synonymous with a cloud cover or moderate wind, while the latter condition is characteristic of cold air "pooling" due to mountain winds at night.

Under neutral conditions in which mixing throughout the layer occurs, the ultimate dispersion is in a direction determined by the wind direction in the main valley. As previously mentioned, the two wind directions are southwesterly, along the mountain-valley range and westerly, blowing up out of the valley through the gap between Terrace and Saxton Mountains to the east. These winds range between 5 and 10 miles per hour.

Under stable conditions, the stratification of air isolates the valley flow from the large-scale wind flow of the main valley. Cold air "pooling" in the valley will cause a temperature inversion to develop. This inversion will tend to "trap" dispersion within a well-mixed region in the first several hundred feet. Fifty percent of the time, these stable conditions exist. Of this, approximately 25 percent are extreme in that pollutant "trapping" or fumigation in the lower levels will occur. Wind speeds will be 3 to 5 miles per hour with flow generally down the valley away from the Saxton region. Since daytime heating takes place in the region, prolonged periods of pollutant "trapping" do not exist.

Since releases from the SNEC facility during decommissioning are considered "ground" in nature, highest radioactive dispersion values will be close to the site boundary and in the direction of the prevailing wind flow.

It can be expected that the major portion of the particulate matter originating at the site will be deposited in the valley north-northeast of the site. These areas are sparsely occupied and almost completely covered by forests.

Wet deposition of radioactive particulate matter will occur during periods of precipitation. Since most major precipitation events occur from a northeast direction, radioactive material would be deposited toward the south and southwest directions. In addition, with a ground release, this washout will occur close to the source and within the plant's property line.

It should be noted that an elevated release, by definition [reference 9.4], is a release that is 2 to 2.5 times the height of the nearest adjacent building structure. While ground release is considered for the site during the decommissioning phase, plant operational phase releases were via the ventilation stack which would be considered as an elevated release. In the case of an elevated release, the wet deposition of particulate matter will occur in the same direction as for the ground release but washout could have occurred farther away from the release point. The SNEC Facility Final Safeguards Report [reference 9.5] indicated that "washout of particulate matter would be expected to occur primarily along the river southwest of the site".

SECTION 5.0 HISTORICAL SITE ASSESSMENT METHODOLOGY

SECTION 5.1 APPROACH AND RATIONALE

The SNEC Facility is somewhat unique in that it was constructed and operated on a site that had already been in use as a commercial steam electrical generating station. In this sense, the SNEC Facility is essentially a site within a site.

The fundamental approach to development of the SNEC Facility Historical Site Assessment was to research and determine the actual and potential impacts to the overall property that were created by the existence of, operation of, and decommissioning of, the Saxton Nuclear Experimental Corporation's nuclear operations.

The history of the SSGS Station facilities and its remains are included as appropriate in order to support or facilitate a full understanding of the SNEC Facility.

It is not the intention of this Historical Site Assessment to define and/or develop information associated with the SSGS in excess of that which is required to support the SNEC Facility License Termination Program.

In recognition of the long period of time that electrical generating facilities were present on the site and the successive generations of site work activities that have taken place over several decades, it was necessary to pursue "institutional lore" type issues to a greater extent then would normally have been the case.

SECTION 5.2 BOUNDARIES OF SITE

For purposes of this Historical Site Assessment, all contiguous Penelec property that surrounds and borders the SNEC Facility Site was considered. The boundaries of this property are shown on Figure B-1.

SECTION 5.3 DOCUMENTS REVIEWED

The following documents were reviewed during the course of this Historical Site Assessment. Additional documents reviewed are listed in Section 9.0 REFERENCES.

5.3.1 Phase I Environmental Site Assessment – PENELEC-GPUN/Saxton Facility – December 1994 – prepared by CH2M HILL.

5.3.2 Saxton Nuclear Facility Final Safeguards Report – April 20, 1961

5.3.3 Saxton Soil Remediation Project Report – 1994

5.3.4 SNEC Status Report and Recommendations – August 24, 1981

5.3.5 SNEC Historical Site Assessment Questionnaires – July 12, 1998 [Responses]

5.3.6 Historical Facility Photographs

5.3.7 BACKGROUNDER – Questions and Answers about SNEC – GPUN Communications Division – April 1993.

5.3.8 SNEC Letter to AEC regarding Gaseous Radioactivity Release – December 28, 1971

5.3.9 SNEC Letter to AEC regarding Gaseous Radioactivity Release – December 9, 1971

5.3.10 SNEC Letter to AEC regarding Gaseous Radioactivity Release – May 18, 1970

5.3.11 SNEC Letter to AEC regarding Gaseous Radioactivity Release – August 31, 1970

5.3.12 SNEC Letter to AEC regarding Spill of Radioactive Water – December 10, 1968

5.3.13 SNEC Letter to AEC regarding Gaseous Radioactivity Release – October 9, 1963

5.3.14 Pre-operational Environmental Radioactivity Survey Program – Nuclear Sciences & Engineering Corporation – circa 1961.

5.3.15 SNEC Facility Decommissioning Environmental Report – April 1996

5.3.16 SNEC Facility Decommissioning Plan – February 1996

5.3.17 Preliminary Hydrogeological Investigation SNEC – Groundwater Technology Inc – 1981

5.3.18 Phase 1 Report of Findings – Groundwater Investigation – GEO Engineering Inc.-1992

5.3.19 SNEC Demolition Plan – 6675-PLN-4542.04 - June 1992

5.3.20 SNEC Facility Reactor Support Buildings Demolition Report – 1994

5.3.21 Historical SNEC Facility Radiological Surveys

5.3.22 Report on Drilling and Radiometric Analysis of Samples Collected at Sites of Spent Resin and Liquid Waste Tanks – SNEC Facility. Penn State – January 16, 1989

5.3.23 Geologic, Chemical, Radiometric and Geotechnical Studies of Samples from Eleven Drill-holes in Surficial Materials – SNEC Facility. Penn State – December 20, 1988

5.3.24 Saxton Reactor Facility Decommissioning Study – November 1971

5.3.25 Project Plan for Dismantlement of the Saxton Nuclear Experimental Facility – Burns and Roe – November 25, 1981

5.3.26 Saxton Nuclear Experimental Reactor Facility Radiation Protection Manual – September 15, 1961

5.3.27 Saxton Decommissioning Plan and Safety Analysis Report – April 1972

5.3.28 Various historical newspaper articles relating to the SNEC Facility operations and events.

5.3.29 Various drawings and blueprints relating to the construction of the SSGS.

5.3.30 Various drawings of the SNEC Facility structures, systems and components.

5.3.31 Final Release Survey of the Reactor Support Buildings – GPUN – Rev-3 – March 1992

5.3.32 Confirmatory Radiological Survey for Portions of the Saxton Nuclear Experimental Facility Saxton, Pennsylvania – Oak Ridge Associated University – June 1991

5.3.33 1994 Saxton Soil Remediation Project – GPUN – May 1995

5.3.34 Letter to R.W. Heward Jr., SNEC President and M.B. Roche, SNEC Vice President from Gary Baker, SNEC Plant Manager – titled "Radiological Status of the SNEC Exclusion Area Yard" – dated November 3, 1986

5.3.35 Letter to NRC from J.E. Hildebrand – C301-91-0001 – Final Release Survey of the Reactor Support Buildings, Revision No-2 – dated January 31, 1991

5.3.36 R.G. Rolph letter to File – SNEC-92-0042 – Radioactive Material Release – dated December 1, 1992

5.3.37 B.A. Good letter to File – SNEC-93-0002 – Telecon with J. Roth, NRC, Re: Release of Resins during Demolition Activities – dated January 4, 1993

5.3.38 Letter from R.W. Heward to NRC – C301-88-2012 – Responses to NOV contained in NRC Inspection Report No. 50-146/88-01 – dated June 27, 1988

5.3.39 USNRC Post Demolition Inspection Report No. 50/146/92-02 of October 20, 1992 – dated November 24, 1992

5.3.40 Saxton Nuclear Experimental Corporation – Reactor Operations Daily Summaries – April 1962 through May 1973

5.3.41 June 1988 In-situ Survey conducted by EG&G Energy Measurements for the DOE/NRC. Report No. DOE/ONS-8806

5.3.42 Multi-Agency Radiation Survey and Site Remediation Manual [MARSSIM] – NUREG-1575

5.3.43 Decommissioned Status of the Saxton Reactor Facility – February 20, 1975

5.3.44 Letter - "Disposal of SNEC Owned Equipment" – dated October 22, 1974 from C.R. Montgomery to George Minkin

5.3.45 Letter – "Disposal of SNEC Owned Equipment at the Saxton Steam Generating Station" – dated November 13, 1974 from C.R. Montgomery to C.L. Imhoff

5.3.46 Letter – "Assignment of SNEC Owned Property to the Borough of Saxton" – dated December 18, 1974 from C.R. Montgomery to R.C. Bartle

5.3.47 July 1989 "Aerial Radiological Survey of the Saxton Nuclear Experimental Corporation Facility" conducted by EG&G Energy Measurements for the DOE/NRC, report number EGG-10617-1132

5.3.48 CoPhysics Corporation Report – Review of the "Final Release Survey of the Reactor Support Buildings" at the Saxton Nuclear Experimental Facility – dated December 14, 1999 – Theodore E. Rahon, PhD., CHP.

5.3.49 SNEC Facility License Amendment No-15 to DPR-4 – Issued April 20, 1998

5.3.50 NUREG/CR-5849 "Manual for Conducting Radiological Surveys in Support of License Termination" – February 1993 – DRAFT

5.3.51 SNEC Soil Characterization Plan – 6575-PLN-4542.05

5.3.52 SNEC Soil Disposal Plan – 6575-PLN-4542.07

5.3.53 Haley and Aldrich "Summary of Field Work" – July 1998

SECTION 5.4 PROPERTY INSPECTIONS

Information contained in this report utilized material extracted from previous documented property inspections as well as extensive inspections by the current SNEC Engineering staff. Such inspections are appropriately cited and referenced within the text of this report.

SECTION 5.5 PERSONAL INTERVIEWS

An "Historical Site Assessment Questionnaire" was developed and sent to present and former employees of the SNEC Facility. The responses to this questionnaire [Reference 9.19] are incorporated as appropriate, throughout this report.

Additional personnel interviews were conducted that related to particular aspects of SNEC Facility and SSGS plant operations. In some cases, these additional interviews had to be conducted via telephone and U.S. Mail.

SECTION 6.0 HISTORY AND CURRENT USAGE

SECTION 6.1 HISTORY

SECTION 6.1.1 SAXTON STEAM GENERATING STATION [SSGS]

Information in this section was extracted from Reference 9.1.

PENELEC purchased the property sometime prior to 1922. Prior to PENELEC ownership, the property was apparently owned by David Weaver and was either undeveloped or used as farmland.

The history of farming practices and pesticide application in the area is not known. The Bedford County Tax Office could not provide site ownership history details.

According to PENELEC, the SSGS was built during 1922 and 1923 by the Day and Zimmerman Company of Philadelphia, for the former Penn Central Light & Power Company. The electric installation consisted of number-1 and number-2 steam-turbine generators of 12,000 KW capability each, installed in 1924. And number-3 steam-turbine generator of 38,000 KW capability installed in 1926. The total capacity of the station was 62,000 KW. The Saxton Steam Generating Station was in continuous operation from 1924 to July of 1954. Following July 1954 it served as an active reserve station, operating on-call to meet system load and capacity requirements. The plant consisted of one main building that housed boilers, generators and related equipment.

A 780-foot long gravity dam impounded the Raystown Branch of the Juniata River about 700 feet downstream from the mouth of Shoup Run. The backwater from this dam extended approximately 1-1/2 miles upstream, providing pondage for the plant's circulating water supply.

Circulating water was provided to the plant via a 6-foot by 8-foot concrete intake tunnel that was approximately 650 feet in length. At the plant end of the intake tunnel a concrete forebay structure housed trash racks, a settling chamber and a mechanical rack rake. From the forebay structure, the circulating water then passed through a divided screen chamber with four traveling screens. Screen wash from this system was directed into the station discharge tunnel via a 20-inch diameter pipe.

A concrete discharge tunnel, approximately 650 feet long, conveyed heated discharge water to the river.

A spray pond installation provided the capability for cooling and recirculating 30,000 gpm of heated plant discharge water. A 30,000-gpm pump drew water from a chamber in the discharge tunnel and pumped it through a system of 768 two-inch spray nozzles arranged in an area 297 feet long by 125 feet wide. The cooled water flowed back into the river some 300 feet upstream from the intake structure. This spray pond system was regularly operated during the months of June through September whenever the circulating water flow exceeded 30,000 gpm and at other times when river conditions made it necessary or desirable.

During periods of freezing weather, heated water from the spray pond supply line was recirculated back into the intake tunnel in order to prevent ice formation within the forebay and travelling screen areas.

A small concrete dam was formerly located on Shoup Run approximately 850 feet upstream from the mouth. A concrete pipe 42 inches in diameter referred to in this document as the "Shoup Run Shunt", which is still present, extends 865 feet from the upstream side of the this dam to a point at the east wing-wall on the downstream side of the main dam on the river. This installation was used to divert the normal flow of Shoup Run, which is highly acidic, from the main circulating water reservoir in order to protect the condensers and station service water piping from excessive corrosion.

Other facilities included the following: a garage, warehouse, coal storage areas, and coal conveyor.

From 1923 to 1944, coal was transported to the plant from a mine several miles away via railroad or an aerial tramway. From 1945 to 1974, coal was shipped via rail or truck from other Pennsylvania mines.

The SSGS was retired on December 31, 1974.

Demolition and salvage operations for the SSGS began in 1975. According to Kovalchik Salvage Company (Indiana, Pennsylvania), all metals and wood were removed prior to demolition of the main building structure [reference 9.1].

The former SSGS main building structure was leveled, and structural brick and concrete were placed in the below grade portion of the main building. The area was then covered with soil and crushed stone.

Demolition debris is currently present below grade at the former building site to depths of at least 30 to 40 feet. Demolition activities took place from approximately 1975 to 1977. Plant demolition material was apparently also used to fill the former cooling water spray pond area.

The SSGS garage and warehouse remain on the site. The warehouse is presently in use for material storage by PENELEC and the garage building is used by SNEC for storage of materials and equipment.

The out-fall of the garage building floor drain system ties into the Shoup Run Shunt. Resin liners, containing very low levels of radioactivity, were stored in this area by the SNEC facility at one point but no radioactive contamination was detected by surveys that were taken following removal of the resin containers.

The SSGS staff for many years apparently used a lay-down area located to the north of the sub-station. The exact nature of the use of this temporary storage area is unknown, however it was apparently used for scrap metal storage and burning insulation off of scrap wire on some occasions.

Figure B-1 depicts a property map of the Saxton Site that shows the relationship between the SSGS and the SNEC Facility.

SECTION 6.1.2 NUCLEAR PLANT

The SNEC facility is situated on a 1.148-acre plot of land deeded to SNEC by PENELEC. This plot contains the yard and buildings of the nuclear plant. An additional 9.6 acre area is fenced in around the electrical switchyard and buildings that are still in use by PENELEC.

The Saxton Nuclear Experimental Corporation Facility is a deactivated 23.5-megawatt thermal, pressurized water reactor (PWR). It is owned by the Saxton Nuclear Experimental Corporation, a wholly owned subsidiary of GPU Incorporated and maintained by GPU Nuclear.

SNEC was designed and constructed by Gilbert Associates Incorporated [GAI] who worked under the direction of Westinghouse, the prime contractor. A "Preliminary Hazards and Safety Report" was submitted to the Atomic Energy Commission [AEC] on July 24, 1959 and a construction permit was issued on February 11, 1960.

Construction of the SNEC Facility began in 1960 and was completed in 1962. In May of 1962, nearly 800 people attended the formal dedication of the reactor which was the fifth nuclear plant in the United States at that time. The nuclear power facility first went critical on April 12, 1962 and it was operated until May 1,1972, primarily for training and research and development purposes.

The SNEC Facility is maintained under a 10 CFR Part 50 License and associated Technical Specifications. The license was amended to possess but not operate the SNEC reactor. The license expires on February 11, 2000 but will remain in effect until license termination has been successfully completed in accordance with 10 CFR 50.51(b).

The SNEC reactor was permanently shutdown on May 1, 1972. During its operation, the SNEC Facility generated 96,400.3 Mega-watt hours of gross generation.

The nuclear fuel was removed from the site in 1972 and shipped to the Atomic Energy Commission (AEC) facility at Savannah River, South Carolina, who remained owner of the fuel. As a result neither SNEC nor GPU Nuclear have any responsibility relative to the spent fuel from the SNEC Facility.

In addition, the reactor control rod blades and a portion of the superheated test loop were also shipped off site.

Following fuel removal, the plant equipment, tanks and piping located outside of the CV were removed.

The buildings and structures that supported reactor operations were partially decontaminated from 1972 through 1974.

After the formation of GPU Nuclear in 1980, SNEC formed an agreement with GPU Nuclear to utilize GPU Nuclear and its resources to maintain, repair, modify, or dismantle SNEC facilities as may be required.

GPU Nuclear has the responsibility to carry out the SNEC facility decommissioning process.

Decontamination/removal of reactor support structures and buildings was performed in 1987, 1988, and 1989, in preparation for demolition of these structures. This included removal and discharge of approximately 210,000 gallons of groundwater from various structures, the decontamination of the C & A Building, the RWDF, yard pipe tunnel, the FDSB, and removal of the RWST.

A comprehensive final release survey [reference 9.7] was conducted from October 1988 to June 1989, to verify that residual contamination was within NRC guidelines for unrestricted use.

Upon acceptance of the final release survey by the NRC, the C & A building, the RWDF building, the yard pipe tunnel, the FDSB, and the RWST were demolished in 1992. This demolition activity is documented in reference 9.10.

In November of 1994, the SNEC Soil Remediation Project [reference 9.9] was completed. This was a comprehensive project involving soil monitoring, sampling, excavation, packaging and shipment of contaminated site soil. The program successfully reduced radioactive contamination levels below the NRC current and presently proposed levels required to meet site cleanup criteria for unrestricted use.

Site-specific radiological and environmental data were obtained in 1995 as part of the SNEC Site Characterization Plan [reference 9.35] to support development of the SNEC Facility Decommissioning Plan [reference 9.6].

In February of 1996, GPU Nuclear issued the SNEC Facility Decommissioning Plan [reference 9.6].

In November 1996, construction of the SNEC Facility – Decommissioning Support Facility [DSF] was completed. This structure is located immediately adjacent to the south side of the CV and serves as a staging area for moving equipment in and out of the CV. The opening between the DSF and the CV was not created until License Amendment No-15 [reference 9.30] was issued authorizing decommissioning to commence.

On April 20, 1998, GPU Nuclear received License Amendment No-15 [reference 9.30] from the NRC, which authorized decommissioning of the SNEC Facility.

During the spring and summer of 1998, decommissioning activities that included asbestos insulation remediation, equipment and component removal, and removal of the three yard septic tanks, was completed. Also, in this time period, a Large Component Removal Contractor commenced preparations for removal and disposal of the SNEC Facility large components [the reactor vessel, the steam generator, and the pressurizer].

During the Fall of the 1998, the SNEC Facility reactor vessel, steam generator, and pressurizer were successfully removed from the CV and shipped to the Chem-Nuclear disposal facility in Barnwell, South Carolina.

During the winter of 1998 and the spring of 1999, the remaining mechanical components were removed from the CV and concrete decontamination operations were commenced.

The only remaining SNEC buildings and structures are the CV, a concrete shield wall located around the NW and NE quadrant of the CV, the remaining portion of the septic system base mat, the septic system underground out-fall piping, the DSF, and the tunnel sections adjacent to the outer circumference of the CV. Concrete barrier walls have been installed to isolate the open ends of the tunnel that were formerly connected to the C &A Building, the RWDF, and the former SSGS.

SECTION 6.1.3 BRIEF HISTORY OF SNEC SITE DECOMMISSIONING ACTIVITIES

DECOMMISSIONING ACTIVITIES DURING 1972 – 1973

On May 1, 1972 the SNEC Facility reactor was shutdown for the final time. In the months following shutdown, all spent nuclear fuel was removed from the plant and shipped to the USDOE facilities at their Savannah River Site in South Carolina. During this period, all special nuclear material (fuel, sources etc.) was also removed from the site and properly dispositioned.

Figure B-2 depicts the SNEC Facility Site – Post Shutdown Configuration.

During the following period, the SNEC facility processed the remaining inventory of contaminated water [~ 30,000 gallons], removed and shipped the majority of components from the reactor support buildings, excavated and dispositioned all underground SNEC facility tanks and associated piping, removed piping systems from the yard pipe tunnel, removed the ventilation stack, drained systems within the CV and disposed of all remaining contaminated resins and other waste materials. Some underground piping associated with the Safety Injection system and the spent resin system remains and will need to be removed during decommissioning.

The buildings and structures that supported reactor operations were partially decontaminated and the SNEC Facility was placed in a form of monitored storage that is somewhat analogous to the present condition that is referred to as "SAFESTOR".

Items and activities of interest to Final Status Survey planning personnel are:

- Removed underground storage tanks were stored in the SNEC Facility yard areas following removal and during preparation for shipment.
- All unused piping associated with the underground liquid storage tanks was removed.
- Ashes were hauled in and used to backfill the hole where the three liquid storage tanks were formerly buried [RWDF Liquid Storage Tanks 1 and 2 and the Decontamination Tank].
- A plastic pipeline was installed between the discharge tank pump and a valved, capped fitting on the river water return line where it enters the SSGS [3/1/73].
- The river water header at the SSGS was cut and plastic pipe was run from the SSGS entrance to the SNEC Facility C&A building tunnel [3/6/73].
- The contaminated sections of the outer tanks around the storage tanks were cut out and put in the storage tanks.
- Drained the river water system, storage well system, recirculation system, heating system, d/p cells, demineralized water system, shutdown cooling system and component cooling system. Set up demineralizer and demineralized the CV sump [5/29/73].
- The reactor support buildings of the SNEC Facility were extensively surveyed in July and August of 1973. The surveys included thousands of smear samples and direct radiation readings in the RWDF, the C&A building, the yard pipe tunnel, and the RWST and pump house. These surveys provided the post-shutdown radiological conditions in the buildings. Smearable contamination levels were all less than 1000 dpm/100cm2 beta-gamma and less than 100-dpm/100cm2 alpha. Direct radiation measurements (contact and general area) ranged from about 0.05 mR/hr to about 0.3 mR/hr on contact with the surface. The unrestricted release criterion at that time, was a 0.4 mR/hr fixed activity limit. These surveys showed that most areas met the 0.4 mR/hr criterion.
- The radiological condition of the SNEC facility following shutdown is documented in a report titled "Decommissioned Status of the Saxton Reactor Facility" which was submitted to the USNRC on February 20, 1975 [reference 9.23]

DECONTAMINATION ACTIVITIES – 1987/1988

In the late 1980s a decision was made to commence the completion of the SNEC facility decommissioning process. This decision was driven, in part, because the remaining support buildings and structures were becoming significantly deteriorated and posed an industrial safety hazard to workers.

Figure B-3 depicts the SNEC Facility in its Pre-Demolition Configuration.

A technical specification change request was submitted to the NRC to remove the reactor support buildings from the SNEC Facility Technical Specifications, as a prerequisite for demolition.

Characterization surveys were performed in 1987 to locate areas in the reactor support buildings that needed additional decontamination to meet USNRC release guidelines. Measurements were made for both fixed and removable radioactivity.

Results of these surveys showed that additional decontamination was needed in all areas/cubicles of the RWDF, the yard pipe tunnel, the RWST and in most of the first floor cubicles of the C&A building.

Based on the radiological characterization results, the appropriate release criteria were selected from USNRC Regulatory Guide 1.86 "Termination of Operating Licenses for Nuclear Reactors".

An extensive decontamination effort and a comprehensive final release survey were performed to document the radiological condition of the reactor support buildings and to demonstrate compliance with USNRC guidelines for unrestricted release and use.

The overall strategy to complete the decommissioning of the facility and to release the site for unrestricted use consisted of a multi-year, multi-phased effort containing the following elements:

- Removal of groundwater from the basement of the RWDF and yard pipe tunnel.
- Decontamination, survey, and dismantlement of the reactor support structures and outbuildings.
- Decontamination, survey, and dismantlement of the CV and restoration of the site.

The first phase, groundwater removal, was completed in 1987. The water from the RWDF basement and the yard pipe tunnel was first pumped into one of two 7500-gallon holding tanks. Water samples were collected and analyzed for radiological and water quality characteristics prior to discharge. A total of approximately 210,000 gallons of water were released to the Raystown Branch of the Juniata River. All such water releases were in accordance with Federal and state regulations and requirements.

Decontamination was performed in 1987, 1988, and 1989 on the C&A building, the RWDF building, the FDSB, and the yard pipe tunnel to ensure residual contamination was as low as reasonably achievable.

The decontamination effort involved removal of any remaining components such as ventilation ductwork, suspended ceiling tiles, control room consoles, doors, floor drains, etc. All materials were surveyed in accordance with approved procedures for survey and release of equipment, and disposed of as either clean scrap or radioactive waste.

After the buildings were gutted, more detailed radiological surveys were performed on the floors, walls, and ceilings to locate areas needing further decontamination.

The C&A building required the least amount of decontamination and as expected, the RWDF required the most extensive decontamination effort. The yard pipe tunnel also required extensive decontamination.

The RWST and its associated Safety Injection Pump House were dismantled and the contaminated sections were shipped off site as "Low Specific Activity" [LSA] radioactive waste to a contractor for decontamination and final disposal. The concrete pad that supported the tank was left on site at that time.

The FDSB was an earthen unit with wooden cribbing. It was used to store drums of radioactive waste generated by RWDF operations. The top 6 to 12 inches of surficial soil materials were removed and shipped off site as LSA radioactive waste for disposal at a licensed disposal facility.

Debris generated from decontamination activities consisted mainly of metal and concrete. A small portion of the radioactive waste was sent directly from the site for burial as LSA radioactive waste. This consisted mainly of scrap metal that was found to be contaminated. The majority of the debris was high density concrete generated during surface/structure decontamination. This debris was packaged as LSA radioactive waste and shipped to a contractor for waste volume reduction and burial.

Approximately 16,820 cubic feet of concrete debris was processed by the contractor, which resulted in the burial of approximately 5100 cubic feet. The total volume of radioactive waste generated by the decontamination activities in 1987 and 1989, was approximately 8500 cubic feet.

A comprehensive final release survey of these structures/buildings was conducted from October 1988 to June 1989 to verify that residual contamination was within USNRC guidelines for unrestricted use. The final exposure rate measurements of the buildings were within the variability of the off site background exposure rate measurements. In-situ gamma spectroscopy confirmed that radioactivity in the buildings is mostly naturally occurring radionuclides.

Several areas were identified that were inaccessible during the final release survey. They were designated as "Demolition Hold-Points" that were to be surveyed during the dismantlement and demolition phase.

The Penelec line shack that is located to the north-northeast of the FDSB contained surficial materials in the overhead structural beams, which appeared to have entered the building through a vent. The surficial materials were found to contain a maximum of 15 pCi/gm of Cs-137. All accessible beams were vacuumed, wiped down and surveyed. All survey measurements were below the USNRC guidelines.

Two Penelec buildings, a garage and a warehouse building, were also surveyed. The warehouse building was found to contain a few small locations with elevated radiation readings which were sampled and subsequently determined to be the result of natural radioactivity contained in structural materials.

The SNEC facility chlorinator pump house building was surveyed. All survey results were less than USNRC release guidelines except for one pipe that was designated as a Demolition Hold-Point.

WORK ACTIVITIES PRIOR TO REACTOR SUPPORT BUILDING DEMOLITION

As described above, decontamination and survey of the reactor support buildings was completed in 1989. This was documented in a report titled "Saxton Nuclear Experimental Facility Final Release Survey of the Reactor Support Buildings" [reference 9.7]. Revision-0 of the report was issued on April 16, 1990, revision-1 was issued on September 6, 1990, revision-2 was issued on January 31, 1991, and revision-3 was issued on March 6, 1992. The survey results indicated that the residual radioactivity was less than the USNRC guidelines for unrestricted use. In fact, decontamination and survey efforts were designed to exceed minimum regulatory guidance and standards whenever lower limits were reasonably achievable.

An independent verification survey was performed in October of 1990, by Oak Ridge Associated Universities [ORAU], under contract with the NRC. The ORAU report [reference 9.8] was issued in June of 1991 and was received by SNEC in November 1991. This report concluded that the documentation provided by GPU Nuclear was thorough and adequately described the final radiological status of the reactor support buildings. Radiological data demonstrated that the residual activity levels satisfied the established decommissioning guidelines.

Upon NRC acceptance of the final release survey, the SNEC license was amended to remove the reactor support buildings and other structures from the technical specifications, thus paving the way for demolition of those buildings and structures.

REACTOR SUPPORT BUILDING DEMOLITION ACTIVITIES – 1992

Information in this section was extracted from Reference 9.10.

In preparation for this activity the SNEC facility issued the "SNEC Demolition Plan" [6675-PLN-4542.04] and completed all required permitting, training, and safety prerequisites.

Throughout the demolition process, an on-going environmental monitoring program was conducted which concluded that the dismantlement of the SNEC Facility outbuildings had no adverse effect on the environment or the public health and safety.

Following preparatory work, demolition of the SNEC outbuilding structures began on June 23, 1992 when a wrecking ball was first used on the Yard Pipe Tunnel roof.

Since the structures had been free released (except for Hold Points) under the guidance provided by USNRC Regulatory Guide 1.86, the Stanford Letter (reference 9.36) and the additional requirements referenced in reference 9.7, the demolition process was considered conventional in nature.

The FDSB, the Yard Pipe Tunnel, the C&A building, and the RWDF were systematically dismantled and demolished in accordance with the SNEC Demolition Plan and adherence to the Hold Points.

The RWST foundation pad was completely demolished and removed.

The Chlorinator/Sewage Treatment building was demolished down to grade elevation. The three underground septic style tanks remained in place for later disposition.

The Yard Pipe Tunnel was demolished to its floor elevation. The C&A building was demolished to grade elevation, and the RWDF was demolished to three feet below grade.

Soil samples were obtained and analyzed from areas beneath concrete floors, as they became accessible during demolition operations.

During the demolition process, concrete debris was crushed and utilized as fill material in the below grade portions of structures. The RWDF utilized clean soil from off site for the final three feet of back fill.

All backfilled areas were compacted in approximately 12" lifts as they were filled. Following final grading, the site was then hydro-seeded and mulched and erosion controls were installed to minimize run-off.

The excavated site soil was arranged into two piles to await future disposition. With the exception of the two soil piles, the site was recontoured and hydro-seeded (seeding included the soil piles). The south soil pile was comprised solely of FDSB soil and soil excavated from the south side of the Yard Pipe Tunnel. The north soil pile was comprised of all other soil excavated prior to demolition and soil removed from the Westinghouse area.

Demolition debris in the form of scrap metal, roof trusses, I-beams, etc., was salvaged by the demolition contractor and recycled. Non-recyclable roofing debris and excess concrete debris was transported to the Modern Landfill near York, Pa., for disposal.

Hold Point materials were dispositioned by removal, survey and free release or decontamination survey and free release or disposal as radioactive waste.

This phase of demolition activities was concluded on September 4, 1992.

Following demolition completion, an announced safety inspection was conducted by the USNRC. No safety concerns or violations of regulatory requirements were identified. Results of NRC surveys indicated that the materials in Hold Status could be released for unrestricted use or disposal. Details of this inspection can be found in Reference 9.16.

Figure B-4 depicts the SNEC Facility in its Post Demolition Configuration.

Items and activities of interest to Final Status Survey planning personnel are:

- Per reference 9.16, section 3.0 "Analyses performed by the licensee on soil from the bottom of the excavations indicated the presence of radionuclides below the NRC guideline values (i.e., values that would allow that soil to be released for unrestricted use). However, no such release was requested or is being granted at this time."
- A ½-inch steel plate was installed against the concrete block wall (installed in 1974) that separates the CV Pipe Tunnel from the Yard Pipe Tunnel, to provide protection during demolition and backfill work.
- Drainage holes were not made in the Yard Pipe Tunnel floor because the walls were demolished down to the floor elevation.
- Approximately 400 tons of clean fill limestone from off site was used in the RWDF back-fill and to form a boundary between the free released Yard Pipe Tunnel and the adjacent soil during backfill operations.

- The C&A building north foundation wall, approximately 12 inches south of and parallel to the CV Tunnel, was left intact to prevent inadvertent damage to the CV Tunnel structure which was not included in this phase of demolition.

- Clean fill brought in from off site was analyzed to determine a baseline radioactivity level. This fill was in the form of No.4 or 2B crushed limestone from New Enterprise Stone & Lime Plants at either Roaring Spring or McConnelstown, Pa., or soil from a private landholder near the site.

- Clean fill soil [see above], excavated from a nearby source was used to bring the site to grade and serve as topsoil after demolition of the affected structures was completed. Up to three feet of soil was placed over the former structures, the site was recontoured to predominant grade, compacted, and hydro-seeded to complete the project.

- The complete 1992 inventory of railroad ties used in construction of the FDSB (387 total plus six 55-gallon drums of tie fragments) was removed. Of this inventory, 14 railroad ties had small sections, which were removed and disposed of, as radioactive waste. It should be noted that an access opening at the northwest corner of the FDSB was a pre-existing condition at the time of this demolition. Some railroad ties had been removed (probably in the mid to late 1980s) to facilitate this access. Disposition of these materials has not been determined.

- SNEC management had committed that no SNEC waste would be disposed of at the Bedford County Landfill. SNEC management entered into an agreement with Waste Management Inc., to dispose of all clean demolition debris at the Modern Landfill facility near York, Pa.

<u>1993/1994 SAXTON SOIL REMEDIATION PROJECT</u>

Information contained in this section was extracted from Reference 9.9.

In November 1993 comprehensive soil monitoring and sampling work was performed at the SNEC facility to determine and assess the extent of radioactive contamination levels present on the site.

NUREG/CR-5849 "Manual for Conducting Radiological Surveys in Support of License Termination – February 1993 – DRAFT" [reference 9.31] was used as a basis document for the development of methods and guidelines in establishing survey and assessment protocols.

A formal plan was written, "SNEC Soil Characterization Plan, 6575-PLN-4542.05" [reference 9.32] which provided specific direction and detail for the assessment of the site soil radioactivity.

Following the soil characterization work it was decided to proceed with excavation, packaging and shipment of site soil.

A soil disposal plan, "SNEC Soil Disposal Plan, 6575-PLN-4542.07" [reference 9.33] was issued in July 1994, to provide specific instructions for scope of excavation work, pre-operational and post-operational radiological survey and sampling procedures, soil shipping and handling procedures, emergency and contingency plans and final soil remediation criteria.

A site survey was developed. The affected area of the SNEC site consisted of approximately 2 acres, which comprised the area surrounding the CV, the yard area and the Westinghouse area. These areas were land surveyed into 10 square meter grids. Two soil piles (one contaminated and one clean) were each divided and indexed into ten equal vertical slices.

An equivalent total of 132 grids (not counting soil piles) were surveyed either as part of the initial soil characterization or as follow-up surveys immediately prior to remediation work. The equivalent of 32 grids was remediated which represented 22% of the area surveyed.

Contaminated soil was disposed of at both licensed disposal sites in South Carolina (105 cubic feet) and Utah (56,161 cubic feet). A total of 11 millicuries (1.2 to Barnwell and 9.8 to Envirocare) of radioactivity was contained in the soil that was shipped.

Site areas that were surveyed and remediated are mapped out on figures contained in reference 9.9.

In an interview, Perry Carmel the SNEC Site Supervisor stated that the 'South Soil Pile' was surveyed and released for use as fill material to restore excavated remediation areas to the normal site contour.

Figure B-5 depicts the SNEC Facility in its Post Soil Removal Configuration.

Items and activities of interest to Final Status Survey planning personnel are: [extracted from reference 9.9]

- Grids F6 through F9 and G6 through G9 [see figures contained in reference 9.9] will need to be further evaluated due to localized sites with elevated radiation readings near or in remnants of old structures and piping buried underground.

- In some cases radioactive contamination extended to a soil depth greater than 4 feet. Removal of this contamination would have required major demolition techniques not contained within this work scope and would have delayed the project beyond the point where adequate site erosion and sedimentation controls (seeding) could be implemented. It was determined to defer this work under the decommissioning of the CV. These areas are identified in reference 9.9. Note that these areas have been capped with clean soil that will require removal prior to excavation of potentially contaminated structures and substrate.

- At the time that the project was completed it was determined that 95% of the remediated areas (with the exception of the above mentioned grid locations), would be <3 mrem/yr. (residential scenario) and would not require further remediation.

1998 LARGE COMPONENT REMOVAL PROJECT

During the late summer and early fall of 1998, the SNEC Facility Large Components [the Reactor Vessel, the Steam Generator, and the Pressurizer] were successfully removed from the CV, packaged, and shipped to the Chem-Nuclear disposal facility in Barnwell, South Carolina.

Figure B-6 depicts the SNEC Facility in its present configuration.

SECTION 6.2 CURRENT USAGE

At the present time, the operating PENELEC facilities on the property include the substation, a line shack building, and the former SSGS warehouse.

GPU Nuclear is presently conducting decommissioning operations at the SNEC Facility.

The present day SNEC facilities include: the CV, the CV Shield Wall and pipe tunnel, the septic system base mat, the DSF, a number of temporary office trailers, a self-contained rest room facility, small storage sheds and a waste shipping staging area. SNEC also makes use of the former SSGS garage for storage of materials and equipment.

SECTION 6.3 ADJACENT LAND USAGE

The area surrounding the site is generally rural, forested and mountainous terrain. The population density of the area is low with small concentrations in the valleys and along main highways.

The population in the Borough of Saxton was listed as 838 in the 1990 census.

Current uses of adjoining properties include undeveloped wooded and residential areas. A cemetery is present along the eastern property boundary, with undeveloped wooded and residential areas along the northern, southern, and western property boundaries.

The site area adjoins the Raystown Branch of the Juniata River, which is a popular local fishing and recreation area. However, the vast majority of recreational activities along the river are centered downstream of the Site, on Raystown Lake.

The nearest private residence is located approximately 1300 feet to the south east of the CV, on the PA route 913 side of the Shoup Run Bridge.

SECTION 7.0 FINDINGS

SECTION 7.1 POTENTIAL CONTAMINANTS

The basic radiological contaminants of interest at the SNEC Facility site are Cesium-137, Cobalt-60 and H-3 (Tritium). Other fission products and activation products while they may be present are not expected to be encountered in significant abundance.

Some low-level transuranium radionuclides, such as Amercium-241 and Plutonium-238 and 239 are present in the SNEC Facility CV and in the former effluent pathway piping leading to the SSGS discharge tunnel.

However, Cs-137 is the dominant isotope present in soils and sediments remaining at the site outside of the site structures.

SECTION 7.2 POTENTIAL CONTAMINATED AREAS

This section of the report contains information that indicates the presence of potentially contaminated site areas.

Prior to consideration of the material that is contained in this section of the HSA report, it will be useful to review the basic manner in which MARSSIM addresses *IMPACTED* and *NON-IMPACTED* areas.

Basically, areas that have some potential for residual contamination are classified as "impacted areas" and areas that have no reasonable potential for residual contamination are classified as "non-impacted areas".

Impacted areas are divided into three classifications:

- Class-1 Areas – areas that have, or had prior to remediation, a potential for radioactive contamination [based on history] or known contamination [based on surveys] above the $DCGL_W$. Examples include: previously remediated areas, known leaks/spills, former burial or disposal sites, waste storage sites, and areas with contaminants in discrete solid pieces of material and high specific activity.

- Class-2 Areas – areas that have, or had prior to remediation, a potential for radioactive contamination or known contamination, but are not expected to exceed the $DCGL_W$. Examples include: locations where radioactive materials were present in unsealed form, potentially contaminated transport routes, areas downwind from stack release points, upper walls and ceilings of rooms subjected to airborne radioactivity, areas handling low concentrations of radioactive materials and areas on the perimeter of former contamination control areas.

- Class-3 Areas – any impacted areas that are not expected to contain any residual radioactivity, or are expected to contain levels of residual radioactivity at a small fraction [10% or less] of the $DCGL_W$, based on history and survey data. Examples include, buffer zones around Class-1 and Class-2 areas and areas with very low potential for residual contamination but insufficient information to justify a non-impacted classification.

SECTION 7.2.1 IMPACTED AREAS – KNOWN & POTENTIAL

SNEC FACILITY CONTAINMENT VESSEL

The SNEC Facility CV housed the nuclear reactor plant and many of its important support systems, structures and components. This structure contained the highest levels of loose surface contamination and the highest levels of activation products of any facility within the SNEC Facility Complex.

The 1971 SNEC Facility Decommissioning Study [reference 9.20] makes the following statement, "... it has been assumed that the concrete that has been wetted by the refueling pool water will require removal and disposal as radioactive waste. This is assumed to be the case since there has been some seepage of radioactive fluids through these surfaces indicating that surface decontamination would not be sufficient to permit unrestricted access."

Recommend classification of CV interior as a Class-1 Impacted Area.

Recommend classification of the CV exterior as a Class-2 Impacted Area due to the fact that it was located downwind from the ventilation system exhaust stack.

Recommend classification of the CV exterior surfaces from 2 meters above the grade elevation down to ~2 meters below grade, as a Class-1 Impacted Area due to the presence of the contaminated CV pipe tunnel and the below grade CV piping penetrations.

Due to the presence of elevated activity associated with the equipment hatch and the personnel hatch, recommend classification as Class-1 Impacted Areas or removal of these structures prior to Final Status Survey.

POTENTIAL METEOROLOGICAL DISPERSION OF EXHAUST PARTICLUATES

Over the operating history of the SNEC Facility there was a potential for both "elevated" [vent stack] and "ground" [SNEC Ventilation System] releases of very small quantities of particulate radioactive materials as a result of HEPA Filtered ventilation system operations.

While there is no direct or "institutional lore" evidence of particulate releases from these systems, MARSSIM suggests that "areas downwind of stack release points" should be initially classified as Class-2 Impacted Areas.

During the period of elevated releases [plant operational phase], the prevailing meteorological conditions lead us to expect that the major portion of the particulate matter originating at the site would have been deposited in the valley north-northeast of the site. During the ground release [decommissioning phase] this particulate matter could be expected to be deposited on the Penelec property in the general north-northeast direction from the existing ventilation exhaust.

Wet deposition [washout] of radioactive particulate matter occurs during periods of precipitation. Since most major precipitation events occur from a northeast direction, radioactive material would have been deposited toward the south and southwest directions from the release point. The washout of radioactive material from elevated releases is expected to have occurred primarily along the river to the southwest of the site. In addition, the washout from the ground release phase is expected to occur close to the source [SNEC Ventilation System Exhaust] and within the plant's property line.

An additional mechanism for meteorological dispersion of contaminants involves the transport of dust and other finely divided particles from slightly contaminated yard areas of the site. This dispersion would act in a manner similar to the "ground" release from the SNEC Ventilation Exhaust system.

In June of 1988 an in-situ survey [reference 9.21] of the combined SNEC/Penelec site and surrounding areas was performed. With the exception of the measurements made on the SNEC site area, the in-situ measurements showed no indication of Cs-137 at levels greatly above normal background. The measurements made on the perimeter of the facility did not deviate significantly from the measurements made outside the plant boundaries. The results of this survey for off-site locations were generally consistent with known, worldwide radioactive fallout values with the exception of a single location to the northeast of the site [shown as "site-12" in the report]. This location was determined to be at the high end of the acceptable values and since it is located in the downwind direction, further investigation and characterization is warranted.

An aerial radiological survey [reference 9.28] was conducted in July of 1989, over a 32 square mile area surrounding the SNEC Facility. The survey was conducted at a nominal altitude of 200 feet with line spacings of 300 feet. A plot of the gamma exposure rates (extrapolated to 1 meter above ground) was prepared. The Cs-137 activity inferred from aerial data was within the limits of the deposition from worldwide fallout. No other man-made contaminates were detected in the survey area.

The SNEC Facility final status survey program should include an investigation of these general areas because they represent the most probable locations for both on-site and off-site deposition of airborne particulates originating from the SNEC Facility if any such events did occur. This investigation should also include the elevated off-site measurement mentioned above. This measurement was obtained at Location-12 on the June 1988 In-Situ Survey conducted by the USDOE and is contained in report number DOE/ONS-8806 [reference 9.21].

Recommend that these meteorological dispersion zones, as depicted on the Conceptual Model & Site Diagram [Appendix-A], be classified as Class-2 Impacted Areas.

NORTHEAST DUMP SITE

The Phase-1 Environmental Assessment performed by CH2M Hill in 1994 [reference 9.1] identified this area. "Solid wastes were noted in an area approximately 300 yards northeast of the Penelec line shack. Materials included empty 5-gallon cans of anti-corrosion paint, rags, gloves, roofing material, broken glass, wooden ties, and miscellaneous scrap metal including one empty 55-gallon drum. The disposal area covers an area approximately 70 feet by 100 feet near the boundary of a wooded area. According to Landis Shriver [former SSGS employee] an area on the northern part of the property was historically used by area residents until Fuller's Dump and the Tri-County Landfill were opened."

A physical inspection of this area was conducted by D&D Engineering in April of 1999. The materials described above were still in evidence. Samples of the anti-corrosion paint and roofing materials were obtained for analysis. Labeling on the paint cans indicate that the product was intended specifically for use on electrical distribution sub-stations. Numerous discarded coveralls, rags, and gloves were clearly identified as having been used in conjunction with application of the paint. The noted 55-gallon drum was still on the site and was severely rusted. The drum is empty and has been perforated by several bullet holes. The described dumpsite is also contiguous to an area where other electrical distribution type materials have been disposed. Additional materials include large electrical insulators of the type typically found on large utility poles, sections of utility poles, industrial light bulbs, loosely coiled wire fencing, and wire rope cabling used as guy wires for utility poles. The area is additionally strewn with empty beverage containers and minor amounts of household debris such as shoes, clothing and toys etc.

At the site of the paint can disposal, the April 1999 inspection also noted two; yellow plastic shoe covers of the type typically used as anti-contamination clothing at nuclear facilities. These shoe covers were located within 15 feet of each other and did not contain any indications that they had been used in association with the painting products (i.e. there was no paint on the shoe covers). The shoe covers were retrieved by SNEC Radiological Controls personnel and surveyed for the presence of radioactivity. None was detected. In addition, Radiological Control technicians conducted an external micro-Rem survey of the dump area and no radiation levels above those normal to the general area of the property were noted.

This site will be in investigated further due to it's location immediately adjacent to the Penelec site property and because anti-contamination clothing materials were found at the site.

Recommend that this area be classified as a Class-3 Impacted Area.

SAXTON STEAM GENERATING STATION [SSGS] DEMOLITION

The Phase-1 Environmental Assessment performed by CH2M Hill in 1994 made the following statement: "The former SSGS main building structure was leveled, and structural brick and concrete were placed in the below grade portion of the main building. The area was then covered with soil or crushed stone. Demolition debris is currently present below grade at the former building site to depths of at least 30 to 40 feet. Demolition activities took place from approximately 1975 to 1977. Plant demolition material was apparently also used to fill the former cooling water spray pond area."

The following is extracted from the SNEC Facility Final Safeguards Report dated April 20, 1961 [reference 9.5]. Section 201 – General Features, E. Existing Station Arrangement "In order to isolate the existing boilers, steam headers, and feed water system from the nuclear steam system both from the standpoint of possible radioactivity contamination and from the standpoint of carryover of foreign matter into the nuclear steam cycle, a new steam header and feed-water system has been provided in the existing power plant. Because of this isolation which is being effected by spool pieces of piping, the Unit No.2 turbine generator will not be available for use on boiler steam immediately after the nuclear plant is shut down for repairs or modifications."

The following is also extracted from the SNEC Facility Final Safeguards Report dated April 20, 1961. Section 303 Radiation Protection, D. Radioactive Material Control, 3. Release of Plant Effluents, b. Liquid Releases, "The liquid effluents from the RWDF Waste Treatment Plant are released after monitoring, to the environment by one of three paths. Two of these paths involve dilution by the Unit No.2 condenser circulating water prior to discharge to the river and the third path involves discharge to the sewage treatment plant prior to direct release to the river. The RWDF Waste Treatment Plant effluent and the steam generator blow-down are discharged to the condenser circulating water outlet tunnel in the existing plant. The effluent from the 1200-gallon Monitor Tanks is discharged to the sewage treatment plant or depending on the radioactivity, to the RWDF Storage Tanks." Other data in this section indicate that such releases were monitored.

Following final shutdown of the SNEC Facility, a demineralizer system was utilized to process the remaining contaminated water on site. This was predominantly storage well water that was processed following the spent fuel/Special Nuclear Material shipping campaign. The demineralizer effluent pathway was via a temporary piping connection to the normal SSGS plant pathway.

In view of the above information, the SSGS contained piping and components that could have come into contact with varying quantities of radioactive fluids over the operational life of the nuclear plant. There is no evidence that radiological assessments were made of the affected SSGS piping and components prior to the demolition of the facility. While the levels of radioactivity in liquid releases would be expected to be very low and within the limitations imposed at the time of the releases, there is a potential for these materials to concentrate within the SSGS components. It is known, for example, that a flow meter in the SNEC Facility discharge line to the SSGS was found to be contaminated when it was removed in April of 1994.

The SSGS Discharge Tunnel is still intact and is located beneath the back-fill of the demolished plant. The tunnel runs the entire width of the plant in a general east to west direction where it turns and runs beneath the present electrical sub-station on out to the Juniata River.

It is known via interviews with former SSGS employees, that all SSGS plant cooling water was returned to the Juniata River via this pathway. The SSGS Spray Pond pumping equipment took suction on the discharge tunnel when the Spray Pond system was in operation. Additionally, heated discharge tunnel water was recirculated back into the SSGS intake tunnel via the spray pump piping, during periods of freezing weather, to prevent ice formation in the intake. The employees also stated that SSGS lavatory wastes, boiler blow-down water and intake screen wash system flushing water also was directed to the river via this pathway. Processed water from the SNEC Facility along with Steam Generator surface and bottom blow-down water and component cooling water was also discharged via the tunnel.

The SNEC Facility has initiated a formal radiological characterization program to address this tunnel and contained equipment.

It is recommended that we initially classify the former SSGS demolition site area as Impacted. Additional scoping and characterization survey efforts are needed in order to determine the nature and extent of impact.

SAXTON STEAM GENERATING STATION – SPRAY POND

Located to the south – southwest of the SSGS is the site of the former Spray Pond. This facility occupied a tract of ground that was approximately the size of a football field. The spray pond consisted of a series of risers, laterals and nozzles through which SSGS discharge cooling water could be periodically pumped. Our present understanding is that this system was placed into service during the spring and summer months when the river water temperature was high and when the river level was low. During these times, river water entering the plant was so high in temperature that the added heat from plant operations made it too hot to return to the river via the normal discharge tunnel.

Since the SNEC facility water, including discharges from the RWDF Evaporator tanks, was discharged to the river via the SSGS discharge tunnel, the possibility exists that some quantity of low level radioactive water from SNEC could have been introduced into the spray pond.

During SSGS demolition the 600 feet of 30-inch diameter steel pipe that carried plant water to the spray pond was excavated and salvaged. A small section approximately 5-6 feet long remained at the plant end and was excavated by SNEC D&D personnel for examination. No radioactivity was detected on this artifact.

Recommend that the spray pond area be initially classified as a Class-2 Impacted area. This area is depicted on the Conceptual Model & Site Diagram contained in Appendix-A.

SUB-STATION YARD DRAINAGE AREA

The present Penelec electrical substation contains a yard storm water runoff system that collects storm water and directs it into a drainage line that passes beneath the northwest substation fence-line. At this point, the drainage empties into a depressed drainage swale that proceeds northwesterly in the general direction of the Raystown Branch of the Juniata River. It is known that ponded water from the SNEC Facility yard area and above the SNEC Facility septic system weir area, has been pumped over to the substation yard drainage system in the past. During a preliminary, information-only, walk-down of site areas conducted in late April of 1999, the area where the substation yard drainage system enters the drainage swale exhibited very slight increases over the existing background radiation levels. This area will require additional investigation.

Recommend that this be classified as a Class-1 Impacted Area since ponded water from a Class-1 Impacted Area on the SNEC Facility site was pumped into this area in the past.

SNEC FACILITY YARD SEPTIC SYSTEM

The former septic system contained very low levels of radioactivity in the water and sludges. This material was removed in the summer of 1998 and shipped to a waste disposal processor. Following removal of the contents, the three septic tank structures were removed and the area was back-filled with clean, 4B graded limestone, in preparation for large component removal activities that required use of the area. The remaining structures include the 7 foot by 21 foot by 8 inch thick concrete foundation pad that support the septic tanks [~8-feet below grade], the north-most concrete block wall that enclosed the northern-most septic tank [the chlorinator tank] and partial remnants of the east and west concrete block walls from the same structure [~3-4 feet below grade].

The removed septic tank structures were surveyed and released for disposal. It is known that ground water in-leakage occurred in and around these tanks and that tank water level varied with the surrounding water table.

Recommend that these below grade structures be classified as a Class-1 Impacted Area due to the overlying Class-1 Impacted Area.

SITE ROADWAYS

All site roadways both actual and historical, that either presently exist or that have existed since the SNEC Facility construction was completed, may have been used to transport radioactive material. A site map marked to show the locations of all of these roadways is provided on the Conceptual Model & Site Diagram in Appendix-A. All such roadways and the areas immediately adjacent to them must be evaluated.

Recommend that the actual roadways be classified as Class-2 Impacted Areas and the areas immediately adjacent to the roadways should be classified as Class-3 Impacted Areas.

YARD PIPING SYSTEMS

The 1994 Soil Remediation Project report [reference 9.9] contains photographs in it's Appendix-6 that show that sections of Safety Injection Piping are still present. The captions of these photographs state that this piping "will have to be removed during decommissioning". These areas will have to be located and included in the "Yard Remediation" Station Work Instruction.

There are no records that indicate exactly how much underground piping remains at the SNEC Facility. We do know that some piping that exits the CV is stubbed off and capped out in the yard, but no real dimensions are available. This piping will have to be exposed and assessed.

The 1989 gamma logging conducted by Penn State [Reference 9.18] indicated the probable presence of stubs of pipe containing radioactive material, that originally led from the containment to the spent resin tanks.

Recommend that the area immediately surrounding the CV, out to approximately 10 feet, should be initially classified as a Class-1 Impacted Area as a result of piping stubs that may be present in that area.

Recommend that the yard areas containing the Safety Injection Piping remnants should be initially classified as Class-1 Impacted Areas.

UNDERGROUND STORAGE TANK SITES

Three underground Spent Resin Storage Tanks were formerly located in the yard area immediately northwest of the CV shield wall. In addition, three Gas Decay Tanks, two Storage Tanks and one Decontamination Tank were located underground in the yard area north of the pipe tunnel between the CV and the RWDF. All tanks were removed in the 1972-73 time period and the excavations refilled with the excavated soil [which may have been contaminated] and additional quantities of fly ash. Upon removal, the tanks were stored in the SNEC Facility yard area until they could be prepared for shipment. Most tanks were cut open and used as waste shipping containers. While the underground tanks were double tanks [tank within a tank] and no evidence exists that indicates that any inner tank ever experienced any leakage, historical records do indicate that contaminated portions of outer tanks were cut away from the storage tanks.

The fact that excavated soil from the underground tank removal project was used to backfill the holes and that fly ash was used to complete the backfill, may indicate the low level contaminated soil was placed back into the excavation beneath the fly ash. This would indicate that some level of deeper soil sampling is prudent for these areas. In a 1986 report [Reference 9.11] the SNEC Plant Manager reported that "The yard is almost uniformly contaminated with Cesium-137 and Cobalt-60. The levels are above what may be considered background based upon analysis of control samples. Those yard areas found to be clean (i.e. not significantly above background) coincide with areas that were excavated to remove buried radwaste tanks. These areas were backfilled and are relatively clean at the present time." This report is quoted here because there is evidence that indicates that the underground tank overburden soils were used to backfill the tank removal excavations and the balance of the backfill was then made up of fly ash. Consequently SNEC will have to investigate these areas in order to determine if contaminated soil is present beneath the upper backfill material.

One HSA Questionnaire respondent indicated that "We pumped annuli [the void space between underground tanks and their associated outer tank] from underground tanks into yard drains during heavy rains. Since the tanks never leaked it was considered non-radioactive". Historical logbook entries show that annuli were sampled. During a telephone interview with a former employee, it was determined that groundwater did leak into the annulus areas of some underground tanks and the water was always sampled and determined to be non-contaminated prior to pumping operations.

In 1990 the SNEC Facility attempted to utilize Ground-Penetrating Radar techniques to evaluate the site yard for presence of underground piping and equipment. This technique was unsuccessful due to the high iron concentrations in the soil. Core samples down to bedrock were taken in areas where underground storage tanks were previously located and confirmed that the tanks were removed. It is not known whether or not these core samples were examined for radioactivity. [Reference 9.12]

Recommend that the yard area north-northwest of the CV shield wall above the Spent Resin Storage Tanks should be classified as a Class-1 Impacted Area.

Recommend that the yard area north of the former pipe tunnel and between the CV and the former RWDF, that is above the underground tank sites, should be initially classified as a Class-1 Impacted Area.

FORMER AND PRESENT-DAY RADWASTE STAGING AREAS

Photographs taken during the 1994 Soil Remediation Project indicate that bagged soil was generally staged over essentially the entire SNEC site. Additionally radwaste is presently handled and packaged in the DSF and is staged for shipment, in an East Side area of the SNEC site, adjacent to the Penelec line shack building.

Although this would normally result in a recommendation that these areas be classified as Class-2 Impacted Areas, yard area has already been classified as a Class-1 Impacted Area.

FORMERLY REMEDIATED SNEC FACILITY STRUCTURES

In the early 1990's the SNEC Facility C & A Building, the RWDF, the Yard Pipe Tunnel, the

FDSB, the RWST and foundation pad were decontaminated and demolished.

The SNEC Ventilation Stack was demolished in the 1974-75 time frame.

Historical records indicate that a 40 gallon spill of contaminated water occurred in the Safety Injection pump-house [adjacent to the RWST] in November of 1968. Approximately 1 gallon of this water leaked out to the grounds and was remediated. The HSA Questionnaire also received a response that small spills occurred during sampling operations in and around this facility.

One HSA Questionnaire respondent indicated that "the refueling water storage tank pad was contaminated which may be an indication of leaks from that tank".

One HSA Questionnaire respondent indicated that "pipe tunnel seepage was consistently contaminated with Cs-137". Soils around former and remnant pipe tunnel locations will have to be checked.

One HSA Questionnaire respondent indicated that "there were sumps in nearly every building which contained contaminated material. With the rise and fall of the water table, contamination leaked everywhere".

One HSA Questionnaire respondent indicated that "Remember one instance where a Monitor Tank was overfilled and overflowed to the adjacent concrete".

One HSA Questionnaire respondent indicated that "The pipe tunnel water and groundwater were synonymous after and during my experience and I know that this water had measurable levels of tritium and Cs-137".

Per the MARSSIM classification criteria these sites could be classified as either Class-1 or Class-2 Impacted areas. Based upon the substantial survey data that is available for these areas, it is recommended that they be classified as Class-2 Impacted Areas.

Based upon a study [reference 9.29] that compared the methodologies in NUREG-2082, Reg Guide 1.86, and the "Stanford Letter" (reference 9.36) that were followed during release of the C & A Building, the RWDF and the interconnecting pipe tunnel, to the MARSSIM requirements, it has been determined that the below grade areas of these structures can be classified as Class-3 impacted areas.

<u>ADJACENT SITE SOIL REMEDIATION AREAS</u>

During the 1994-soil remediation project, areas immediately adjacent to the SNEC Site were remediated. These areas include the area adjacent to and immediately south of the FDSB, the roadway adjacent to the FDSB and a few small, scattered locations along the northern SNEC site boundary.

Due to their location outside of the physical SNEC Site property, it is recommended that these areas be initially classified as Class-1 Impacted Areas.

<u>STEAM TUNNEL/CV PIPE TUNNEL</u>

The steam tunnel exits the southwest side of the pipe tunnel that surrounds the CV and was connected to the SSGS. The tunnel is known to have been surface contaminated. It is presently sealed near both of its ends with concrete block walls.

The CV Pipe Tunnel contains the cut off and capped remnants of former SNEC Facility piping systems. Historical SNEC records indicate that some of these capped piping remnants may exhibit radiation levels up to several millirem per hour.

Since this area is potentially surface contaminated and since it was not physically isolated from the SSGS, it poses some questions as to just how well SSGS cleanup was accomplished prior to demolition. Additional characterization of this area is warranted.

Recommend that these areas be classified as a Class-1 Impacted Area.

YARD DRAINAGE WEIR AREA AND SNEC OUTFALL LINE

One of the RWDF Evaporator water release pathways was via the sewage treatment system and on to the river. This pathway involved the yard weir and SNEC outfall piping. In addition, the decontamination shower water from the C & A building was also directed to this pathway after analysis demonstrated that radioactivity levels were within limits.

One respondent to the SNEC HSA Questionnaire indicated that the weir sediment had been found to be contaminated in the past.

One HSA Questionnaire respondent indicated that "River sediment [vicinity of the outfall] showed elevated Cesium concentrations". This information is confirmed by environmental radioactivity monitoring program reports that also report the presence of Co-60 at this location.

Recommend that the weir area, its surrounding soil, the SNEC outfall piping and the river sediments at the point of release to the river, be classified as Class-1 Impacted Areas.

GENERAL SNEC FACILITY YARD AREAS

A respondent from the HSA Questionnaire indicated that surface contamination of the fly ash covered yard area between the C&A Building and the RWDF Building occurred during 1972-73 decommissioning activities.

Numerous HSA Questionnaire respondents indicated that the Filled FDSB and adjacent truck loading area were contaminated.

One HSA Questionnaire respondent indicated that the surface soils above the underground tanks was reused as backfill following tank removal operations. This former surface soil would now be beneath some of the fly ash backfill that was also used to complete the excavation backfill. Since yard soil was known to be contaminated at various locations, some to the backfilled soil may have contained contamination.

One HSA Questionnaire respondent indicated that soil contamination may have occurred in a trailer truck parking area just inside and immediately to the north of the fence gate north of the Penelec Line Shack.

One HSA Questionnaire respondent indicated that there were substantial yard area excavations during the 1972-73 decommissioning process. This may have resulted in contaminated surface soils being refilled to lower elevations within excavated areas.

One HSA Questionnaire respondent recalled that "tanks were sitting west of the CV that were labeled as contaminated". Since there is not very much room within the SNEC site to the west of the CV, these tanks may have been stored on the SSGS side of the fence.

One HSA Questionnaire respondent recalled that the asphalt covered yard area was used to stage filled waste drums on the day before shipments.

One HSA Questionnaire respondent recalled "In the mid 1960's the site was in the path of fallout from a Chinese atomic bomb test. Every site radiological monitor pegged. It was reported to the Pennsylvania Bureau of Radiological Health and they told us about the bomb test. They also told us that they received similar reports from other nuclear sites in the state".

In a 1986 report [Reference 9.11] the SNEC Plant Manager reported that "The yard is almost uniformly contaminated with Cesium-137 and Cobalt-60. The levels are above what may be considered background based upon analysis of control samples. Those yard areas found to be clean (i.e. not significantly above background) coincide with areas that were excavated to remove buried radwaste tanks. These areas were backfilled and are relatively clean at the present time." This report is quoted here because there is evidence that indicates that the underground tank overburden soils were used to backfill the tank removal excavations and the balance of the backfill was then made up of fly ash. Consequently SNEC will have to investigate these areas in order to determine if contaminated soil is present beneath the upper backfill material.

Recommend that all yard areas contained within the 1.148-acre SNEC Site be classified as Class-1 Impacted Areas.

PENELEC WAREHOUSE, GARAGE BUILDING AND LINE SHACK BUILDING

The Penelec Garage Building is presently used by SNEC to store supplies and equipment. At one point this facility was also used to temporarily store resin liners containing very low levels of radioactive resins. The external surfaces of the liners were not contaminated and no contamination has ever been detected during surveys of the facility with the exception of the building floor drains that have recently been evaluated as containing Cs-137 above background levels. Additional characterization activities are in progress for this building. Per MARSSIM guidance, the floor drains, the floors and the walls to a height of 2 meters, should be classified as Class-1 Impacted Areas. The upper interior walls and ceiling is recommended as a Class-3 Impacted Area. The external walls are recommended as Class-3 Impacted Areas and the facility roof should be classified as a CLASS-2 Impacted Area.

The Penelec Warehouse was not used by the SNEC Facility but due to its proximity to the SNEC site, routine radiation surveys or the facility were conducted. A routine survey in 1988 revealed the presence of fixed contamination at two locations within the facility. Samples of the construction materials were taken and analyzed. The analysis indicated that only natural radioactivity (Ac-228, Ra-226, K-40) was detected in all of the samples. While no contamination of this facility can be attributed to operation/decommissioning of the SNEC facility, it would be appropriate to classify the affected areas of this facility as a Class-2 Impacted Area and the remaining areas as Class-3 Impacted Areas, due to its proximity to the SNEC facility [Reference 9.7].

A small area immediately to the east of the Penelec Warehouse Building was used in the past to burn trash and from the warehouse. A radiological survey conducted in the summer of 1986 indicated elevated soil contamination in this area [~3,000 CPM]. This area should be designated as a Class-1 Impacted Area.

During the final release survey conducted in 1989, the Penelec Line Shack building located to the east of the SNEC site fence line, was found to contain surficial materials in the overhead structural beams. This material appeared to have entered the building through a vent since the structure is located in the general downwind direction from the SNEC site. The surficial materials were sampled and analyzed and found to contain a maximum of 15 pCi/gm Cs-137. Therefore all accessible beams were vacuumed, wiped down and surveyed. All survey measurements were below the USNRC guidelines [Reference 9.7]. In view of this former discovery of low level contaminants in the line shack building and the fact that it has been over a decade since this survey was accomplished, recommend that this facility be classified as a Class-1 Impacted Area.

OFF-SITE AIRBORNE PARTICULATE MONITORING EQUIPMENT

During operation, the SNEC Facility maintained two off-site airborne particulate radiation monitors. They were identified as RIC-8 and RIC-9. RIC-8 was located approximately 500 feet NE of the CV and RIC-9 was located approximately 500 feet SW of the CV. This equipment contained radioactive check sources when they were operational and must be checked to ensure that the check sources have been removed and that no residual radioactive contaminants are remaining. These monitors are located within the Environmental Dispersion Class-2 Impacted Area and should therefore be classified to the same level.

INTAKE WATER SYSTEMS

During operation of the SSGS, water was withdrawn from the Raystown Branch of the Juniata River to provide various services to the plant. A dam was utilized to impound the river in the area of the plant intake structure. A nearby stream known as Shoup Run emptied into the Juniata River upstream of the plant intake. Since this stream was impacted by coal-mining operations it's discharge to the Juniata River was shunted around the dam to prevent it from mixing with the SSGS intake waters. This shunt runs beneath portions of the Penelec property and its origin at Shoup Run and its terminus below dam is still in evidence but the shunt is no longer active

This intake water system only provided intake of river water to the SSGS and no discharges to the river were made via this pathway. Operations at the SNEC Facility were not directly associated with this system although the SNEC river water cooling system used this as its source.

Based upon interviews with former SSGS employees, during freezing weather, warm water from the SSGS Discharge Tunnel was allowed to flow into the SSGS intake tunnel via a pathway that utilized the Spray Pond supply piping. This configuration was established in order to prevent ice formation on the intake tunnel screen wash and filtration system components. This flow path, by use of discharge tunnel water, would have provided a mechanism for low level radioactivity to enter the SSGS intake circulating water.

Recommend that the intake tunnel inlet structure be classified as a Class-3 Impacted Area and that the portion of the intake tunnel from the point where spray pump water was introduced, back to the SSGS, be classified as a Class-2 Impacted Area.

SSGS DEMOLITION SITE

As previously stated in this HSA, the SSGS Discharge Tunnel, portions of which are located within the SSGS demolition site, have been classified as impacted areas. In addition, the connection between the SSGS Discharge Tunnel and the SSGS Intake Tunnel via the Spray Pond system provides the potential for low levels of radioactive contamination to have been introduced to the SSGS circulating water supply side.

Since portions of the SSGS demolition site are already classified as Impacted Areas, the balance of the demolition site should also be classified as a Impacted Area until such time as additional characterization data is obtained that can support alternative levels of classification.

PENELEC SITE DRAINAGE SYSTEM

Based upon visual examination and inspection of SSGS site area drawings and blueprints, the presence of several underground drainage lines was detected. This includes storm water runoff from the original SSGS plant, a shunt line that diverted the Shoup Run water to a location downstream of the SSGS main intake, and a network of yard drains in and around the Penelec warehouse and garage buildings.

Robotic examination of these lines was accomplished and a mapping of all lines was accomplished. A characterization program has been implemented and samples have been obtained and analyzed for the presence of radioactivity.

The Garage Building floor drain system has been verified to tie into the Shoup Run shunt line. Since the Garage floor drains exhibited elevated Cs-137 activity, the portion of the Shoup Run shunt line than runs from the point of drain tie-in on down to its outfall, should be classified as a Class-2 Impacted area. The outfall area should be classified as a Class-3 Impacted Area.

SNEC FACILITY DECOMMISSIONING SUPPORT FACILITY [DSF]

The Decommissioning Support Facility [which consists of a Material Handling Bay (MHB), a Personnel Access Facility (PAF), and a Decommissioning Support Building (DSB)] was constructed in 1996 in order to provide support facilities for decommissioning. Based upon available information and the facility operating history, it is recommended that the floors and interior walls of these structures, up to 2 meters, be classified as Class-1 Impacted Areas. The upper walls and ceilings of the building interiors should be classified as Class-2 Impacted Areas. The exterior of the buildings should be classified as Class-3 Impacted Areas. The Class-3 Impacted Area classification will also apply to the Carport area of the building.

SECTION 7.2.2 NON-IMPACTED AREAS

ADDITIONAL SITE DEBRIS

The Penelec property, which surrounds the SNEC Facility site, contained an operating steam electric generating plant from about 1923 until it was shutdown and demolished between 1975 and 1977. As a result of this long historical power plant association, the site, not unexpectedly, contains fly ash and coal residues nearly everywhere on the property. In addition, the Penelec site area to the south and southwest of the SNEC facility contains several areas where demolition debris from the former SSGS was placed. These debris accumulations are most evident in the area of the spray pond that serviced the steam plant. Historical records indicate that portions of the SSGS plant demolition debris were used to fill in the spray pond. There are no records or evidence that SNEC Facility operations were in any way, associated with this debris.

To the extent not otherwise classified, this area should be classified as a NON-IMPACTED AREA.

INADVERTENT BREACH OF CONTAINMENT VESSEL LINER

On May 25, 1995 during performance of core bore sampling of the concrete floor areas in the lowest level of the CV, the steel CV liner beneath the concrete was inadvertently penetrated. This resulted in groundwater in-leakage to the building.

The event was evaluated and it was determined that there were no environmental consequences related to this occurrence. This conclusion was drawn based on the knowledge that the liner penetration was sufficiently below grade, compared to the water table, that the resulting hydrostatic pressure forced groundwater into the CV. Under this condition, reverse flow of water from the CV out to the groundwater, was not possible.

The penetration was subsequently repaired and the event was reviewed by the NRC.

This occurrence does not constitute an area of interest to the SNEC Facility License Termination process and should not require any further action.

BALANCE OF SITE

To the extent not otherwise classified, the balance of the Penelec Site areas are classified as Non-Impacted Areas

SECTION 7.3 POTENTIAL CONTAMINATED MEDIA

The potentially contaminated media that is anticipated to be present on the SNEC Facility site and the adjacent Penelec site consists of predominantly soils, silts, residual water, remnants of yard area piping, and structural concrete and steel components as follows:

- Some water and sediments located in the CV Pipe Tunnel may be contaminated to low levels.
- Water located in the SSGS Discharge Tunnel and associated Seal Chambers is contaminated to very low levels.
- Some of the silt and sludge contained in the SSGS Discharge Tunnel potentially contaminated to very low levels.
- Some piping components located in the SSGS Discharge Tunnel are contaminated and some of the other piping may also be contaminated to very low levels.
- Portions of the concrete structure that forms the SSGS Discharge Tunnel is surface contaminated and additional concrete surfaces may also be contaminated.
- Some of the silt and sludge contained in the CV Pipe Tunnel may be contaminated to low levels.
- Some of the concrete contained in the CV Pipe Tunnel may be contaminated to low levels.
- Portions of the SNEC yard area surface and sub-surface soils may be contaminated to low levels.
- Some SNEC yard piping may be contaminated.
- Portions of the structural concrete within the CV are surface contaminated and/or volumetrically contaminated.
- Portions of the CV steel liner may be contaminated.

SECTION 7.4 RELATED ENVIRONMENTAL CONCERNS

AFFECTS OF INADVERTENT RADIOACTIVE GAS RELEASES TO THE ENVIRONMENT

Over the operating history of the plant, a total of 5 documented inadvertent radioactive gas releases occurred. The first such release was the result of a small leak in a ½-inch underground line in the Gas Decay Tank system. This occurred in August of 1963 and the quantity of gas released was estimated to be <2 millicuries. No off-site dose calculations were apparently made in association with this event. The second release occurred in May of 1970 and resulted in the release of 7.32 curies of predominantly Xe-133 and Xe-135. The I-131 release for this period was determined to be 41.4 microcuries. The resultant off-site dose was determined to be 0.387 millirem to the maximally exposed individual (M.E.E.). The third release occurred in August of 1970 and resulted in the release or 0.034 curies of predominantly Xe-133 and Xe-135. The I-131 release for this period was determined to be negligible. The resultant off-site dose was determined to be 1.8 microrem to the M.E.E. The fourth release occurred in November of 1971 and resulted in the release of 80.2 curies of predominantly Xe-133 and Xe-135. The I-131 release for this period was determined to be 4.3 microcuries. The resultant off-site dose was determined to be 4.23 millirem to the M.E.E. The fifth release occurred in December of 1971 and resulted in the release of 19.7 curies of predominantly Xe-131 and Xe-135. The I-131 release for this period was determined to be 281 microcuries. The resultant off-site dose was determined to be 1 millirem to the M.E.E. No significant particulate release could be associated with any of the above events.

No atmospheric data were provided with the reports of the above events consequently no dispersal directions can be provided. These events would not be expected to produce environmental consequences that would be evident during conduct of Final Status Survey operations.

WILLIAMSBURG STATION ASH PILE

In 1989 and 1990, GPU Nuclear tested the Williamsburg Station [a nearby Penelec coal-fired generating facility that has since ceased operations and been demolished] ash pile in response to an allegation that unspecified debris from the SNEC Facility had been buried in the pile in the mid 1970's. More than 300 radiation measurements were taken on the ash pile. Samples were taken from a series of groundwater monitoring wells around the ash pile and areas that collect leachate. Samples were also taken from ash and sediment where the leachate would discharge into the Juniata River. The testing determined that all direct radiation measurements and environmental sampling results were consistent with natural background radiation and radioactivity.

The Nuclear Regulatory Commission, the Pennsylvania Department of Environmental Resources and the Pennsylvania Public Utilities Commission were notified regarding the allegations and the testing that was performed.

At the conclusion of the investigative process the results were reviewed and accepted by the state and NRC.

This occurrence does not constitute an area of interest to the SNEC Facility License Termination process and should not require any further action.

RELEASE OF RESINS TO MODERN LANDFILL OF YORK, PA

In August of 1992 during a SNEC site clean up campaign, resin from the chlorinator building was staged for waste material release. Two distinct colors of resin were staged. On September 3, 1992 the resin was loaded with other debris for shipment to the Modern Landfill in York, Pa. The amount of brown resin loaded for shipment would not completely fill a 5-gallon bucket. Approximately one hundred pounds of orange resin was also loaded for disposal. SNEC procedures were followed for surveying material for release. The truck and contents were surveyed and no readings above the release criteria were found. A supplemental frisk of the resin indicated no response above background levels. A sample of each color resin was taken for laboratory analysis. Since this was not considered a bulk material due to the small volume and no frisker response above background was observed, the material was released. Results from the laboratory analysis showed that brown resin to have Cs-137 activity of 7.3 pCi/gm. This was calculated to be a total activity of ~0.13 uCi. If this activity was homogeneously mixed with the 8500 kg of other debris, it became less than 0.02 pCi/gm. This is less than the lower limit of detectable environmental activity and posed no risk to the general public [Reference 9.13].

The above occurrence was discussed with the NRC on December 21, 1992 and the NRC had no concern over the release of the resin since the NRC guidance provided during the Oak Ridge Associated Universities verification survey report, was 15 pCi/gm for Cs-137 [Reference 9.14].

This occurrence does not constitute an area of interest to the SNEC Facility License Termination process and should not require any further action.

NRC NOTICE OF VIOLOATION – RELEASE OF PIPE SECTION WITHOUT PROPER SURVEY DOCUMENTATION

During the course of a NRC Inspection of the SNEC Facility (NRC Inspection 88-01) in 1988, it was noted that the licensee [SNEC] had performed a contamination survey on a large pipe prior to its release for unrestricted use and that no records were maintained that documented the results of the radiological surveys. This resulted in a Severity Level IV violation of NRC regulations.

SNEC accepted the violation. The individuals responsible for releasing the pipe section confirmed that a radiological survey was performed prior to release of the pipe but was not documented as required. This survey indicated that the pipe met the radiological release criteria. An attempt was made to locate and retrieve the pipe section in question but the scrap yard had already cut the pipe up and recycled it. The NRC indicated that this was an isolated case. Subsequent to this occurrence, a review was performed by the GPUN Quality Assurance group at TMI-1 to determine if other items had left the site without the required documented survey. The result of this review indicated that there was no other case in which items were released without survey documentation [Reference 9.15]

This occurrence does not constitute an area of interest to the SNEC Facility License Termination process and should not require any further action.

DISPOSITION OF SNEC EQUIPMENT

The SSGS was demolished between 1975 and 1977 by the Kovalchik Salvage Company of Indiana, Pennsylvania. Reference 9.1 indicates that the Salvage Company removed all metals and wood prior to demolition. There are no historical records that indicate that radiological surveys were performed prior to material removal and demolition. In addition, references 9.24, 9.25, and 9.26 describe a program whereby SNEC donated various SNEC owned property from both the SNEC Facility and the SSGS, to the Borough of Saxton. Some of the equipment went directly to PENELEC which in turn, compensated the Borough of Saxton under an agreed upon pricing arrangement. Reference 9.26 states that 36 items of SNEC owned equipment were removed from the SSGS and 48 items of SNEC owned equipment from the SNEC Facility comprised the total of all equipment dispositioned in this manner. An actual listing of the affected equipment has not been located. Also, there are no historical records indicating that radiological surveys were performed on this equipment prior to release.

A review of information contained in the SNEC Facility Site Characterization Report [reference 9.27] along with analysis of characterization data from the SSGS Discharge Tunnel and other information contained in this Historical Site Assessment, indicates that the some of the SNEC Facility support equipment located within the SSGS could have potentially contained very low levels of radioactive contamination at the time that the SNEC Facility ceased operations in 1973.

It is probable that the magnitude of equipment contamination was low based upon available data but this cannot be absolutely confirmed due to the lack of radiation survey documentation. The SNEC Facility continues to pursue identification and final disposition of the equipment in question but the likelihood for success is not favorable at this time. SNEC has contacted the Kovalchik Salvage Company with regard to gaining a more complete understanding of the SSGS debris bed. Per Mr. Joseph Kovalchik, all metal materials were removed from the SSGS prior to the commencement of demolition operations. Any metallic materials that remain would be incorporated into concrete columns and equipment foundation pads etc. Attempts to obtain the listing of the SNEC owned equipment that was given over to the Borough of Saxton have been unsuccessful.

This remains as an open issue.

SECTION 8.0 CONCLUSIONS

Sufficient Data is available and has been reviewed to support initial classification of the SNEC Facility site and potentially impacted adjacent Penelec property for purposes of Final Status Survey and License Termination document preparation.

The information contained in this HSA and its supporting documents is sufficient to assist the SNEC staff in the design, development and execution of the necessary surveys, investigations, and related activities that are required to prepare the site for license termination with the expectation of attaining a high degree of success.

SECTION 9.0 REFERENCES

9.1 Phase 1 Environmental Site Assessment – PENELEC-GPUN/Saxton Facility. Prepared by CH2HILL Inc. – December 1994.

9.2 Preliminary Hydrogeological Investigation SNEC – Groundwater Technology Inc. – 1981

9.3 Phase 1 Report of Findings – Groundwater Investigation – GEO Engineering Inc.-1992

9.4 SNEC Facility Decommissioning Environmental Report – April 1996

9.5 Saxton Nuclear Facility Final Safeguards Report – April 20, 1961

9.6 SNEC Facility Decommissioning Plan – February 1996

9.7 Final Release Survey of the Reactor Support Buildings – GPUN – Rev-3 – March 1992.

9.8 Confirmatory Radiological Survey for Portions of the Saxton Nuclear Experimental Facility Saxton, Pennsylvania – Oak Ridge Associated University – June 1991

9.9 1994 Saxton Soil Remediation Project – GPUN – May 1995

9.10 SNEC Reactor Support Buildings Demolition Report – GPUN – March 1994

9.11 Letter to R.W. Heward Jr., SNEC President and M.B. Roche, SNEC Vice President from Gary G. Baker, SNEC Plant Manager – titled "Radiological Status of the SNEC Exclusion Area Yard" – dated November 3, 1986.

9.12 Letter to NRC from J. E. Hildebrand – C301-91-0001 – Final Release Survey of the Reactor Support Buildings, Revision No.2 – dated January 31, 1991.

9.13 R.G. Rolph letter to File – SNEC-92-0042 – Radioactive Material Release – dated December 1, 1992.

9.14 B.A. Good letter to File – SNEC-93-0002 – Telecon with J. Roth, NRC, Re: Release of Resins during Demolition Activities – dated January 4, 1993.

9.15 Letter from R.W. Heward to NRC – C301-88-2012 – Response to NOV contained in NRC Inspection Report No. 50-146/88-01 – dated June 27, 1988.

9.16 USNRC Post Demolition Inspection Report No. 50/146/92-02 of October 20, 1992 – dated November 24, 1992.

9.17 Saxton Nuclear Experimental Corporation – Reactor Operations Daily Summaries – April 1962 through May 1973.

9.18 Report on Drilling and Radiometric Analysis of Samples Collected at Sites of Spent Resin and Liquid Waste Tanks – SNEC Facility. Penn State – January 16, 1989.

9.19 SNEC Facility Historical Site Assessment Questionnaire – Responses

9.20 Saxton Reactor Facility Decommissioning Study – November 1971

9.21 June 1988 In-situ Survey conducted by EG&G Energy Measurements for the DOE/NRC. The report number is DOE/ONS-8806

9.22 .Multi-Agency Radiation Survey and Site Remediation Manual [MARSSIM] – NUREG-1575

9.23 Decommissioned Status of the Saxton Reactor Facility" - February 20, 1975

9.24 Letter – "Disposal of SNEC Owned Equipment" – Dated October 22, 1974 from C. R. Montgomery to George Minkin.

9.25 Letter – "Disposal of SNEC Owned Equipment at the Saxton Steam Generating Station" – Dated November 13, 1974 from C. R. Montgomery to C. L. Imhoff.

9.26 Letter – "Assignment of SNEC Owned Property to the Borough of Saxton" – Dated December 18, 1974 from C. R. Montgomery to R. C. Bartle.

9.27 SNEC Facility Site Characterization Report – May 1996.

9.28 July 1989 "Aerial Radiological Survey of the Saxton Nuclear Experimental Corporation Facility" conducted by EG&E Energy Measurements for the DOE/NRC, report number EGG-10617-1132

9.29 CoPhysics Corporation Report - Review of the "Final Release Survey of the Reactor Support Buildings" at the Saxton Nuclear Experimental Facility – 12/14/99 – Theodore E. Rahon, PhD.,CHP.

9.30 SNEC Facility License Amendment No-15 to DPR-4 – Issued April 20, 1998

9.31 NUREG/CR-5849 "Manual for Conducting Radiological Surveys in Support of License Termination – February 1993 – DRAFT

9.32 SNEC Soil Characterization Plan – 6575-PLN-4542.05

9.33 SNEC Soil Disposal Plan – 6575-PLN-4542.07

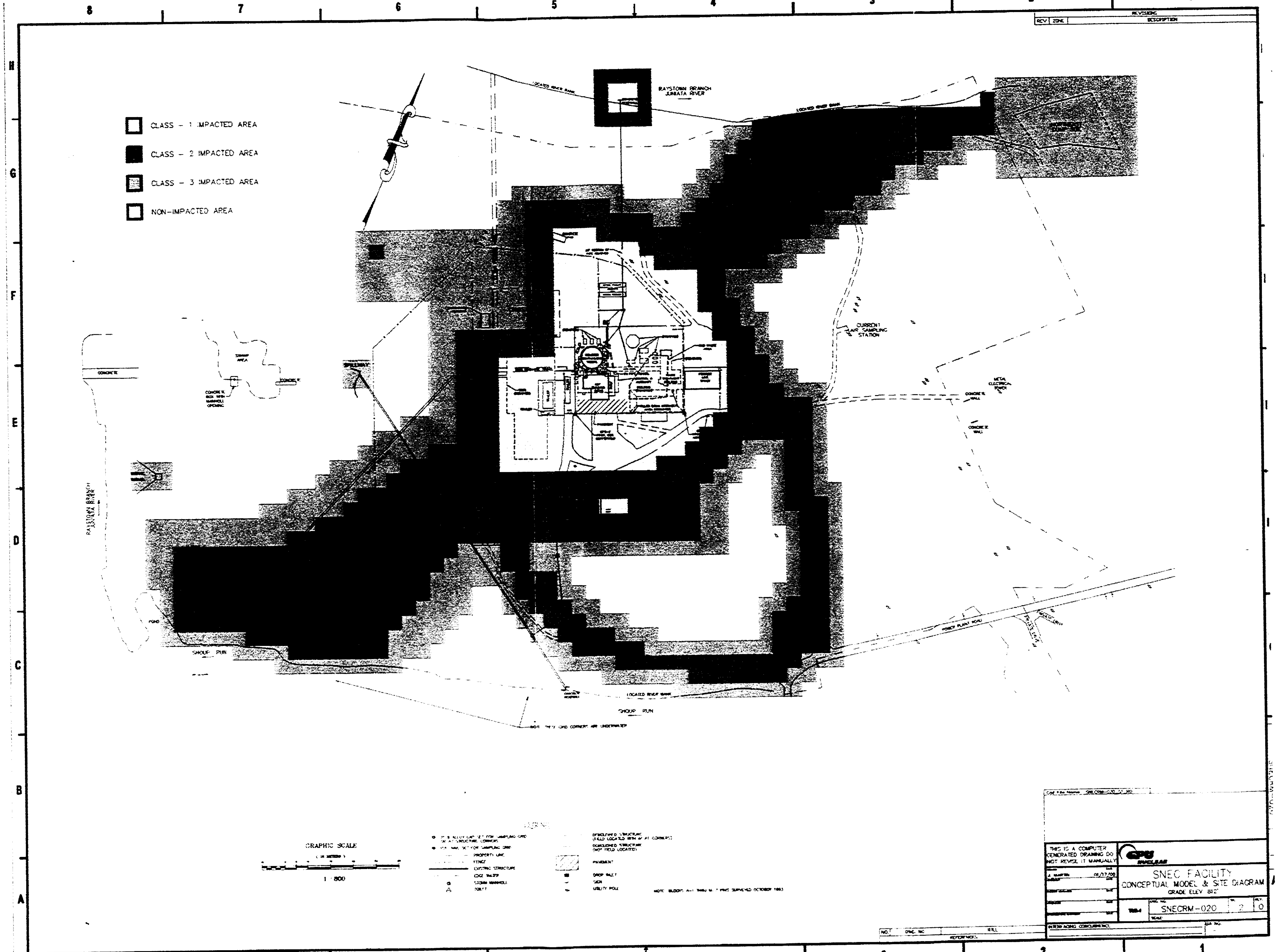
9.34 Haley and Aldrich "Summary of Field Work" – July 1998

9.35 SNEC Site Characterization Plan – 6575-PLN-4520.06

9.36 Letter to Stanford University form James R. Miller, Chief, Standardization and Special Projects Brand, Division of Licensing, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission – April 21, 1982 – Docket No. 50-141.

SECTION 10.0 APPENDICES

APPENDIX – A
CONCEPTUAL MODEL AND SITE DIAGRAM SHOWING CLASSIFICATIONS



CLASS - 1 IMPACTED AREA
CLASS - 2 IMPACTED AREA
CLASS - 3 IMPACTED AREA
NON-IMPACTED AREA
RAYSTOWN BRANCH
JUNIATA RIVER
LOCATED RIVER BANK
CURRENT AIR SAMPLING STATION
SHOUP RUN
POND
POWER PLANT ROAD
CONCRETE
SWAMP AREA
CONCRETE WALL
METAL ELECTRICAL POWER
GRAPHIC SCALE
1 : 800
NOTE: BLOCKS A-1 THRU M-7 PINS SURVEYED OCTOBER 1993
THIS IS A COMPUTER GENERATED DRAWING DO NOT REVISE IT MANUALLY
SNEC FACILITY
CONCEPTUAL MODEL & SITE DIAGRAM
GRADE ELEV 812'
SNECRM-020

APPENDIX – B
FIGURES

SAXTON NUCLEAR EXPERIMENTAL CORPORATION
HISTORICAL SITE ASSESSMENT REPORT

FIGURE B-1
Penelec/SNEC Facility Site Boundary

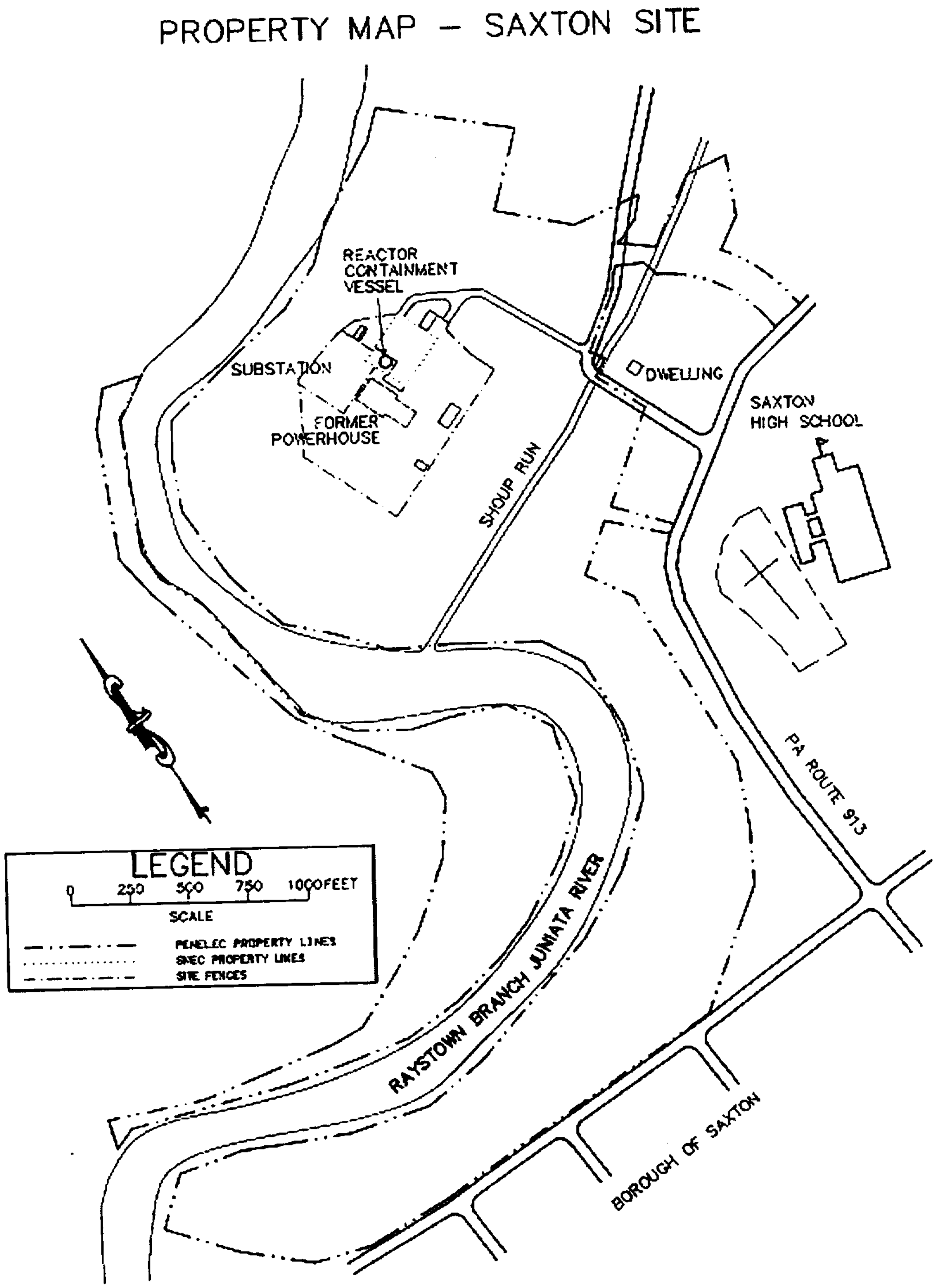
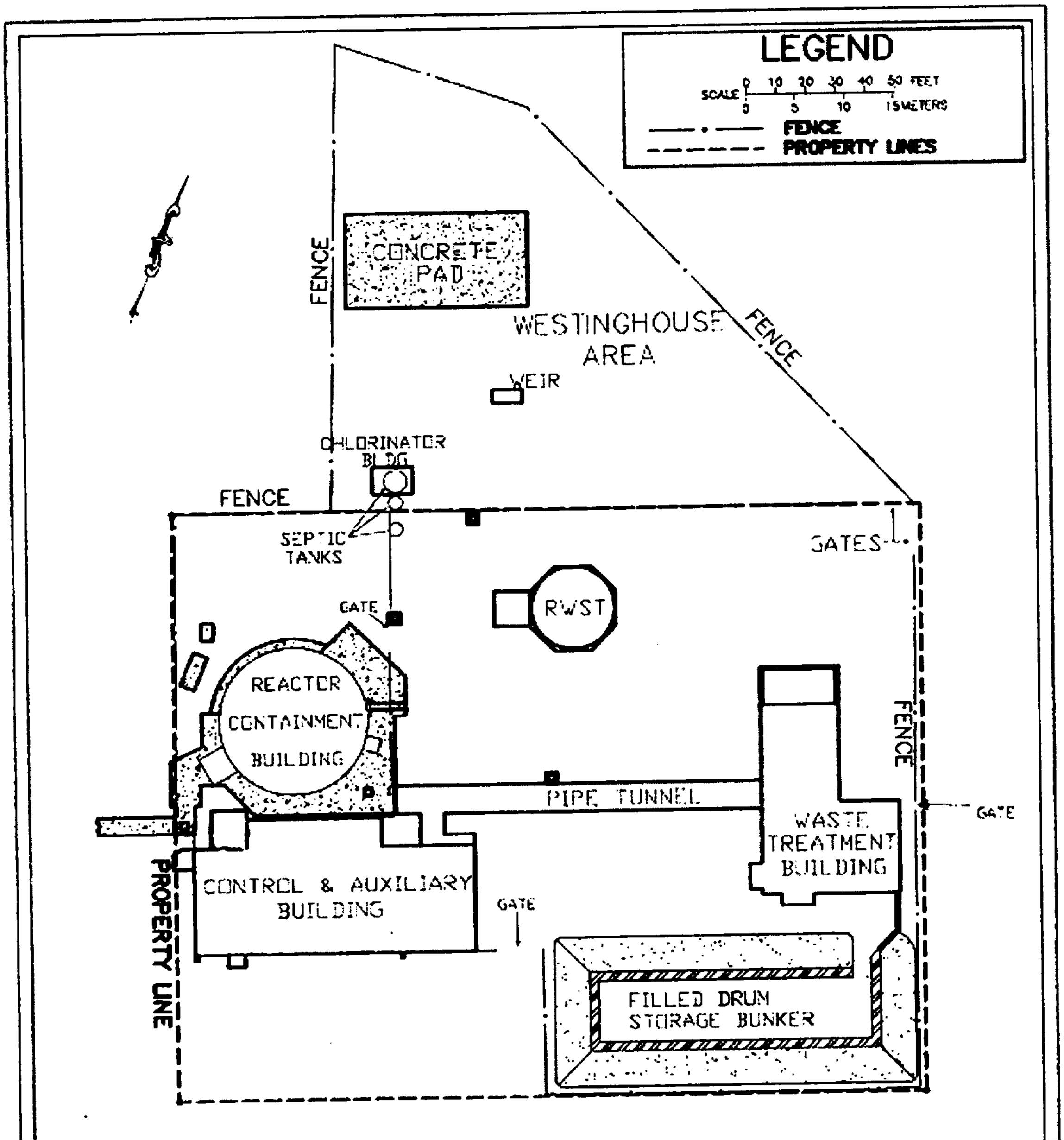


FIGURE B-2
SNEC Facility Post-Shutdown Configuration



SNEC FACILITY POST-SHUTDOWN CONFIGURATION

FIGURE B-3
SNEC Facility Pre-Demolition Configuration

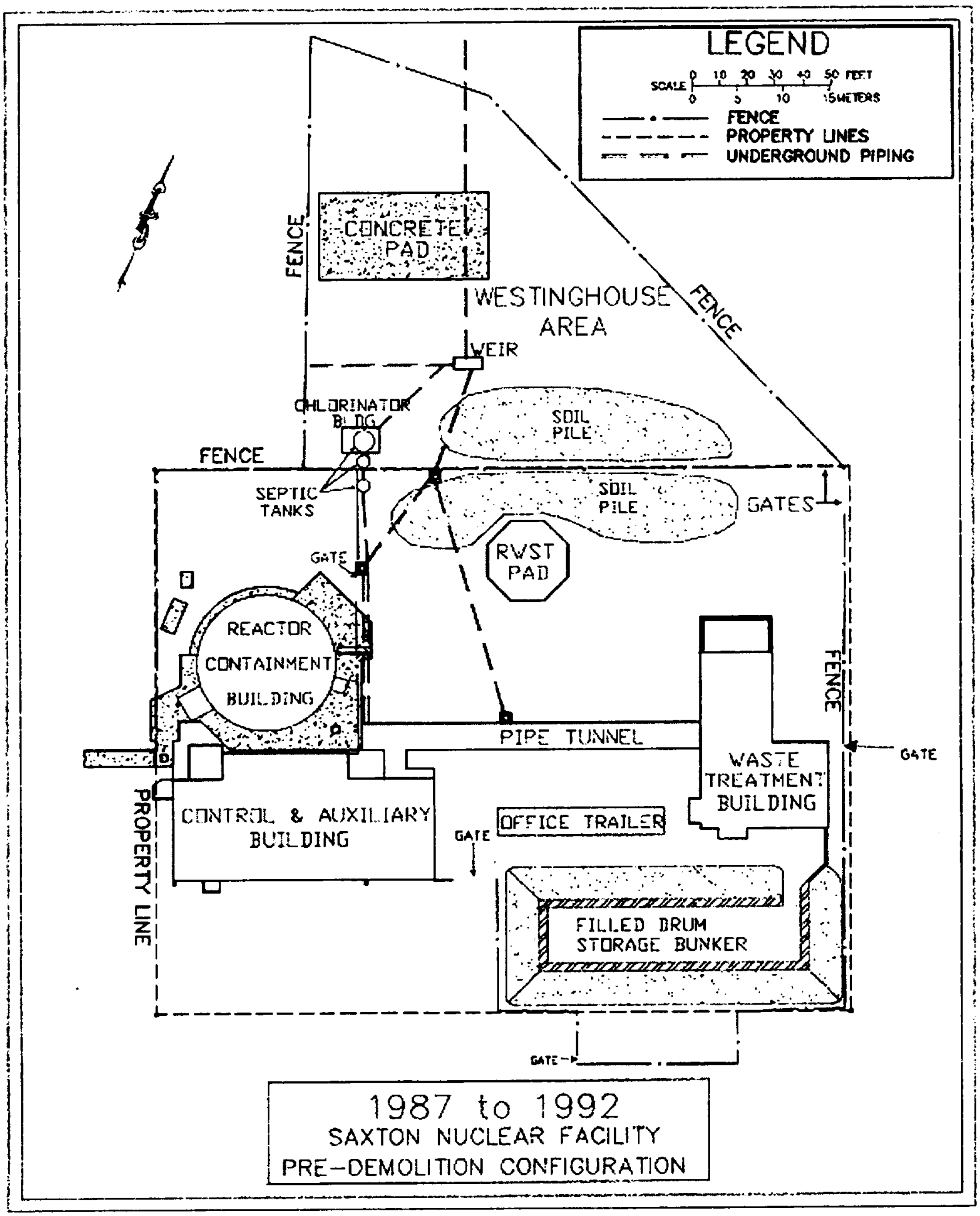
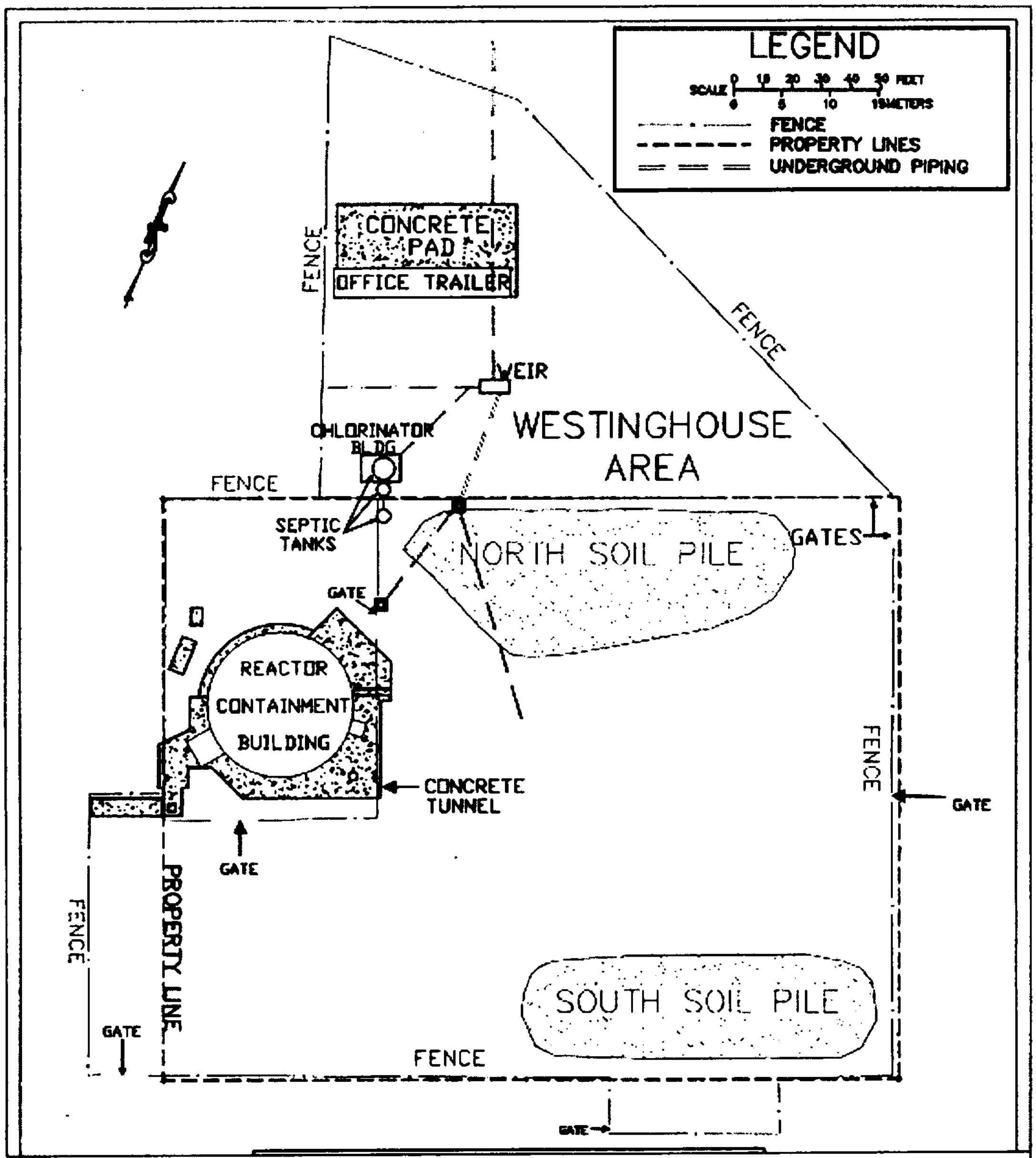


FIGURE B-4
SNEC Facility Post Demolition Configuration



SNEC FACILITY
POST DEMOLITION
CONFIGURATION

FIGURE B-5
SNEC Post Soil Removal Configuration

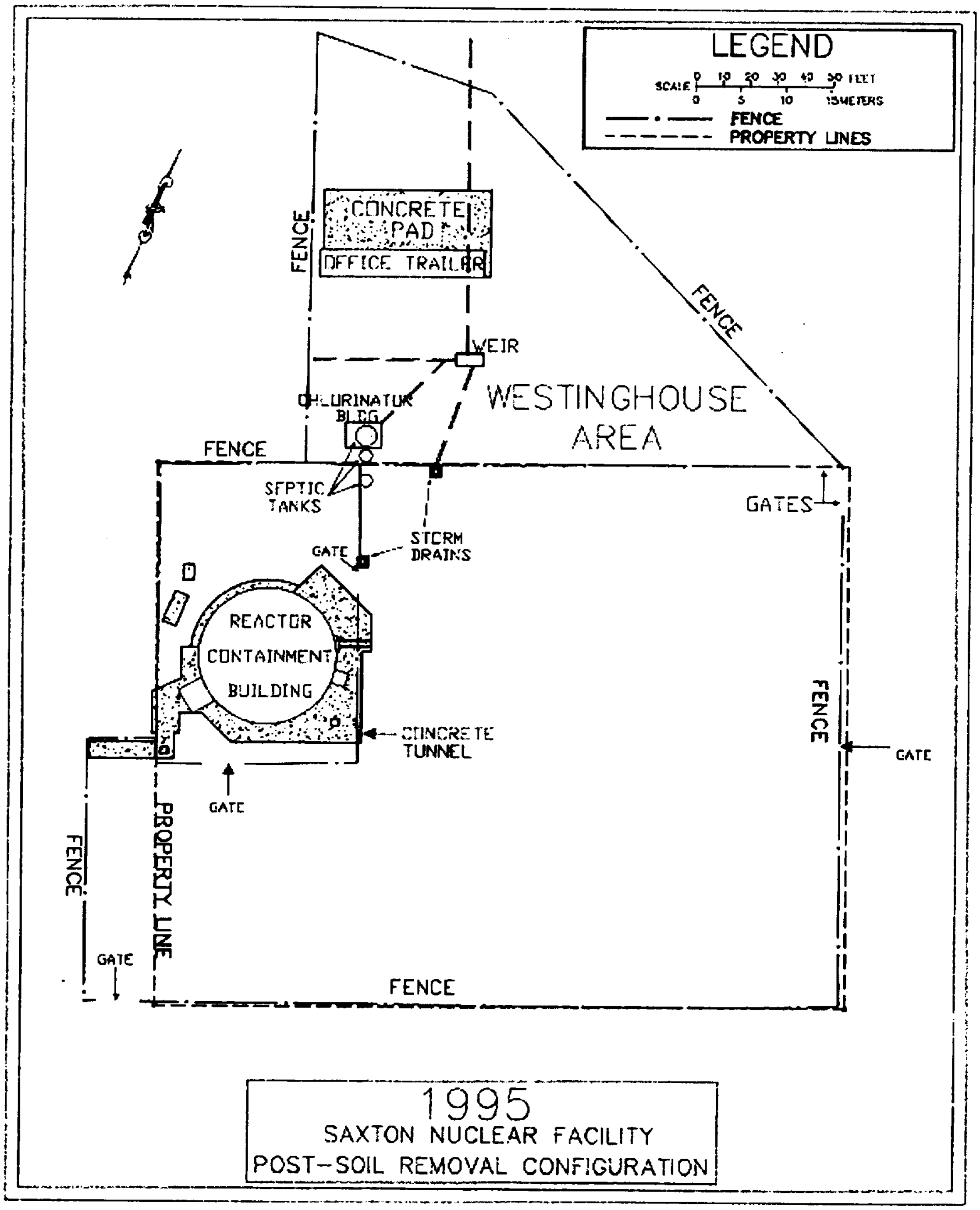
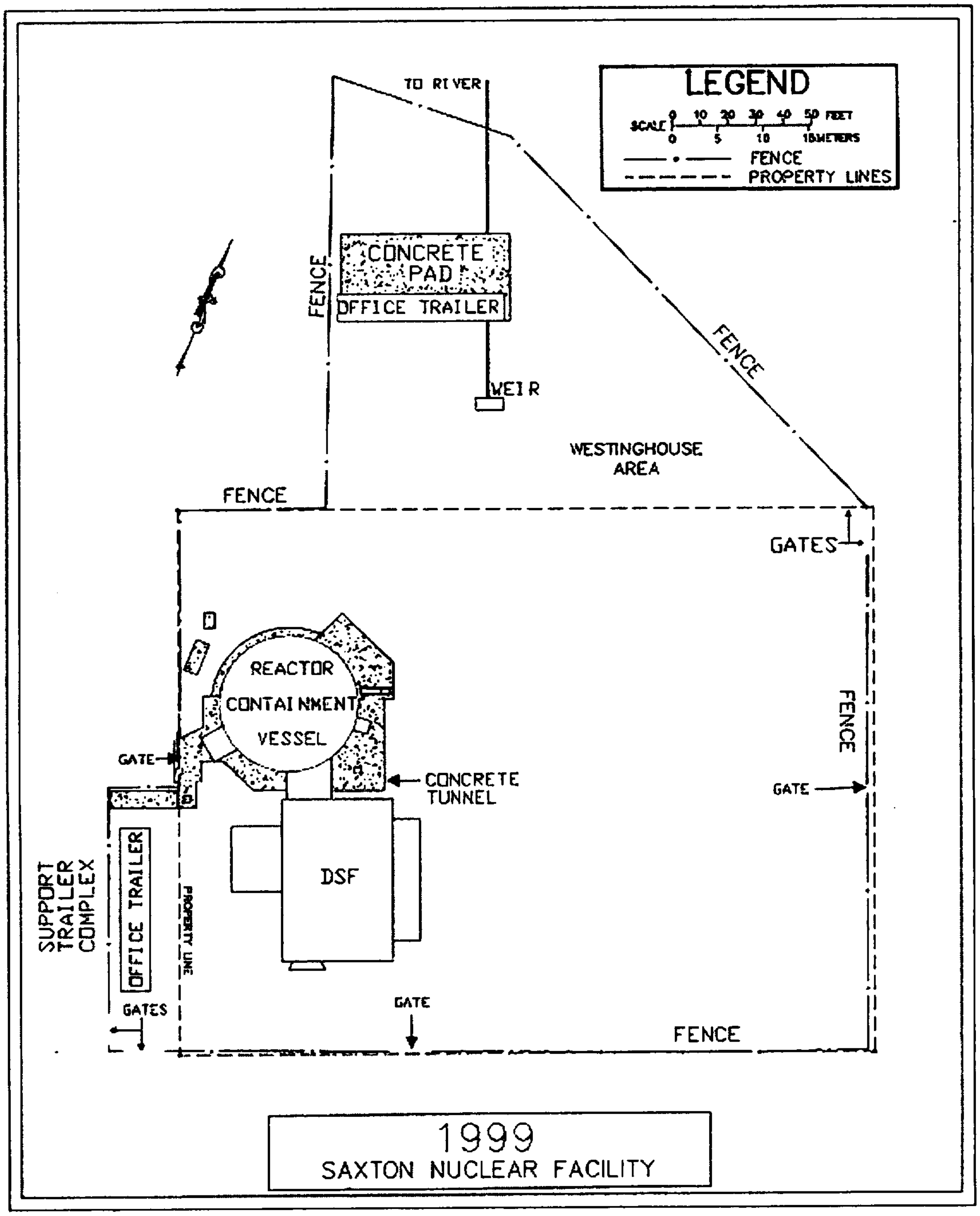


FIGURE B-6
SNEC 1999 Configuration



CoPhysics Corporation
1242 Route 208, Monroe, NY 10950
914-783-4402 800-641-7444
Facsimile: 914-783-7191
www.cophysics.com

December 14, 1999

Mr. Barry Brosey
GPU Nuclear Corp.
Three Mile Island
Rt 441 South
Middletown, Pa. 17057

Dear Barry:

Enclosed please find the final version of my review and assessment of the Saxton rubble bed dose assessment problem. The doses were estimated by dividing the rubble bed into 3 separate volumes, performing a RESRAD analysis on each, and then summing the results. The RESRAD runs are also enclosed as well as a spreadsheet summarizing source term parameters and assumptions used.

I also performed informal sensitivity analyses on K_D and density values resulting in little significant effect on dose estimates (not enclosed). Of course, a more in-depth sensitivity analysis would have to be performed after SNEC decides on a firm course of action for the final site assessment.

If you have any questions, please call me anytime.

Best regards,

Theodore E. Rahon, Ph.D., CHP
President

encl.

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Review of the "Final Release Survey of the Reactor Support Buildings" at the Saxton Nuclear Experimental Facility

Date of Review Report: 12/14/99

INTRODUCTION:

The Saxton Nuclear Experimental Corporation (SNEC) conducted a Final Release Survey of the reactor support buildings at the Saxton Facility from October 1988 to June 1989. Methodologies in NUREG-2082, Reg Guide 1.86, and the "Stanford letter" were followed during survey design, data collection and data analysis. Presently-accepted, USNRC survey methodologies in MARSSIM (Multi-Agency Radiation Survey and Site Investigation Manual, NUREG-1575, EPA402-R-97-016) have some similarities and differences to those in NUREG-2082. Thus, it was the objective of this review to determine if the original SNEC data collected could be used to meet the intent of the survey requirements now in MARSSIM.

It should be noted that the buildings surveyed are no longer standing. After the Final Release Survey, a confirmatory survey by ORAU, and USNRC approval, SNEC demolished the buildings. The remains now exist as beds of rubble filling the below-grade portions of the Yard Tunnel and Radioactive Waste Disposal Facility which were also covered by approximately 1 meter of clean soil.

In this review, two options are discussed:

Option 1

Release buildings retrospectively: Use the SNEC data to meet MARSSIM requirements for release of the previously intact buildings retrospectively by data reanalysis, enhancement, and interpolation/extrapolation.

Option 2

Release the rubble beds as part of the site soil: Use the SNEC final survey data from the previously intact buildings to estimate the radionuclide concentrations in the present rubble beds. While MARSSIM-type field sampling would not be performed, a MARSSIM-based statistical analysis, quality assurance review, and report could be provided. From the radionuclide concentration and site specific data, a dose assessment would be performed and compared to the 25 mrem/yr limit.

Release of the buildings as intact structures may indeed be a moot point and an analysis of the present situation (buried rubble) may be in order.

OPTION #1 - SOLVING DIFFERENCES BETWEEN MARSSIM AND PREVIOUSLY-USED GUIDANCE

MARSSIM was written to be flexible. The authors realized that numerous types of sites and a wide variety of physical, chemical and geometric aspects of radioactive contamination would be encountered. The key aspects of MARSSIM that differ from NUREG-2082 and Reg Guide 1.86 as they mainly relate to Option#1 follow:

1. MARSSIM and related regulatory documents recommend site-specific, dose-based contamination release limits. Dose-based limits for beta-emitters would be many times greater than the Reg Guide 1.86 limits used in the SNEC survey, thus increasing the likelihood of the survey data being useful under MARSSIM. However, the dose-based contamination limits for alpha-emitters may be less than those in Reg Guide 1.86, thus a more sensitive assessment of alpha-emitters would be needed. One such method, used in this review, is a surogate comparison of estimated alpha emitter levels to measured beta-gamma levels.

2. In MARSSIM, the numbers of sample and background readings to be performed in a survey are determined by instrument sensitivity relative to guideline limits. The SNEC survey utilized a fixed number of surface contamination survey points (i.e., 5 per square meter) regardless of instrument sensitivity. While it is beyond the scope of this review to calculate the necessary number of data points required by MARSSIM for the buildings, it is the author's opinion that the number of measurement locations in the SNEC data is far greater than those that would be required by MARSSIM. Also, the number of background surface contamination measurements will need to be determined per MARSSIM requirements and may have to be supplemented with additional off-site, background readings. Again this would depend on the instrument sensitivity relative to the site-specific, contamination release levels to be calculated.

3. MARSSIM requires a random placement (using a random number generator) of the sample/measurement grid over the geophysical grid. The purpose of this is to eliminate potential bias that may occur when measurement locations are chosen by the survey team based on building geometric layout. However, the SNEC data grid was laid out to fit in or coincide with the plant layout and thus was biased (as were all radiation surveys previously performed under NUREG's 2082 and 5849). This problem might be solved by resampling the SNEC data on paper, i.e., the SNEC data points are so numerous that it is likely that the intersections of a randomly placed sampling grid would coincide with enough SNEC data points to eliminate the bias and meet the statistical intent of MARSSIM.

4. MARSSIM discusses the need for specifying Data Quality Objectives (DQO's) as part of a survey quality assurance program. While such DQO's were not specifically identified in the SNEC survey, the QA program used by SNEC should be able to meet typical DQO's used in present fission/activation product surveys under MARSSIM.

OPTION #2 - ESTIMATING DOSES FROM THE RUBBLE BEDS

A preliminary dose assessment of the rubble beds was performed as part of this review. Briefly, the methodology used follows:

1. The beds were assumed to contain all of the demolished C&A Building, RWDF, and Yard Tunnel concrete even though some of the debris was actually shipped off-site. (conservative assumption)
2. The entire measured surface area in or on these buildings was assummed to contain 5000 dpm/100 sq.cm gross beta activity. (conservative assumption)
3. An additional conservative factor of 10 was applied to the surface activity estimate to account for potential activity absorbed into surfaces (i.e., self absorption) or that may be incorporated in microcracks such that the activity may have been out of range of the GM detectors. (very conservative assumption)
4. RESRAD 5.82 was used with site specific parameters and rubble bed dimensions provided by SNEC.
5. An estimated radionuclide distribution was derived from gamma spectroscopic and radiochemical analyses of paint chips from the RWDF and C&A Buildings (including Cs-137, Co-60, U-234, U-235, U-238, and Pu-238). Also added to this distribution were additional radionuclides detected in water from the RWDF / Yard Tunnel (Am-241 and H-3). The radionuclide distribution estimated from these analyses was thought to be more representative of surface contamination in the buildings than data from concrete rubble analysis which showed very few plant-associated radionuclides greater than the detection limits, i.e., the radionuclide levels in the concrete sample were too low to provide a reasonable estimate of the nuclide distribution. The estimated distribution is shown in the table below.

Estimated Radionuclide Distribution:

	From Paint Chip Analyses							Additional radionuclides added based on water analysis	
Radionuclide:	Cs-137	Co-60	U-234	U-235	U-238	Pu-238		Am-241	H-3
% of surf. contam. activity*	94.8%	1.8%	1.1%	1.0%	1.0%	0.3%		1.0%	180%

* Total surface contamination activity assumed to be ~= gross beta activity (even though a small fraction of the activity may be alpha emitters). Total percentage is greater than 100% due to the addition of tritium and Am-241 as potential contaminants.

Using an average surface contamination level of 5000 dpm/100 cm^2, a surface area of 4882 m^2, and a concrete density of 2 g/cc, the following radionuclide concentrations were estimated:

Radionuclide:	Cs-137	Co-60	U-234	U-235	U-238	Pu-238	Am-241	H-3
Concentration (pCi/g)	0.4	0.002	0.004	0.004	0.004	0.004	0.004	0.8

The results of the RESRAD analysis of the above data follow:

t (yr)	0	1	3	10	30	100	300	1,000
Dose (TEDE) (mrem/yr)	1.9e-6	7.6e-4	1.1e-2	3.0e-3	1.1e-3	1.0e-3	9.6e-3	3.5e-2

where:

t = time after disposal (yr)
Dose = Annual dose (TEDE) from all pathways (mrem/yr) including water-dependent and water independent pathways (i.e., ground, inhalation, plant, meat, milk, soil, water, and fish)

The above analysis was performed as a preliminary estimate for purposes of assessment strategy guidance. A more in-depth analysis would be required for the site final status survey report.

CONCLUSION:

The specific data reanalysis option to be used should be discussed with and approved by USNRC representatives before further work is performed. Option #2 is probably the most appropriate for the present physical condition of the site and would involve the more straightforward analysis of the two options.

Questions regarding this review may be addressed to the undersigned.

Theodore E. Rahon, Ph.D., CHP
President

C&A BLDG AND RWDF RUBBLE BED SOURCE TERM PARAMETERS

SOURCE:

C&A surface area: 2585 sq.m (ref pag 46 of report)
RWDF surface area: 2232 sq.m
RWDF pad surface area: 65 sq.m TOTAL Surface Area: 4882 sq.m

Total Activity Estimation:

< 5000 beta dpm/100 sq.cm x 4882 sq.m x 10000 sq.cm/1 sq.m = 2.44e8 dpm
<= 1.1e8 pCi

Add factor of 10 self-abs/misc cor factor: Act. <= 1.1e9 pCi

Average Concentration Estimation: 1.1e9 pCi/ 1340 cu.m /(2 g/cc) * 1 cu.m/1e6 cc = 0.4 pCi/g
(volume & density from below) (gr beta activity)

VOLUME 1

Compressor Room and Evap. Gas Str Room (~ 150 sq.m)

Approx. Outside Dim: 28' x 57' (Includes shield walls, stairwells)			Density Used
Cover Material Top Layer: 3' clean soil	Est. Density =	1.0 - 1.2	1
Contam Layer: 8' concrete rubble & clean #2 stone to fill voids	Est. Density =	1.7 - 2.4	
Base Fill Material: 1' clean #2 stone	Est. Density =	1.7 - 2.0	
Contam Layer: 1' concrete floor slab & clean #2 stone to fill holes in floor	Est. Density =	3	

Assume contaminated layer includes Base Fill Material and Floor Slab	Density
Therefore, contam. Layer thickness = 10' (3 m)	2

Total Contam Volume: 28 x 57 x 10 = 15,960 cu. Ft = 450 cu.m

VOLUME 2

Evap. Concentrates Room (6m x 12 m ~ 72 sq.m)

Approx. Outside Dim: 19' x 40' (Includes shield walls, stairwells)			Density Used
Cover Material Top Layer: 3' clean soil	Est. Density =	1.0 - 1.2	1
Contam Layer: 17' concrete rubble & clean #2 stone to fill voids	Est. Density =	1.7 - 2.4	
Base Fill Material: 1' clean #2 stone	Est. Density =	1.7 - 2.0	
Contam Layer: 1' concrete floor slab & clean #2 stone to fill holes in floor	Est. Density =	1.7 - 2.0	

Assume contaminated layer includes Base Fill Material and Floor Slab	Density
Therefore, contam. Layer thickness = 19' (5.8 m)	2

Total Contam Volume: 19 x 40 x 19 = 14,440 cu. Ft = 410 cu.m

VOLUME 3

Yard Pipe & CV Tunnels (42m x 5.8 m ~ 250 sq.m)

			Density Used
Approx. Outside Dim: 137' x 19' (Includes entire width of excavation)			
Cover Material Top Layer: 3' clean soil	Est. Density =	1.0 - 1.2	1
Contam Layer: 6.5' concrete rubble (mostly crushed block) & base slab	Est. Density =	1.8-3.0	
Base Fill Material: none (2 m)			
			Density
Total Contam Volume: 137 x 19 x 6.5 = 16,900 cu. Ft = 480 cu.m			2

TOTAL VOLUME = 450 + 410 + 480 = 1340 cu.m

DOSE SUMMATION

t	0	1	3	10	30	100	300	1000
VOL1	6.30E-07	3.10E-04	1.00E-03	1.10E-03	3.70E-04	4.20E-04	3.30E-03	1.20E-02
VOL2	6.30E-07	2.40E-04	9.30E-03	1.40E-03	5.20E-04	3.10E-04	3.60E-03	1.40E-02
VOL3	6.30E-07	2.10E-04	6.10E-04	5.40E-04	1.80E-04	2.90E-04	2.70E-03	9.30E-03
TOT mrem/yr	1.89E-06	7.60E-04	1.09E-02	3.04E-03	1.07E-03	1.02E-03	9.60E-03	3.53E-02

Max: 0.011 mrem/yr
3rd year

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines

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	Ac-227+D	6.720E+00	6.720E+00	DCF2(1)
B-1	Am-241	4.440E-01	4.440E-01	DCF2(2)
B-1	Co-60	2.190E-04	2.190E-04	DCF2(3)
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(4)
B-1	H-3	6.400E-08	6.400E-08	DCF2(5)
B-1	Np-237+D	5.400E-01	5.400E-01	DCF2(6)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2(7)
B-1	Pb-210+D	2.320E-02	2.320E-02	DCF2(8)
B-1	Pu-238	3.920E-01	3.920E-01	DCF2(9)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2(10)
B-1	Th-229+D	2.160E+00	2.160E+00	DCF2(11)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(12)
B-1	U-233	1.350E-01	1.350E-01	DCF2(13)
B-1	U-234	1.320E-01	1.320E-01	DCF2(14)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2(15)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(16)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3(1)
D-1	Am-241	3.640E-03	3.640E-03	DCF3(2)
D-1	Co-60	2.690E-05	2.690E-05	DCF3(3)
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(4)
D-1	H-3	6.400E-08	6.400E-08	DCF3(5)
D-1	Np-237+D	4.440E-03	4.440E-03	DCF3(6)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3(7)
D-1	Pb-210+D	7.270E-03	7.270E-03	DCF3(8)
D-1	Pu-238	3.200E-03	3.200E-03	DCF3(9)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3(10)
D-1	Th-229+D	4.030E-03	4.030E-03	DCF3(11)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(12)
D-1	U-233	2.890E-04	2.890E-04	DCF3(13)
D-1	U-234	2.830E-04	2.830E-04	DCF3(14)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3(15)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3(16)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Am-241 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(2,1)
D-34	Am-241 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-05	5.000E-05	RTF(2,2)
D-34	Am-241 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-06	2.000E-06	RTF(2,3)
D-34				
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(3,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(3,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(3,3)
D-34				

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

Menu	Parameter	Current Value	Default	Parameter Name
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(4,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(4,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(4,3)
D-34				
D-34	H-3 , plant/soil concentration ratio, dimensionless	4.800E+00	4.800E+00	RTF(5,1)
D-34	H-3 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.200E-02	1.200E-02	RTF(5,2)
D-34	H-3 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-02	1.000E-02	RTF(5,3)
D-34				
D-34	Np-237+D , plant/soil concentration ratio, dimensionless	2.000E-02	2.000E-02	RTF(6,1)
D-34	Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(6,2)
D-34	Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(6,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(7,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(7,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(7,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(8,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(8,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(8,3)
D-34				
D-34	Pu-238 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(9,1)
D-34	Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(9,2)
D-34	Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(9,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(10,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(10,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(10,3)
D-34				
D-34	Th-229+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(11,1)
D-34	Th-229+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(11,2)
D-34	Th-229+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(11,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(12,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(12,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(12,3)
D-34				
D-34	U-233 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(13,1)
D-34	U-233 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(13,2)
D-34	U-233 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(13,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(14,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(14,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(14,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(15,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(15,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(15,3)
D-34				

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

Menu	Parameter	Current Value	Default	Parameter Name
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(16,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(16,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(16,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Am-241 , fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Am-241 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(2,2)
D-5				
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(3,2)
D-5				
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(4,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(4,2)
D-5				
D-5	H-3 , fish	1.000E+00	1.000E+00	BIOFAC(5,1)
D-5	H-3 , crustacea and mollusks	1.000E+00	1.000E+00	BIOFAC(5,2)
D-5				
D-5	Np-237+D , fish	3.000E+01	3.000E+01	BIOFAC(6,1)
D-5	Np-237+D , crustacea and mollusks	4.000E+02	4.000E+02	BIOFAC(6,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(7,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(7,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(8,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(8,2)
D-5				
D-5	Pu-238 , fish	3.000E+01	3.000E+01	BIOFAC(9,1)
D-5	Pu-238 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(9,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(10,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(10,2)
D-5				
D-5	Th-229+D , fish	1.000E+02	1.000E+02	BIOFAC(11,1)
D-5	Th-229+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(11,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(12,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(12,2)
D-5				
D-5	U-233 , fish	1.000E+01	1.000E+01	BIOFAC(13,1)
D-5	U-233 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(13,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(14,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(14,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(15,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(15,2)
D-5				

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

Menu	Parameter	Current Value	Default	Parameter Name
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(16,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(16,2)

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parame Name
R011	Area of contaminated zone (m**2)	1.500E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.800E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+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	4.000E-03	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Co-60	2.000E-03	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Cs-137	4.000E-01	0.000E+00	---	S1(4)
R012	Initial principal radionuclide (pCi/g): H-3	8.000E-01	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): Pu-238	4.000E-04	0.000E+00	---	S1(9)
R012	Initial principal radionuclide (pCi/g): U-234	4.000E-03	0.000E+00	---	S1(14)
R012	Initial principal radionuclide (pCi/g): U-235	4.000E-03	0.000E+00	---	S1(15)
R012	Initial principal radionuclide (pCi/g): U-238	4.000E-03	0.000E+00	---	S1(16)
R012	Concentration in groundwater (pCi/L): Am-241	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(4)
R012	Concentration in groundwater (pCi/L): H-3	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): Pu-238	not used	0.000E+00	---	W1(9)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(14)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(15)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(16)
R013	Cover depth (m)	1.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	2.000E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	3.450E-04	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	3.500E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.730E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	1.050E+01	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	3.867E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	8.000E+00	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.940E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.024E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.500E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	5.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Density of saturated zone (g/cm**3)	1.480E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.500E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	3.500E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.730E+01	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	3.000E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	1.050E+01	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	5.000E-04	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	3.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.860E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	6.100E-01	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	3.500E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	3.500E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	1.050E+01	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	1.730E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Am-241				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.907E-03	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+03	1.000E+03	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	5.000E+03	1.000E+03	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.168E-03	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	5.000E+00	1.000E+03	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.138E-02	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for H-3				
R016	Contaminated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.937E-01	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Pu-238				
R016	Contaminated zone (cm**3/g)	5.000E+03	2.000E+03	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+04	2.000E+03	---	DCNUCU(9,1)
R016	Saturated zone (cm**3/g)	1.000E+04	2.000E+03	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.171E-05	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCC(14)
R016	Unsaturated zone 1 (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCU(14,1)
R016	Saturated zone (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCS(14)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.951E-04	ALEACH(14)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(14)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCC(15)
R016	Unsaturated zone 1 (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCU(15,1)
R016	Saturated zone (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCS(15)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.951E-04	ALEACH(15)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(15)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCC(16)
R016	Unsaturated zone 1 (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCU(16,1)
R016	Saturated zone (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCS(16)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.951E-04	ALEACH(16)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(16)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.907E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Np-237				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.574E+02	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	-1.000E+00	-1.000E+00	2.574E+02	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.574E+02	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.274E-04	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for daughter Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.168E-03	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)

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 Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.849E-04	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(10)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(10,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(10)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.350E-04	ALEACH(10)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(10)
R016	Distribution coefficients for daughter Th-229				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(11)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(11,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.762E-07	ALEACH(11)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(11)
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(12)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(12,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.762E-07	ALEACH(12)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(12)
R016	Distribution coefficients for daughter U-233				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(13)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(13,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(13)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.168E-03	ALEACH(13)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(13)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	-1.000E+00	1.000E+00	-1 shows non-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:	5.000E+01	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	7.071E+01	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	0.000E+00	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	0.000E+00	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	0.000E+00	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	0.000E+00	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	0.000E+00	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	0.000E+00	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	0.000E+00	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	0.000E+00	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	0.000E+00	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	0.000E+00	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	1.000E+00	1.000E+00	---	FRACA(1)
R017	Ring 2	2.732E-01	2.732E-01	---	FRACA(2)
R017	Ring 3	0.000E+00	0.000E+00	---	FRACA(3)
R017	Ring 4	0.000E+00	0.000E+00	---	FRACA(4)
R017	Ring 5	0.000E+00	0.000E+00	---	FRACA(5)
R017	Ring 6	0.000E+00	0.000E+00	---	FRACA(6)
R017	Ring 7	0.000E+00	0.000E+00	---	FRACA(7)
R017	Ring 8	0.000E+00	0.000E+00	---	FRACA(8)
R017	Ring 9	0.000E+00	0.000E+00	---	FRACA(9)
R017	Ring 10	0.000E+00	0.000E+00	---	FRACA(10)
R017	Ring 11	0.000E+00	0.000E+00	---	FRACA(11)
R017	Ring 12	0.000E+00	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	5.200E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	6.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	3.100E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	1.100E+02	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	2.100E+01	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	5.000E+00	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	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	1.000E+00	5.000E-01	---	FR9
R018	Contamination fraction of plant food	1.000E+00	-1	---	FPLANT
R018	Contamination fraction of meat	1.000E+00	-1	---	FMEAT
R018	Contamination fraction of milk	1.000E+00	-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

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	1.000E+00	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
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
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	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	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

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)

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	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

Contaminated Zone Dimensions	
Area:	150.00 square meters
Thickness:	3.00 meters
Cover Depth:	1.00 meters

Initial Soil Concentrations, pCi/g	
Am-241	4.000E-03
Co-60	2.000E-03
Cs-137	4.000E-01
H-3	8.000E-01
Pu-238	4.000E-04
U-234	4.000E-03
U-235	4.000E-03
U-238	4.000E-03

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 25 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):	6.345E-07	3.148E-04	1.045E-03	1.109E-03	3.701E-04	4.178E-04	3.304E-03	1.153E-02
M(t):	2.538E-08	1.259E-05	4.181E-05	4.437E-05	1.480E-05	1.671E-05	1.321E-04	4.612E-04

Maximum TDOSE(t): 1.153E-02 mrem/yr at t = 1.000E+03 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-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	3.571E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	1.424E-07	0.2244	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	4.918E-07	0.7751	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	1.835E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.605E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.728E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	2.912E-10	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	6.345E-07	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	3.571E-25	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.424E-07	0.2244
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.918E-07	0.7751
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.835E-21	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.605E-19	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.728E-12	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.912E-10	0.0005
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	6.345E-07	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	7.814E-18	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	1.262E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	4.820E-07	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	1.893E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.928E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.764E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	2.952E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	6.085E-07	0.0019	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	7.814E-18	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.262E-07	0.0004
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.820E-07	0.0015
H-3	1.578E-04	0.5013	3.601E-09	0.0000	0.000E+00	0.0000	9.748E-05	0.3096	8.390E-06	0.0266	5.052E-05	0.1605	3.142E-04	0.9981
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.893E-21	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.928E-16	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.764E-12	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.952E-10	0.0000
Total	1.578E-04	0.5013	3.601E-09	0.0000	0.000E+00	0.0000	9.748E-05	0.3096	8.390E-06	0.0266	5.052E-05	0.1605	3.148E-04	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground mrem/yr	Ground fract.	Inhalation mrem/yr	Inhalation fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	Soil mrem/yr	Soil fract.
Am-241	2.421E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	9.909E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	4.629E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	2.458E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.776E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.838E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	3.033E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.623E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-Nuclide	Water mrem/yr	Water fract.	Fish mrem/yr	Fish fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	All Pathways* mrem/yr	All Pathways* 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	2.421E-17	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.909E-08	0.0001
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.629E-07	0.0004
H-3	5.103E-04	0.4882	1.197E-08	0.0000	0.000E+00	0.0000	3.336E-04	0.3192	3.259E-05	0.0312	1.682E-04	0.1609	1.045E-03	0.9995
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.458E-21	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.776E-15	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.838E-12	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.033E-10	0.0000
Total	5.103E-04	0.4882	1.197E-08	0.0000	0.000E+00	0.0000	3.336E-04	0.3192	3.259E-05	0.0312	1.682E-04	0.1609	1.045E-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 = 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	9.032E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	4.250E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	4.017E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	2.218E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	2.145E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	2.127E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	3.336E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	4.446E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	9.032E-17	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.250E-08	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.017E-07	0.0004
H-3	5.395E-04	0.4864	1.270E-08	0.0000	0.000E+00	0.0000	3.554E-04	0.3204	3.525E-05	0.0318	1.785E-04	0.1609	1.109E-03	0.9996
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.218E-20	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.145E-14	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.127E-12	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.336E-10	0.0000
Total	5.395E-04	0.4864	1.270E-08	0.0000	0.000E+00	0.0000	3.554E-04	0.3204	3.525E-05	0.0318	1.785E-04	0.1609	1.109E-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-Nuclide	Ground mrem/yr	Ground fract.	Inhalation mrem/yr	Inhalation fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	Soil mrem/yr	Soil fract.
Am-241	3.740E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	3.785E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	2.681E-07	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	6.617E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	2.453E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	3.247E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	4.378E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.723E-07	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-Nuclide	Water mrem/yr	Water fract.	Fish mrem/yr	Fish fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	All Pathways* mrem/yr	All Pathways* 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	3.740E-16	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.785E-09	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.681E-07	0.0007
H-3	1.799E-04	0.4862	4.238E-09	0.0000	0.000E+00	0.0000	1.186E-04	0.3204	1.177E-05	0.0318	5.953E-05	0.1609	3.698E-04	0.9993
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.617E-19	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.453E-13	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.247E-12	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.378E-10	0.0000
Total	1.799E-04	0.4862	4.238E-09	0.0000	0.000E+00	0.0000	1.186E-04	0.3204	1.177E-05	0.0318	5.953E-05	0.1609	3.701E-04	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	3.869E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	7.978E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	6.504E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	4.992E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	6.296E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.437E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	1.133E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	6.620E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	2.988E-04	0.7153	1.524E-06	0.0036	0.000E+00	0.0000	1.168E-04	0.2796	3.890E-07	0.0009	6.585E-08	0.0002	4.176E-04	0.9997
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.978E-13	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.504E-08	0.0002
H-3	4.522E-18	0.0000	1.072E-22	0.0000	0.000E+00	0.0000	3.019E-18	0.0000	3.072E-19	0.0000	1.506E-18	0.0000	9.354E-18	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.992E-17	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.296E-12	0.0000
U-235	5.013E-08	0.0001	2.410E-10	0.0000	0.000E+00	0.0000	1.957E-08	0.0000	2.582E-11	0.0000	1.101E-10	0.0000	7.009E-08	0.0002
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.133E-09	0.0000
Total	2.989E-04	0.7154	1.524E-06	0.0036	0.000E+00	0.0000	1.168E-04	0.2797	3.890E-07	0.0009	6.596E-08	0.0002	4.178E-04	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	3.074E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.906E-04	0.1485	3.427E-07	0.0001	2.885E-08	0.0000	0.000E+00	0.0000
Co-60	2.503E-23	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.895E-21	0.0000	7.412E-22	0.0000	1.690E-22	0.0000	0.000E+00	0.0000
Cs-137	1.138E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.341E-06	0.0010	1.285E-06	0.0004	7.809E-07	0.0002	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	1.095E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.548E-05	0.0047	1.985E-08	0.0000	6.550E-10	0.0000	0.000E+00	0.0000
U-234	6.212E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.556E-04	0.1076	1.609E-06	0.0005	6.222E-06	0.0019	0.000E+00	0.0000
U-235	9.120E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.957E-04	0.2106	1.971E-05	0.0060	5.812E-06	0.0018	0.000E+00	0.0000
U-238	1.717E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.295E-04	0.0997	1.434E-06	0.0004	5.769E-06	0.0017	0.000E+00	0.0000
Total	1.984E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.890E-03	0.5722	2.440E-05	0.0074	1.861E-05	0.0056	0.000E+00	0.0000

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

Water Dependent Pathways

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	9.739E-04	0.2948	4.967E-06	0.0015	0.000E+00	0.0000	3.809E-04	0.1153	1.272E-06	0.0004	2.148E-07	0.0001	1.852E-03	0.5607
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.830E-21	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.409E-06	0.0016
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	6.810E-16	0.0000	3.429E-18	0.0000	0.000E+00	0.0000	2.672E-16	0.0000	1.512E-17	0.0000	3.687E-17	0.0000	1.550E-05	0.0047
U-234	1.814E-10	0.0000	9.229E-13	0.0000	0.000E+00	0.0000	7.117E-11	0.0000	4.023E-12	0.0000	9.648E-12	0.0000	3.634E-04	0.1100
U-235	6.476E-06	0.0020	2.752E-08	0.0000	0.000E+00	0.0000	2.532E-06	0.0008	1.181E-07	0.0000	1.281E-08	0.0000	7.303E-04	0.2211
U-238	8.432E-15	0.0000	4.249E-17	0.0000	0.000E+00	0.0000	3.309E-15	0.0000	1.873E-16	0.0000	4.562E-16	0.0000	3.367E-04	0.1019
Total	9.804E-04	0.2968	4.994E-06	0.0015	0.000E+00	0.0000	3.834E-04	0.1161	1.390E-06	0.0004	2.276E-07	0.0001	3.304E-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 = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.263E-06	0.0001	4.675E-07	0.0000	0.000E+00	0.0000	1.058E-04	0.0092	7.157E-07	0.0001	5.771E-08	0.0000	6.614E-07	0.0001
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	8.092E-16	0.0000	3.217E-22	0.0000	0.000E+00	0.0000	4.952E-16	0.0000	2.256E-16	0.0000	1.421E-16	0.0000	8.702E-20	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	9.510E-10	0.0000	1.754E-09	0.0000	0.000E+00	0.0000	3.343E-07	0.0000	3.958E-09	0.0000	4.382E-09	0.0000	2.073E-09	0.0000
U-234	3.202E-05	0.0028	1.056E-05	0.0009	0.000E+00	0.0000	1.717E-03	0.1489	2.923E-05	0.0025	1.189E-04	0.0103	4.051E-06	0.0004
U-235	1.470E-03	0.1275	1.736E-05	0.0015	0.000E+00	0.0000	4.881E-03	0.4234	3.271E-04	0.0284	1.073E-04	0.0093	7.957E-06	0.0007
U-238	2.545E-04	0.0221	9.270E-06	0.0008	0.000E+00	0.0000	1.297E-03	0.1125	2.225E-05	0.0019	1.053E-04	0.0091	3.646E-06	0.0003
Total	1.758E-03	0.1525	3.767E-05	0.0033	0.000E+00	0.0000	8.001E-03	0.6940	3.793E-04	0.0329	3.316E-04	0.0288	1.632E-05	0.0014

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	6.006E-04	0.0521	3.063E-06	0.0003	0.000E+00	0.0000	2.349E-04	0.0204	7.850E-07	0.0001	1.325E-07	0.0000	9.485E-04	0.0823
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.672E-15	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	4.756E-12	0.0000	2.513E-14	0.0000	0.000E+00	0.0000	1.867E-12	0.0000	1.049E-13	0.0000	2.361E-13	0.0000	3.475E-07	0.0000
U-234	2.157E-07	0.0000	1.141E-09	0.0000	0.000E+00	0.0000	8.472E-08	0.0000	4.757E-09	0.0000	1.069E-08	0.0000	1.912E-03	0.1658
U-235	1.164E-04	0.0101	4.613E-07	0.0000	0.000E+00	0.0000	4.554E-05	0.0039	3.184E-06	0.0003	2.169E-07	0.0000	6.977E-03	0.6051
U-238	1.016E-10	0.0000	5.360E-13	0.0000	0.000E+00	0.0000	3.988E-11	0.0000	2.240E-12	0.0000	5.055E-12	0.0000	1.692E-03	0.1467
Total	7.172E-04	0.0622	3.525E-06	0.0003	0.000E+00	0.0000	2.805E-04	0.0243	3.974E-06	0.0003	3.601E-07	0.0000	1.153E-02	1.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Branch Fraction*	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
			DSR(j,t) (mrem/yr)/(pCi/g)							
Am-241	Am-241	1.000E+00	8.927E-23	9.314E-23	1.014E-22	1.365E-22	3.189E-22	1.044E-01	4.625E-01	2.339E-01
Am-241	Np-237	1.000E+00	0.000E+00	1.954E-15	6.052E-15	2.258E-14	9.349E-14	7.450E-08	5.980E-04	3.183E-03
Am-241	U-233	1.000E+00	0.000E+00	4.748E-25	4.438E-24	5.628E-23	7.391E-22	2.545E-12	3.895E-09	7.566E-08
Am-241	Th-229	1.000E+00	0.000E+00	8.637E-25	2.405E-23	9.925E-22	3.651E-20	3.999E-18	2.065E-10	2.164E-08
Am-241	∑DSR(j)		8.927E-23	1.954E-15	6.052E-15	2.258E-14	9.349E-14	1.044E-01	4.631E-01	2.371E-01
Co-60	Co-60	1.000E+00	7.121E-05	6.310E-05	4.954E-05	2.125E-05	1.893E-06	3.989E-10	1.915E-18	0.000E+00
Cs-137	Cs-137	1.000E+00	1.230E-06	1.205E-06	1.157E-06	1.004E-06	6.702E-07	1.626E-07	1.352E-05	4.180E-15
H-3	H-3	1.000E+00	0.000E+00	3.928E-04	1.306E-03	1.386E-03	4.622E-04	1.169E-17	0.000E+00	0.000E+00
Pu-238	Pu-238	1.000E+00	4.588E-18	4.688E-18	4.894E-18	5.688E-18	8.742E-18	3.934E-17	3.873E-02	7.009E-04
Pu-238	U-234	1.000E+00	0.000E+00	1.167E-22	3.680E-22	1.462E-21	7.253E-21	1.427E-19	2.928E-05	1.382E-04
Pu-238	Th-230	1.000E+00	0.000E+00	5.393E-27	5.106E-26	6.776E-25	1.014E-23	6.739E-22	4.158E-08	8.610E-07
Pu-238	Ra-226	1.000E+00	0.000E+00	4.543E-20	1.252E-18	4.976E-17	1.646E-15	1.248E-13	1.925E-07	1.403E-05
Pu-238	Pb-210	1.000E+00	0.000E+00	1.598E-31	1.342E-29	1.881E-27	2.206E-25	1.058E-22	1.970E-07	1.471E-05
Pu-238	∑DSR(j)		4.588E-18	4.733E-18	6.145E-18	5.544E-17	1.654E-15	1.248E-13	3.876E-02	8.686E-04
U-234	U-234	1.000E+00	4.014E-17	4.131E-17	4.377E-17	5.359E-17	9.552E-17	7.223E-16	8.840E-02	3.761E-01
U-234	Th-230	1.000E+00	0.000E+00	3.815E-21	1.210E-20	4.906E-20	2.574E-19	6.067E-18	1.865E-04	2.720E-03
U-234	Ra-226	1.000E+00	0.000E+00	4.816E-14	4.439E-13	5.363E-12	6.131E-11	1.574E-09	1.093E-03	4.819E-02
U-234	Pb-210	1.000E+00	0.000E+00	2.254E-25	6.309E-24	2.654E-22	1.041E-20	1.555E-18	1.182E-03	5.096E-02
U-234	∑DSR(j)		4.014E-17	4.820E-14	4.440E-13	5.363E-12	6.131E-11	1.574E-09	9.086E-02	4.780E-01
U-235	U-235	1.000E+00	4.319E-10	4.408E-10	4.593E-10	5.302E-10	7.990E-10	3.356E-09	8.347E-02	7.106E-01
U-235	Pa-231	1.000E+00	0.000E+00	6.363E-14	1.974E-13	7.396E-13	3.099E-12	3.328E-11	7.609E-02	7.701E-01
U-235	Ac-227	1.000E+00	0.000E+00	9.004E-15	8.196E-14	9.492E-13	9.773E-12	1.752E-05	2.302E-02	2.636E-01
U-235	∑DSR(j)		4.319E-10	4.409E-10	4.596E-10	5.319E-10	8.118E-10	1.752E-05	1.826E-01	1.744E+00
U-238	U-238	1.000E+00	7.280E-08	7.379E-08	7.583E-08	8.339E-08	1.094E-07	2.833E-07	8.410E-02	4.218E-01
U-238	U-234	1.000E+00	0.000E+00	1.171E-22	3.723E-22	1.519E-21	8.124E-21	2.048E-19	7.522E-05	1.068E-03
U-238	Th-230	1.000E+00	0.000E+00	5.407E-27	5.146E-26	6.951E-25	1.093E-23	8.574E-22	7.858E-08	3.739E-06
U-238	Ra-226	1.000E+00	0.000E+00	4.553E-20	1.259E-18	5.072E-17	1.742E-15	1.498E-13	3.163E-07	4.840E-05
U-238	Pb-210	1.000E+00	0.000E+00	1.706E-31	1.350E-29	1.911E-27	2.312E-25	1.240E-22	3.130E-07	4.956E-05
U-238	∑DSR(j)		7.280E-08	7.379E-08	7.583E-08	8.339E-08	1.094E-07	2.833E-07	8.418E-02	4.230E-01

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF
The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

Summary : SNEC Rubble Bed in Compressor Room and Evap. Gas Str Room
File   : SNECVOL1.RAD

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 25 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	*3.430E+12	*3.430E+12	*3.430E+12	*3.430E+12	*3.430E+12	2.394E+02	5.399E+01	1.054E+02
Co-60	3.511E+05	3.962E+05	5.046E+05	1.176E+06	1.321E+07	6.268E+10	*1.131E+15	*1.131E+15
Cs-137	2.033E+07	2.075E+07	2.160E+07	2.489E+07	3.731E+07	1.537E+08	1.849E+06	*8.701E+13
H-3	*9.594E+15	6.365E+04	1.914E+04	1.804E+04	5.409E+04	*9.594E+15	*9.594E+15	*9.594E+15
Pu-238	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	6.450E+02	2.878E+04
U-234	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	2.751E+02	5.230E+01
U-235	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	1.427E+06	1.369E+02	1.433E+01
U-238	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	2.970E+02	5.911E+01

*At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 1.000E+03 years

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	4.000E-03	381.7 ± 0.8	4.818E-01	5.189E+01	2.371E-01	1.054E+02
Co-60	2.000E-03	0.000E+00	7.121E-05	3.511E+05	0.000E+00	*1.131E+15
Cs-137	4.000E-01	129.1 ± 0.3	7.112E-04	3.515E+04	4.180E-15	*8.701E+13
H-3	8.000E-01	5.82 ± 0.01	1.571E-03	1.591E+04	0.000E+00	*9.594E+15
Pu-238	4.000E-04	226.5 ± 0.5	4.383E-02	5.704E+02	8.686E-04	2.878E+04
U-234	4.000E-03	1.000E+03	4.780E-01	5.230E+01	4.780E-01	5.230E+01
U-235	4.000E-03	1.000E+03	1.744E+00	1.433E+01	1.744E+00	1.433E+01
U-238	4.000E-03	1.000E+03	4.230E-01	5.911E+01	4.230E-01	5.911E+01

*At specific activity limit

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	3.571E-25	3.726E-25	4.056E-25	5.459E-25	1.276E-24	4.176E-04	1.850E-03	9.358E-04
Np-237	Am-241	1.000E+00	0.000E+00	7.814E-18	2.421E-17	9.032E-17	3.740E-16	2.980E-10	2.392E-06	1.273E-05
U-233	Am-241	1.000E+00	0.000E+00	1.899E-27	1.775E-26	2.251E-25	2.956E-24	1.018E-14	1.558E-11	3.027E-10
Th-229	Am-241	1.000E+00	0.000E+00	3.455E-27	9.620E-26	3.970E-24	1.460E-22	1.599E-20	8.260E-13	8.657E-11
Co-60	Co-60	1.000E+00	1.424E-07	1.262E-07	9.909E-08	4.250E-08	3.785E-09	7.978E-13	3.830E-21	0.000E+00
Cs-137	Cs-137	1.000E+00	4.918E-07	4.820E-07	4.629E-07	4.017E-07	2.681E-07	6.504E-08	5.409E-06	1.672E-15
H-3	H-3	1.000E+00	0.000E+00	3.142E-04	1.045E-03	1.109E-03	3.698E-04	9.354E-18	0.000E+00	0.000E+00
Pu-238	Pu-238	1.000E+00	1.835E-21	1.875E-21	1.957E-21	2.275E-21	3.497E-21	1.574E-20	1.549E-05	2.803E-07
U-234	Pu-238	1.000E+00	0.000E+00	4.667E-26	1.472E-25	5.848E-25	2.901E-24	5.709E-23	1.171E-08	5.526E-08
U-234	U-234	1.000E+00	1.605E-19	1.653E-19	1.751E-19	2.144E-19	3.821E-19	2.889E-18	3.536E-04	1.504E-03
U-234	U-238	1.000E+00	0.000E+00	4.685E-25	1.489E-24	6.077E-24	3.250E-23	8.192E-22	3.009E-07	4.271E-06
U-234	∑DOSE(j):		1.605E-19	1.653E-19	1.751E-19	2.144E-19	3.821E-19	2.890E-18	3.539E-04	1.509E-03
Th-230	Pu-238	1.000E+00	0.000E+00	2.157E-30	2.043E-29	2.710E-28	4.055E-27	2.696E-25	1.663E-11	3.444E-10
Th-230	U-234	1.000E+00	0.000E+00	1.526E-23	4.841E-23	1.962E-22	1.029E-21	2.427E-20	7.458E-07	1.088E-05
Th-230	U-238	1.000E+00	0.000E+00	2.163E-29	2.058E-28	2.781E-27	4.374E-26	3.430E-24	3.143E-10	1.495E-08
Th-230	∑DOSE(j):		0.000E+00	1.526E-23	4.841E-23	1.962E-22	1.030E-21	2.427E-20	7.461E-07	1.090E-05
Ra-226	Pu-238	1.000E+00	0.000E+00	1.817E-23	5.006E-22	1.990E-20	6.582E-19	4.991E-17	7.699E-11	5.611E-09
Ra-226	U-234	1.000E+00	0.000E+00	1.926E-16	1.776E-15	2.145E-14	2.452E-13	6.296E-12	4.371E-06	1.928E-04
Ra-226	U-238	1.000E+00	0.000E+00	1.821E-22	5.035E-21	2.029E-19	6.968E-18	5.993E-16	1.265E-09	1.936E-07
Ra-226	∑DOSE(j):		0.000E+00	1.926E-16	1.776E-15	2.145E-14	2.453E-13	6.296E-12	4.372E-06	1.930E-04
Pb-210	Pu-238	1.000E+00	0.000E+00	0.000E+00	5.367E-33	7.526E-31	8.826E-29	4.233E-26	7.881E-11	5.885E-09
Pb-210	U-234	1.000E+00	0.000E+00	9.016E-28	2.524E-26	1.062E-24	4.163E-23	6.219E-21	4.730E-06	2.038E-04
Pb-210	U-238	1.000E+00	0.000E+00	0.000E+00	5.401E-32	7.643E-30	9.250E-28	4.962E-25	1.252E-09	1.982E-07
Pb-210	∑DOSE(j):		0.000E+00	9.016E-28	2.524E-26	1.062E-24	4.163E-23	6.219E-21	4.731E-06	2.040E-04
U-235	U-235	1.000E+00	1.728E-12	1.763E-12	1.837E-12	2.121E-12	3.196E-12	1.343E-11	3.339E-04	2.842E-03
Pa-231	U-235	1.000E+00	0.000E+00	2.545E-16	7.895E-16	2.958E-15	1.240E-14	1.331E-13	3.044E-04	3.080E-03
Ac-227	U-235	1.000E+00	0.000E+00	3.602E-17	3.278E-16	3.797E-15	3.909E-14	7.008E-08	9.207E-05	1.054E-03
U-238	U-238	1.000E+00	2.912E-10	2.952E-10	3.033E-10	3.336E-10	4.378E-10	1.133E-09	3.364E-04	1.687E-03

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	4.000E-03	3.982E-03	3.946E-03	3.824E-03	3.494E-03	2.548E-03	1.034E-03	4.396E-05
Np-237	Am-241	1.000E+00	0.000E+00	1.293E-09	3.859E-09	1.265E-08	3.623E-08	1.030E-07	2.044E-07	2.376E-07
U-233	Am-241	1.000E+00	0.000E+00	2.827E-15	2.535E-14	2.778E-13	2.404E-12	2.336E-11	1.464E-10	5.632E-10
Th-229	Am-241	1.000E+00	0.000E+00	8.904E-20	2.397E-18	8.785E-17	2.302E-15	7.698E-14	1.577E-12	2.578E-11
Co-60	Co-60	1.000E+00	2.000E-03	1.752E-03	1.343E-03	5.307E-04	3.737E-05	3.461E-09	1.037E-20	0.000E+00
Cs-137	Cs-137	1.000E+00	4.000E-01	3.864E-01	3.607E-01	2.833E-01	1.422E-01	1.272E-02	1.287E-05	4.238E-16
H-3	H-3	1.000E+00	8.000E-01	5.102E-01	2.075E-01	8.903E-03	1.103E-06	2.331E-20	0.000E+00	0.000E+00
Pu-238	Pu-238	1.000E+00	4.000E-04	3.968E-04	3.906E-04	3.696E-04	3.155E-04	1.813E-04	3.726E-05	1.466E-07
U-234	Pu-238	1.000E+00	0.000E+00	1.129E-09	3.361E-09	1.089E-08	3.019E-08	7.749E-08	1.248E-07	1.205E-07
U-234	U-234	1.000E+00	4.000E-03	3.999E-03	3.998E-03	3.992E-03	3.976E-03	3.922E-03	3.769E-03	3.282E-03
U-234	U-238	1.000E+00	0.000E+00	1.134E-08	3.400E-08	1.132E-07	3.382E-07	1.112E-06	3.207E-06	9.316E-06
U-234	∑S(j):		4.000E-03	3.999E-03	3.998E-03	3.992E-03	3.977E-03	3.923E-03	3.773E-03	3.291E-03
Th-230	Pu-238	1.000E+00	0.000E+00	5.090E-15	4.557E-14	4.969E-13	4.242E-12	3.958E-11	2.335E-10	1.029E-09
Th-230	U-234	1.000E+00	0.000E+00	3.600E-08	1.080E-07	3.597E-07	1.077E-06	3.564E-06	1.047E-05	3.250E-05
Th-230	U-238	1.000E+00	0.000E+00	5.103E-14	4.592E-13	5.097E-12	4.575E-11	5.036E-10	4.413E-09	4.467E-08
Th-230	∑S(j):		0.000E+00	3.600E-08	1.080E-07	3.597E-07	1.077E-06	3.564E-06	1.048E-05	3.255E-05
Ra-226	Pu-238	1.000E+00	0.000E+00	7.353E-19	1.976E-17	7.200E-16	1.856E-14	5.888E-13	1.071E-11	1.440E-10
Ra-226	U-234	1.000E+00	0.000E+00	7.796E-12	7.009E-11	7.761E-10	6.917E-09	7.428E-08	6.077E-07	4.945E-06
Ra-226	U-238	1.000E+00	0.000E+00	7.370E-18	1.988E-16	7.340E-15	1.965E-13	7.071E-12	1.759E-10	4.967E-09
Ra-226	∑S(j):		0.000E+00	7.796E-12	7.009E-11	7.761E-10	6.917E-09	7.429E-08	6.079E-07	4.950E-06
Pb-210	Pu-238	1.000E+00	0.000E+00	5.681E-21	4.527E-19	5.282E-17	3.664E-15	2.798E-13	8.162E-12	1.333E-10
Pb-210	U-234	1.000E+00	0.000E+00	8.015E-14	2.129E-12	7.452E-11	1.728E-09	4.111E-08	4.899E-07	4.615E-06
Pb-210	U-238	1.000E+00	0.000E+00	6.068E-20	4.555E-18	5.365E-16	3.841E-14	3.280E-12	1.296E-10	4.490E-09
Pb-210	∑S(j):		0.000E+00	8.015E-14	2.129E-12	7.452E-11	1.728E-09	4.111E-08	4.901E-07	4.620E-06
U-235	U-235	1.000E+00	4.000E-03	3.999E-03	3.998E-03	3.992E-03	3.977E-03	3.923E-03	3.773E-03	3.291E-03
Pa-231	U-235	1.000E+00	0.000E+00	9.457E-08	2.534E-07	8.405E-07	2.487E-06	7.901E-06	2.071E-05	4.412E-05
Ac-227	U-235	1.000E+00	0.000E+00	1.331E-09	1.170E-08	1.198E-07	8.685E-07	5.289E-06	1.745E-05	3.995E-05
U-238	U-238	1.000E+00	4.000E-03	3.999E-03	3.998E-03	3.992E-03	3.977E-03	3.923E-03	3.773E-03	3.291E-03

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

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines

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	Ac-227+D	6.720E+00	6.720E+00	DCF2(1)
B-1	Am-241	4.440E-01	4.440E-01	DCF2(2)
B-1	Co-60	2.190E-04	2.190E-04	DCF2(3)
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(4)
B-1	H-3	6.400E-08	6.400E-08	DCF2(5)
B-1	Np-237+D	5.400E-01	5.400E-01	DCF2(6)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2(7)
B-1	Pb-210+D	2.320E-02	2.320E-02	DCF2(8)
B-1	Pu-238	3.920E-01	3.920E-01	DCF2(9)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2(10)
B-1	Th-229+D	2.160E+00	2.160E+00	DCF2(11)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(12)
B-1	U-233	1.350E-01	1.350E-01	DCF2(13)
B-1	U-234	1.320E-01	1.320E-01	DCF2(14)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2(15)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(16)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3(1)
D-1	Am-241	3.640E-03	3.640E-03	DCF3(2)
D-1	Co-60	2.690E-05	2.690E-05	DCF3(3)
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(4)
D-1	H-3	6.400E-08	6.400E-08	DCF3(5)
D-1	Np-237+D	4.440E-03	4.440E-03	DCF3(6)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3(7)
D-1	Pb-210+D	7.270E-03	7.270E-03	DCF3(8)
D-1	Pu-238	3.200E-03	3.200E-03	DCF3(9)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3(10)
D-1	Th-229+D	4.030E-03	4.030E-03	DCF3(11)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(12)
D-1	U-233	2.890E-04	2.890E-04	DCF3(13)
D-1	U-234	2.830E-04	2.830E-04	DCF3(14)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3(15)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3(16)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Am-241 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(2,1)
D-34	Am-241 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-05	5.000E-05	RTF(2,2)
D-34	Am-241 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-06	2.000E-06	RTF(2,3)
D-34				
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(3,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(3,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(3,3)
D-34				

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

Menu	Parameter	Current Value	Default	Parameter Name
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(4,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(4,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(4,3)
D-34				
D-34	H-3 , plant/soil concentration ratio, dimensionless	4.800E+00	4.800E+00	RTF(5,1)
D-34	H-3 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.200E-02	1.200E-02	RTF(5,2)
D-34	H-3 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-02	1.000E-02	RTF(5,3)
D-34				
D-34	Np-237+D , plant/soil concentration ratio, dimensionless	2.000E-02	2.000E-02	RTF(6,1)
D-34	Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(6,2)
D-34	Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(6,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(7,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(7,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(7,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(8,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(8,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(8,3)
D-34				
D-34	Pu-238 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(9,1)
D-34	Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(9,2)
D-34	Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(9,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(10,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(10,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(10,3)
D-34				
D-34	Th-229+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(11,1)
D-34	Th-229+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(11,2)
D-34	Th-229+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(11,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(12,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(12,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(12,3)
D-34				
D-34	U-233 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(13,1)
D-34	U-233 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(13,2)
D-34	U-233 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(13,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(14,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(14,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(14,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(15,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(15,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(15,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(16,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(16,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(16,3)

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

Menu	Parameter	Current Value	Default	Parameter Name
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Am-241 , fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Am-241 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(2,2)
D-5				
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(3,2)
D-5				
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(4,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(4,2)
D-5				
D-5	H-3 , fish	1.000E+00	1.000E+00	BIOFAC(5,1)
D-5	H-3 , crustacea and mollusks	1.000E+00	1.000E+00	BIOFAC(5,2)
D-5				
D-5	Np-237+D , fish	3.000E+01	3.000E+01	BIOFAC(6,1)
D-5	Np-237+D , crustacea and mollusks	4.000E+02	4.000E+02	BIOFAC(6,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(7,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(7,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(8,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(8,2)
D-5				
D-5	Pu-238 , fish	3.000E+01	3.000E+01	BIOFAC(9,1)
D-5	Pu-238 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(9,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(10,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(10,2)
D-5				
D-5	Th-229+D , fish	1.000E+02	1.000E+02	BIOFAC(11,1)
D-5	Th-229+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(11,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(12,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(12,2)
D-5				
D-5	U-233 , fish	1.000E+01	1.000E+01	BIOFAC(13,1)
D-5	U-233 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(13,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(14,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(14,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(15,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(15,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(16,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(16,2)

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)	7.200E+01	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	5.800E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.200E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+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	4.000E-03	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Co-60	2.000E-03	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Cs-137	4.000E-01	0.000E+00	---	S1(4)
R012	Initial principal radionuclide (pCi/g): H-3	8.000E-01	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): Pu-238	4.000E-03	0.000E+00	---	S1(9)
R012	Initial principal radionuclide (pCi/g): U-234	4.000E-03	0.000E+00	---	S1(14)
R012	Initial principal radionuclide (pCi/g): U-235	4.000E-03	0.000E+00	---	S1(15)
R012	Initial principal radionuclide (pCi/g): U-238	4.000E-03	0.000E+00	---	S1(16)
R012	Concentration in groundwater (pCi/L): Am-241	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(4)
R012	Concentration in groundwater (pCi/L): H-3	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): Pu-238	not used	0.000E+00	---	W1(9)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(14)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(15)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(16)
R013	Cover depth (m)	1.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	2.000E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	3.450E-04	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	3.500E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.730E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	1.050E+01	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	3.867E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	8.000E+00	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.940E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.024E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.500E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	5.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	Romberg failures occurred	EPS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Density of saturated zone (g/cm**3)	1.480E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.500E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	3.500E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.730E+01	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	3.000E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	1.050E+01	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	5.000E-04	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	3.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.860E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	6.100E-01	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	3.500E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	3.500E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	1.050E+01	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	1.730E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Am-241				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.504E-03	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+03	1.000E+03	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	5.000E+03	1.000E+03	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.041E-04	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	5.000E+00	1.000E+03	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.884E-03	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for H-3				
R016	Contaminated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.036E-01	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Pu-238				
R016	Contaminated zone (cm**3/g)	5.000E+03	2.000E+03	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+04	2.000E+03	---	DCNUCU(9,1)
R016	Saturated zone (cm**3/g)	1.000E+04	2.000E+03	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.059E-06	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCC(14)
R016	Unsaturated zone 1 (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCU(14,1)
R016	Saturated zone (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCS(14)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.009E-04	ALEACH(14)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(14)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCC(15)
R016	Unsaturated zone 1 (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCU(15,1)
R016	Saturated zone (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCS(15)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.009E-04	ALEACH(15)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(15)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCC(16)
R016	Unsaturated zone 1 (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCU(16,1)
R016	Saturated zone (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCS(16)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.009E-04	ALEACH(16)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(16)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.504E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Np-237				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.574E+02	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	-1.000E+00	-1.000E+00	2.574E+02	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.574E+02	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.176E-04	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for daughter Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.041E-04	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)

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 Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.025E-04	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(10)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(10,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(10)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.319E-04	ALEACH(10)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(10)
R016	Distribution coefficients for daughter Th-229				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(11)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(11,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.049E-07	ALEACH(11)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(11)
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(12)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(12,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.049E-07	ALEACH(12)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(12)
R016	Distribution coefficients for daughter U-233				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(13)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(13,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(13)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.041E-04	ALEACH(13)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(13)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	-1.000E+00	1.000E+00	-1 shows non-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:	5.000E+01	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	7.071E+01	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	0.000E+00	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	0.000E+00	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	0.000E+00	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	0.000E+00	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	0.000E+00	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	0.000E+00	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	0.000E+00	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	0.000E+00	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	0.000E+00	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	0.000E+00	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	1.000E+00	1.000E+00	---	FRACA(1)
R017	Ring 2	2.732E-01	2.732E-01	---	FRACA(2)
R017	Ring 3	0.000E+00	0.000E+00	---	FRACA(3)
R017	Ring 4	0.000E+00	0.000E+00	---	FRACA(4)
R017	Ring 5	0.000E+00	0.000E+00	---	FRACA(5)
R017	Ring 6	0.000E+00	0.000E+00	---	FRACA(6)
R017	Ring 7	0.000E+00	0.000E+00	---	FRACA(7)
R017	Ring 8	0.000E+00	0.000E+00	---	FRACA(8)
R017	Ring 9	0.000E+00	0.000E+00	---	FRACA(9)
R017	Ring 10	0.000E+00	0.000E+00	---	FRACA(10)
R017	Ring 11	0.000E+00	0.000E+00	---	FRACA(11)
R017	Ring 12	0.000E+00	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	5.200E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	6.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	3.100E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	1.100E+02	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	2.100E+01	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	5.000E+00	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	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	1.000E+00	5.000E-01	---	FR9
R018	Contamination fraction of plant food	1.000E+00	-1	---	FPLANT
R018	Contamination fraction of meat	1.000E+00	-1	---	FMEAT
R018	Contamination fraction of milk	1.000E+00	-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)	9.000E-01	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	1.000E+00	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
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
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	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	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 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	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

Contaminated Zone Dimensions

Area: 72.00 square meters
Thickness: 5.80 meters
Cover Depth: 1.00 meters

Initial Soil Concentrations, pCi/g

Am-241	4.000E-03
Co-60	2.000E-03
Cs-137	4.000E-01
H-3	8.000E-01
Pu-238	4.000E-03
U-234	4.000E-03
U-235	4.000E-03
U-238	4.000E-03

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 25 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):	6.345E-07	2.382E-04	9.298E-04	1.359E-03	5.167E-04	3.089E-04	3.566E-03	1.397E-02
M(t):	2.538E-08	9.527E-06	3.719E-05	5.437E-05	2.067E-05	1.235E-05	1.426E-04	5.590E-04

Maximum TDOSE(t): 1.397E-02 mrem/yr at t = 1.000E+03 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	3.571E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	1.424E-07	0.2244	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	4.918E-07	0.7751	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	1.835E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.605E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.728E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	2.912E-10	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	6.345E-07	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	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	3.571E-25	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.424E-07	0.2244
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.918E-07	0.7751
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.835E-20	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.605E-19	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.728E-12	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.912E-10	0.0005
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	6.345E-07	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	7.820E-18	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	1.263E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	4.846E-07	0.0020	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	1.893E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.928E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.764E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	2.952E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	6.112E-07	0.0026	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	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	7.820E-18	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.263E-07	0.0005
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.846E-07	0.0020
H-3	1.188E-04	0.4989	1.805E-09	0.0000	0.000E+00	0.0000	7.444E-05	0.3125	6.279E-06	0.0264	3.801E-05	0.1596	2.376E-04	0.9974
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.893E-20	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.928E-16	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.764E-12	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.952E-10	0.0000
Total	1.188E-04	0.4989	1.805E-09	0.0000	0.000E+00	0.0000	7.444E-05	0.3125	6.279E-06	0.0264	3.801E-05	0.1596	2.382E-04	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	2.426E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	9.926E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	4.706E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	2.458E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.777E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.839E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	3.034E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.701E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	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	2.426E-17	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.926E-08	0.0001
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.706E-07	0.0005
H-3	4.519E-04	0.4860	7.058E-09	0.0000	0.000E+00	0.0000	2.998E-04	0.3224	2.873E-05	0.0309	1.488E-04	0.1601	9.292E-04	0.9994
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.458E-20	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.777E-15	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.839E-12	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.034E-10	0.0000
Total	4.519E-04	0.4860	7.058E-09	0.0000	0.000E+00	0.0000	2.998E-04	0.3224	2.873E-05	0.0309	1.488E-04	0.1601	9.298E-04	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	9.100E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	4.274E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	4.244E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	2.220E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	2.149E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	2.129E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	3.339E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	4.675E-07	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total 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	9.100E-17	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.274E-08	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.244E-07	0.0003
H-3	6.578E-04	0.4839	1.032E-08	0.0000	0.000E+00	0.0000	4.404E-04	0.3240	4.298E-05	0.0316	2.177E-04	0.1601	1.359E-03	0.9997
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.220E-19	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.149E-14	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.129E-12	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.339E-10	0.0000
Total	6.578E-04	0.4839	1.032E-08	0.0000	0.000E+00	0.0000	4.404E-04	0.3240	4.298E-05	0.0316	2.177E-04	0.1601	1.359E-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	fract.
Am-241	3.824E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	3.850E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	3.161E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	6.642E-18	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	2.465E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	3.257E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	4.390E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	3.204E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	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	3.824E-16	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.850E-09	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.161E-07	0.0006
H-3	2.498E-04	0.4835	3.922E-09	0.0000	0.000E+00	0.0000	1.675E-04	0.3241	1.638E-05	0.0317	8.272E-05	0.1601	5.164E-04	0.9994
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.642E-18	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.465E-13	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.257E-12	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.390E-10	0.0000
Total	2.498E-04	0.4835	3.922E-09	0.0000	0.000E+00	0.0000	1.675E-04	0.3241	1.638E-05	0.0317	8.272E-05	0.1601	5.167E-04	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground mrem/yr	Ground fract.	Inhalation mrem/yr	Inhalation fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	Soil mrem/yr	Soil fract.
Am-241	4.157E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	8.440E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	1.126E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	5.057E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	6.400E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.455E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	1.144E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.138E-07	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-Nuclide	Water mrem/yr	Water fract.	Fish mrem/yr	Fish fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	All Pathways* mrem/yr	All Pathways* fract.
Am-241	2.212E-04	0.7160	7.516E-07	0.0024	0.000E+00	0.0000	8.645E-05	0.2799	2.878E-07	0.0009	4.873E-08	0.0002	3.087E-04	0.9995
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.440E-13	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.126E-07	0.0004
H-3	3.464E-12	0.0000	5.458E-17	0.0000	0.000E+00	0.0000	2.338E-12	0.0000	2.317E-13	0.0000	1.151E-12	0.0000	7.185E-12	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.057E-16	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.400E-12	0.0000
U-235	3.651E-08	0.0001	1.170E-10	0.0000	0.000E+00	0.0000	1.425E-08	0.0000	1.880E-11	0.0000	8.014E-11	0.0000	5.099E-08	0.0002
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.144E-09	0.0000
Total	2.212E-04	0.7162	7.517E-07	0.0024	0.000E+00	0.0000	8.646E-05	0.2799	2.879E-07	0.0009	4.881E-08	0.0002	3.089E-04	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground mrem/yr	Ground fract.	Inhalation mrem/yr	Inhalation fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	Soil mrem/yr	Soil fract.
Am-241	3.726E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.467E-04	0.2094	5.126E-07	0.0001	4.383E-08	0.0000	0.000E+00	0.0000
Co-60	2.964E-23	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.429E-21	0.0000	8.777E-22	0.0000	2.001E-22	0.0000	0.000E+00	0.0000
Cs-137	5.909E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.735E-05	0.0049	6.669E-06	0.0019	4.053E-06	0.0011	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	1.139E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.551E-04	0.0435	1.989E-07	0.0001	6.599E-09	0.0000	0.000E+00	0.0000
U-234	6.518E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.660E-04	0.1026	1.657E-06	0.0005	6.404E-06	0.0018	0.000E+00	0.0000
U-235	9.483E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.449E-04	0.2089	2.159E-05	0.0061	5.987E-06	0.0017	0.000E+00	0.0000
U-238	1.766E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.389E-04	0.0950	1.475E-06	0.0004	5.935E-06	0.0017	0.000E+00	0.0000
Total	2.517E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.369E-03	0.6643	3.210E-05	0.0090	2.243E-05	0.0063	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-Nuclide	Water mrem/yr	Water fract.	Fish mrem/yr	Fish fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	All Pathways* mrem/yr	All Pathways* fract.
Am-241	8.135E-04	0.2281	2.766E-06	0.0008	0.000E+00	0.0000	3.181E-04	0.0892	1.062E-06	0.0003	1.794E-07	0.0001	1.883E-03	0.5280
Co-60	0.000E+00	0.0000	0.000E+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-21	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.808E-05	0.0079
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	4.924E-15	0.0000	1.653E-17	0.0000	0.000E+00	0.0000	1.932E-15	0.0000	1.094E-16	0.0000	2.667E-16	0.0000	1.553E-04	0.0436
U-234	1.313E-10	0.0000	4.453E-13	0.0000	0.000E+00	0.0000	5.152E-11	0.0000	2.912E-12	0.0000	6.985E-12	0.0000	3.741E-04	0.1049
U-235	4.829E-06	0.0014	1.370E-08	0.0000	0.000E+00	0.0000	1.889E-06	0.0005	8.710E-08	0.0000	9.562E-09	0.0000	7.793E-04	0.2185
U-238	3.269E-15	0.0000	1.095E-17	0.0000	0.000E+00	0.0000	1.282E-15	0.0000	7.246E-17	0.0000	1.775E-16	0.0000	3.464E-04	0.0971
Total	8.183E-04	0.2295	2.779E-06	0.0008	0.000E+00	0.0000	3.200E-04	0.0897	1.149E-06	0.0003	1.890E-07	0.0001	3.566E-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 = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground mrem/yr	Ground fract.	Inhalation mrem/yr	Inhalation fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.
Am-241	4.764E-06	0.0003	1.749E-06	0.0001	0.000E+00	0.0000	3.994E-04	0.0286
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	1.964E-13	0.0000	7.208E-20	0.0000	0.000E+00	0.0000	1.202E-13	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	1.084E-08	0.0000	1.657E-08	0.0000	0.000E+00	0.0000	3.417E-06	0.0002
U-234	3.704E-05	0.0027	1.070E-05	0.0008	0.000E+00	0.0000	1.908E-03	0.1365
U-235	1.630E-03	0.1166	1.967E-05	0.0014	0.000E+00	0.0000	6.304E-03	0.4511
U-238	2.796E-04	0.0200	9.403E-06	0.0007	0.000E+00	0.0000	1.425E-03	0.1020
Total	1.951E-03	0.1396	4.154E-05	0.0030	0.000E+00	0.0000	1.004E-02	0.7184

Radio-Nuclide	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	Soil mrem/yr	Soil fract.
Am-241	2.366E-06	0.0002	2.281E-07	0.0000	1.287E-06	0.0001
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	5.470E-14	0.0000	3.446E-14	0.0000	1.014E-17	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	4.073E-08	0.0000	4.770E-08	0.0000	1.007E-08	0.0000
U-234	3.248E-05	0.0023	1.312E-04	0.0094	2.140E-06	0.0002
U-235	4.359E-04	0.0312	1.188E-04	0.0085	4.772E-06	0.0003
U-238	2.445E-05	0.0017	1.157E-04	0.0083	1.923E-06	0.0001
Total	4.952E-04	0.0354	3.660E-04	0.0262	1.013E-05	0.0007

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

Water Dependent Pathways

Radio-Nuclide	Water mrem/yr	Water fract.	Fish mrem/yr	Fish fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.
Am-241	6.691E-04	0.0479	2.275E-06	0.0002	0.000E+00	0.0000	2.617E-04	0.0187
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	3.611E-11	0.0000	1.272E-13	0.0000	0.000E+00	0.0000	1.418E-11	0.0000
U-234	1.648E-07	0.0000	5.809E-10	0.0000	0.000E+00	0.0000	6.470E-08	0.0000
U-235	9.575E-05	0.0069	2.533E-07	0.0000	0.000E+00	0.0000	3.746E-05	0.0027
U-238	7.728E-11	0.0000	2.719E-13	0.0000	0.000E+00	0.0000	3.035E-11	0.0000
Total	7.650E-04	0.0547	2.529E-06	0.0002	0.000E+00	0.0000	2.992E-04	0.0214

Radio-Nuclide	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	All Pathways* mrem/yr	All Pathways* fract.
Am-241	8.744E-07	0.0001	1.476E-07	0.0000	1.344E-03	0.0962
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	4.057E-13	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	7.963E-13	0.0000	1.794E-12	0.0000	3.543E-06	0.0003
U-234	3.633E-09	0.0000	8.170E-09	0.0000	2.122E-03	0.1518
U-235	2.602E-06	0.0002	1.787E-07	0.0000	8.649E-03	0.6189
U-238	1.705E-12	0.0000	3.849E-12	0.0000	1.856E-03	0.1328
Total	3.480E-06	0.0002	3.345E-07	0.0000	1.397E-02	1.0000

*Sum of all water independent and dependent pathways.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 25 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	*3.430E+12	*3.430E+12	*3.430E+12	*3.430E+12	*3.430E+12	3.239E+02	5.311E+01	7.441E+01
Co-60	3.511E+05	3.960E+05	5.037E+05	1.170E+06	1.299E+07	5.924E+10	*1.131E+15	*1.131E+15
Cs-137	2.033E+07	2.063E+07	2.125E+07	2.356E+07	3.164E+07	8.877E+07	3.561E+05	2.465E+13
H-3	*9.594E+15	8.419E+04	2.152E+04	1.472E+04	3.873E+04	2.783E+12	*9.594E+15	*9.594E+15
Pu-238	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	6.439E+02	2.823E+04
U-234	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	2.673E+02	4.713E+01
U-235	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	1.961E+06	1.283E+02	1.156E+01
U-238	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	2.887E+02	5.388E+01

*At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 1.000E+03 years

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	4.000E-03	464.6 ± 0.9	5.338E-01	4.684E+01	3.360E-01	7.441E+01
Co-60	2.000E-03	0.000E+00	7.121E-05	3.511E+05	0.000E+00	*1.131E+15
Cs-137	4.000E-01	134.6 ± 0.3	1.465E-03	1.706E+04	1.014E-12	2.465E+13
H-3	8.000E-01	8.06 ± 0.02	1.738E-03	1.439E+04	0.000E+00	*9.594E+15
Pu-238	4.000E-03	226.5 ± 0.5	4.389E-02	5.696E+02	8.857E-04	2.823E+04
U-234	4.000E-03	1.000E+03	5.304E-01	4.713E+01	5.304E-01	4.713E+01
U-235	4.000E-03	1.000E+03	2.162E+00	1.156E+01	2.162E+00	1.156E+01
U-238	4.000E-03	1.000E+03	4.640E-01	5.388E+01	4.640E-01	5.388E+01

*At specific activity limit

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	3.571E-25	3.731E-25	4.073E-25	5.536E-25	1.330E-24	3.087E-04	1.880E-03	1.324E-03
Np-237	Am-241	1.000E+00	0.000E+00	7.820E-18	2.426E-17	9.100E-17	3.824E-16	2.184E-10	2.896E-06	1.958E-05
U-233	Am-241	1.000E+00	0.000E+00	1.901E-27	1.779E-26	2.267E-25	3.018E-24	7.430E-15	1.817E-11	4.808E-10
Th-229	Am-241	1.000E+00	0.000E+00	3.456E-27	9.635E-26	3.991E-24	1.483E-22	1.682E-20	9.521E-13	1.276E-10
Co-60	Co-60	1.000E+00	1.424E-07	1.263E-07	9.926E-08	4.274E-08	3.850E-09	8.440E-13	4.536E-21	0.000E+00
Cs-137	Cs-137	1.000E+00	4.918E-07	4.846E-07	4.706E-07	4.244E-07	3.161E-07	1.126E-07	2.808E-05	4.057E-13
H-3	H-3	1.000E+00	0.000E+00	2.376E-04	9.292E-04	1.359E-03	5.164E-04	7.185E-12	0.000E+00	0.000E+00
Pu-238	Pu-238	1.000E+00	1.835E-20	1.875E-20	1.957E-20	2.275E-20	3.497E-20	1.575E-19	1.552E-04	2.808E-06
U-234	Pu-238	1.000E+00	0.000E+00	4.667E-25	1.472E-24	5.851E-24	2.906E-23	5.741E-22	1.194E-07	5.992E-07
U-234	U-234	1.000E+00	1.605E-19	1.653E-19	1.751E-19	2.146E-19	3.832E-19	2.917E-18	3.637E-04	1.650E-03
U-234	U-238	1.000E+00	0.000E+00	4.685E-25	1.490E-24	6.083E-24	3.259E-23	8.270E-22	3.095E-07	4.684E-06
U-234	∑DOSE(j):		1.605E-19	1.653E-19	1.751E-19	2.146E-19	3.832E-19	2.918E-18	3.642E-04	1.655E-03
Th-230	Pu-238	1.000E+00	0.000E+00	2.157E-29	2.043E-28	2.711E-27	4.059E-26	2.705E-24	1.682E-10	3.572E-09
Th-230	U-234	1.000E+00	0.000E+00	1.526E-23	4.841E-23	1.963E-22	1.031E-21	2.438E-20	7.564E-07	1.133E-05
Th-230	U-238	1.000E+00	0.000E+00	2.163E-29	2.059E-28	2.782E-27	4.382E-26	3.451E-24	3.203E-10	1.583E-08
Th-230	∑DOSE(j):		0.000E+00	1.526E-23	4.841E-23	1.963E-22	1.031E-21	2.439E-20	7.569E-07	1.135E-05
Ra-226	Pu-238	1.000E+00	0.000E+00	1.817E-22	5.008E-21	1.993E-19	6.607E-18	5.055E-16	8.012E-10	6.418E-08
Ra-226	U-234	1.000E+00	0.000E+00	1.927E-16	1.777E-15	2.149E-14	2.465E-13	6.400E-12	4.585E-06	2.233E-04
Ra-226	U-238	1.000E+00	0.000E+00	1.818E-22	5.038E-21	2.032E-19	6.999E-18	6.081E-16	1.321E-09	2.218E-07
Ra-226	∑DOSE(j):		0.000E+00	1.927E-16	1.777E-15	2.149E-14	2.465E-13	6.401E-12	4.588E-06	2.236E-04
Pb-210	Pu-238	1.000E+00	0.000E+00	0.000E+00	5.369E-32	7.538E-30	8.867E-28	4.297E-25	8.230E-10	6.759E-08
Pb-210	U-234	1.000E+00	0.000E+00	9.018E-28	2.525E-26	1.064E-24	4.187E-23	6.334E-21	4.978E-06	2.370E-04
Pb-210	U-238	1.000E+00	0.000E+00	0.000E+00	5.397E-32	7.657E-30	9.298E-28	5.045E-25	1.312E-09	2.281E-07
Pb-210	∑DOSE(j):		0.000E+00	9.018E-28	2.525E-26	1.064E-24	4.187E-23	6.334E-21	4.980E-06	2.373E-04
U-235	U-235	1.000E+00	1.728E-12	1.763E-12	1.838E-12	2.123E-12	3.205E-12	1.355E-11	3.435E-04	3.120E-03
Pa-231	U-235	1.000E+00	0.000E+00	2.546E-16	7.903E-16	2.968E-15	1.252E-14	1.375E-13	3.346E-04	4.135E-03
Ac-227	U-235	1.000E+00	0.000E+00	3.604E-17	3.285E-16	3.822E-15	3.984E-14	5.098E-08	1.013E-04	1.393E-03
U-238	U-238	1.000E+00	2.912E-10	2.952E-10	3.034E-10	3.339E-10	4.390E-10	1.144E-09	3.461E-04	1.851E-03

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	4.000E-03	3.988E-03	3.963E-03	3.878E-03	3.644E-03	2.932E-03	1.575E-03	1.789E-04
Np-237	Am-241	1.000E+00	0.000E+00	1.294E-09	3.868E-09	1.275E-08	3.704E-08	1.107E-07	2.477E-07	3.658E-07
U-233	Am-241	1.000E+00	0.000E+00	2.829E-15	2.540E-14	2.797E-13	2.454E-12	2.498E-11	1.770E-10	9.525E-10
Th-229	Am-241	1.000E+00	0.000E+00	8.909E-20	2.401E-18	8.831E-17	2.338E-15	8.096E-14	1.817E-12	3.814E-11
Co-60	Co-60	1.000E+00	2.000E-03	1.752E-03	1.346E-03	5.337E-04	3.801E-05	3.662E-09	1.228E-20	0.000E+00
Cs-137	Cs-137	1.000E+00	4.000E-01	3.886E-01	3.667E-01	2.993E-01	1.676E-01	2.203E-02	6.685E-05	1.029E-13
H-3	H-3	1.000E+00	8.000E-01	6.170E-01	3.670E-01	5.956E-02	3.301E-04	4.186E-12	1.146E-34	0.000E+00
Pu-238	Pu-238	1.000E+00	4.000E-03	3.969E-03	3.906E-03	3.696E-03	3.155E-03	1.814E-03	3.732E-04	1.474E-06
U-234	Pu-238	1.000E+00	0.000E+00	1.129E-08	3.361E-08	1.090E-07	3.024E-07	7.792E-07	1.273E-06	1.310E-06
U-234	U-234	1.000E+00	4.000E-03	4.000E-03	3.999E-03	3.996E-03	3.988E-03	3.959E-03	3.877E-03	3.606E-03
U-234	U-238	1.000E+00	0.000E+00	1.134E-08	3.401E-08	1.133E-07	3.392E-07	1.122E-06	3.299E-06	1.024E-05
U-234	∑S(j):		4.000E-03	4.000E-03	3.999E-03	3.996E-03	3.988E-03	3.961E-03	3.882E-03	3.617E-03
Th-230	Pu-238	1.000E+00	0.000E+00	5.090E-14	4.557E-13	4.970E-12	4.246E-11	3.972E-10	2.361E-09	1.073E-08
Th-230	U-234	1.000E+00	0.000E+00	3.601E-08	1.080E-07	3.599E-07	1.078E-06	3.580E-06	1.062E-05	3.404E-05
Th-230	U-238	1.000E+00	0.000E+00	5.104E-14	4.593E-13	5.100E-12	4.584E-11	5.068E-10	4.496E-09	4.753E-08
Th-230	∑S(j):		0.000E+00	3.601E-08	1.080E-07	3.599E-07	1.078E-06	3.581E-06	1.063E-05	3.410E-05
Ra-226	Pu-238	1.000E+00	0.000E+00	7.354E-18	1.977E-16	7.209E-15	1.864E-13	5.964E-12	1.114E-10	1.647E-09
Ra-226	U-234	1.000E+00	0.000E+00	7.797E-12	7.013E-11	7.774E-10	6.951E-09	7.551E-08	6.376E-07	5.729E-06
Ra-226	U-238	1.000E+00	0.000E+00	7.357E-18	1.988E-16	7.351E-15	1.974E-13	7.175E-12	1.837E-10	5.692E-09
Ra-226	∑S(j):		0.000E+00	7.797E-12	7.013E-11	7.774E-10	6.952E-09	7.552E-08	6.379E-07	5.737E-06
Pb-210	Pu-238	1.000E+00	0.000E+00	5.683E-20	4.529E-18	5.290E-16	3.681E-14	2.841E-12	8.523E-11	1.532E-09
Pb-210	U-234	1.000E+00	0.000E+00	8.016E-14	2.130E-12	7.466E-11	1.738E-09	4.187E-08	5.157E-07	5.371E-06
Pb-210	U-238	1.000E+00	0.000E+00	5.554E-20	4.552E-18	5.374E-16	3.860E-14	3.335E-12	1.358E-10	5.169E-09
Pb-210	∑S(j):		0.000E+00	8.016E-14	2.130E-12	7.466E-11	1.738E-09	4.187E-08	5.159E-07	5.378E-06
U-235	U-235	1.000E+00	4.000E-03	4.000E-03	3.999E-03	3.996E-03	3.988E-03	3.960E-03	3.881E-03	3.616E-03
Pa-231	U-235	1.000E+00	0.000E+00	8.460E-08	2.536E-07	8.433E-07	2.512E-06	8.162E-06	2.279E-05	5.954E-05
Ac-227	U-235	1.000E+00	0.000E+00	1.332E-09	1.172E-08	1.206E-07	8.851E-07	5.579E-06	1.978E-05	5.570E-05
U-238	U-238	1.000E+00	4.000E-03	4.000E-03	3.999E-03	3.996E-03	3.988E-03	3.960E-03	3.881E-03	3.616E-03

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

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines

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	Ac-227+D	6.720E+00	6.720E+00	DCF2(1)
B-1	Am-241	4.440E-01	4.440E-01	DCF2(2)
B-1	Co-60	2.190E-04	2.190E-04	DCF2(3)
B-1	Cs-137+D	3.190E-05	3.190E-05	DCF2(4)
B-1	H-3	6.400E-08	6.400E-08	DCF2(5)
B-1	Np-237+D	5.400E-01	5.400E-01	DCF2(6)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2(7)
B-1	Pb-210+D	2.320E-02	2.320E-02	DCF2(8)
B-1	Pu-238	3.920E-01	3.920E-01	DCF2(9)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2(10)
B-1	Th-229+D	2.160E+00	2.160E+00	DCF2(11)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(12)
B-1	U-233	1.350E-01	1.350E-01	DCF2(13)
B-1	U-234	1.320E-01	1.320E-01	DCF2(14)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2(15)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(16)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3(1)
D-1	Am-241	3.640E-03	3.640E-03	DCF3(2)
D-1	Co-60	2.690E-05	2.690E-05	DCF3(3)
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(4)
D-1	H-3	6.400E-08	6.400E-08	DCF3(5)
D-1	Np-237+D	4.440E-03	4.440E-03	DCF3(6)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3(7)
D-1	Pb-210+D	7.270E-03	7.270E-03	DCF3(8)
D-1	Pu-238	3.200E-03	3.200E-03	DCF3(9)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3(10)
D-1	Th-229+D	4.030E-03	4.030E-03	DCF3(11)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(12)
D-1	U-233	2.890E-04	2.890E-04	DCF3(13)
D-1	U-234	2.830E-04	2.830E-04	DCF3(14)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3(15)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3(16)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Am-241 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(2,1)
D-34	Am-241 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-05	5.000E-05	RTF(2,2)
D-34	Am-241 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-06	2.000E-06	RTF(2,3)
D-34				
D-34	Co-60 , plant/soil concentration ratio, dimensionless	8.000E-02	8.000E-02	RTF(3,1)
D-34	Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-02	2.000E-02	RTF(3,2)
D-34	Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF(3,3)
D-34				

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

Menu	Parameter	Current Value	Default	Parameter Name
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(4,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(4,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(4,3)
D-34				
D-34	H-3 , plant/soil concentration ratio, dimensionless	4.800E+00	4.800E+00	RTF(5,1)
D-34	H-3 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.200E-02	1.200E-02	RTF(5,2)
D-34	H-3 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-02	1.000E-02	RTF(5,3)
D-34				
D-34	Np-237+D , plant/soil concentration ratio, dimensionless	2.000E-02	2.000E-02	RTF(6,1)
D-34	Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(6,2)
D-34	Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(6,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(7,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(7,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(7,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(8,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(8,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(8,3)
D-34				
D-34	Pu-238 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(9,1)
D-34	Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(9,2)
D-34	Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(9,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(10,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(10,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(10,3)
D-34				
D-34	Th-229+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(11,1)
D-34	Th-229+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(11,2)
D-34	Th-229+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(11,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(12,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(12,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(12,3)
D-34				
D-34	U-233 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(13,1)
D-34	U-233 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(13,2)
D-34	U-233 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(13,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(14,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(14,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(14,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(15,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(15,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(15,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(16,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(16,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(16,3)

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

Menu	Parameter	Current Value	Default	Parameter Name
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Am-241 , fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Am-241 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(2,2)
D-5				
D-5	Co-60 , fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Co-60 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(3,2)
D-5				
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(4,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(4,2)
D-5				
D-5	H-3 , fish	1.000E+00	1.000E+00	BIOFAC(5,1)
D-5	H-3 , crustacea and mollusks	1.000E+00	1.000E+00	BIOFAC(5,2)
D-5				
D-5	Np-237+D , fish	3.000E+01	3.000E+01	BIOFAC(6,1)
D-5	Np-237+D , crustacea and mollusks	4.000E+02	4.000E+02	BIOFAC(6,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(7,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(7,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(8,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(8,2)
D-5				
D-5	Pu-238 , fish	3.000E+01	3.000E+01	BIOFAC(9,1)
D-5	Pu-238 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(9,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(10,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(10,2)
D-5				
D-5	Th-229+D , fish	1.000E+02	1.000E+02	BIOFAC(11,1)
D-5	Th-229+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(11,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(12,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(12,2)
D-5				
D-5	U-233 , fish	1.000E+01	1.000E+01	BIOFAC(13,1)
D-5	U-233 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(13,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(14,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(14,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(15,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(15,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(16,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(16,2)

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)	2.500E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	4.200E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+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	4.000E-03	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Co-60	2.000E-03	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Cs-137	4.000E-01	0.000E+00	---	S1(4)
R012	Initial principal radionuclide (pCi/g): H-3	8.000E-01	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): Pu-238	4.000E-03	0.000E+00	---	S1(9)
R012	Initial principal radionuclide (pCi/g): U-234	4.000E-03	0.000E+00	---	S1(14)
R012	Initial principal radionuclide (pCi/g): U-235	4.000E-03	0.000E+00	---	S1(15)
R012	Initial principal radionuclide (pCi/g): U-238	4.000E-03	0.000E+00	---	S1(16)
R012	Concentration in groundwater (pCi/L): Am-241	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Co-60	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(4)
R012	Concentration in groundwater (pCi/L): H-3	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): Pu-238	not used	0.000E+00	---	W1(9)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(14)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(15)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(16)
R013	Cover depth (m)	1.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	2.000E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	3.450E-04	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	3.500E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.730E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	1.050E+01	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	3.867E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	8.000E+00	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.940E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.024E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.500E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	5.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	Romberg failures occurred	EPS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Density of saturated zone (g/cm**3)	1.480E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.500E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	3.500E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.730E+01	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	3.000E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	1.050E+01	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	5.000E-04	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	3.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.860E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	6.100E-01	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	3.500E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	3.500E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	1.050E+01	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	1.730E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Am-241				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.360E-03	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Co-60				
R016	Contaminated zone (cm**3/g)	5.000E+01	1.000E+03	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+03	1.000E+03	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	5.000E+03	1.000E+03	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.752E-03	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	5.000E+00	1.000E+03	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	1.000E+03	1.000E+03	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.706E-02	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for H-3				
R016	Contaminated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	0.000E+00	0.000E+00	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.905E-01	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Pu-238				
R016	Contaminated zone (cm**3/g)	5.000E+03	2.000E+03	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+04	2.000E+03	---	DCNUCU(9,1)
R016	Saturated zone (cm**3/g)	1.000E+04	2.000E+03	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.757E-05	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCC(14)
R016	Unsaturated zone 1 (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCU(14,1)
R016	Saturated zone (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCS(14)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.927E-04	ALEACH(14)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(14)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCC(15)
R016	Unsaturated zone 1 (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCU(15,1)
R016	Saturated zone (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCS(15)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.927E-04	ALEACH(15)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(15)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCC(16)
R016	Unsaturated zone 1 (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCU(16,1)
R016	Saturated zone (cm**3/g)	3.000E+02	5.000E+01	---	DCNUCS(16)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.927E-04	ALEACH(16)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(16)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.360E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Np-237				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.574E+02	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	-1.000E+00	-1.000E+00	2.574E+02	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.574E+02	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.411E-04	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for daughter Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.752E-03	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)

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 Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.773E-04	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(10)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(10,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(10)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.252E-03	ALEACH(10)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(10)
R016	Distribution coefficients for daughter Th-229				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(11)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(11,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.464E-06	ALEACH(11)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(11)
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(12)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(12,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.464E-06	ALEACH(12)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(12)
R016	Distribution coefficients for daughter U-233				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(13)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(13,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(13)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.752E-03	ALEACH(13)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(13)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	-1.000E+00	1.000E+00	-1 shows non-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:	5.000E+01	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	7.071E+01	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	0.000E+00	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	0.000E+00	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	0.000E+00	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	0.000E+00	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	0.000E+00	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	0.000E+00	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	0.000E+00	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	0.000E+00	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	0.000E+00	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	0.000E+00	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	1.000E+00	1.000E+00	---	FRACA(1)
R017	Ring 2	2.732E-01	2.732E-01	---	FRACA(2)
R017	Ring 3	0.000E+00	0.000E+00	---	FRACA(3)
R017	Ring 4	0.000E+00	0.000E+00	---	FRACA(4)
R017	Ring 5	0.000E+00	0.000E+00	---	FRACA(5)
R017	Ring 6	0.000E+00	0.000E+00	---	FRACA(6)
R017	Ring 7	0.000E+00	0.000E+00	---	FRACA(7)
R017	Ring 8	0.000E+00	0.000E+00	---	FRACA(8)
R017	Ring 9	0.000E+00	0.000E+00	---	FRACA(9)
R017	Ring 10	0.000E+00	0.000E+00	---	FRACA(10)
R017	Ring 11	0.000E+00	0.000E+00	---	FRACA(11)
R017	Ring 12	0.000E+00	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	5.200E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	6.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	3.100E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	1.100E+02	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	2.100E+01	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	5.000E+00	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	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	1.000E+00	5.000E-01	---	FR9
R018	Contamination fraction of plant food	1.000E+00	-1	---	FPLANT
R018	Contamination fraction of meat	1.000E+00	-1	---	FMEAT
R018	Contamination fraction of milk	1.000E+00	-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)	9.000E-01	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	1.000E+00	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
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
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	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	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 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	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

Contaminated Zone Dimensions	
Area:	250.00 square meters
Thickness:	2.00 meters
Cover Depth:	1.00 meters

Initial Soil Concentrations, pCi/g	
Am-241	4.000E-03
Co-60	2.000E-03
Cs-137	4.000E-01
H-3	8.000E-01
Pu-238	4.000E-03
U-234	4.000E-03
U-235	4.000E-03
U-238	4.000E-03

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 25 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):	6.345E-07	2.142E-04	6.112E-04	5.363E-04	1.755E-04	2.915E-04	2.678E-03	9.346E-03
M(t):	2.538E-08	8.567E-06	2.445E-05	2.145E-05	7.019E-06	1.166E-05	1.071E-04	3.738E-04

Maximum TDOSE(t): 9.346E-03 mrem/yr at t = 1.000E+03 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-Nuclide	Ground mrem/yr	Ground fract.	Inhalation mrem/yr	Inhalation fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	Soil mrem/yr	Soil fract.
Am-241	3.571E-25	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	1.424E-07	0.2244	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	4.918E-07	0.7751	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	1.835E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.605E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.728E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	2.912E-10	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	6.345E-07	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-Nuclide	Water mrem/yr	Water fract.	Fish mrem/yr	Fish fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	All Pathways* mrem/yr	All Pathways* 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	3.571E-25	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.424E-07	0.2244
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.918E-07	0.7751
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.835E-20	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.605E-19	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.728E-12	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.912E-10	0.0005
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	6.345E-07	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	7.808E-18	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	1.261E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	4.792E-07	0.0022	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	1.893E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.928E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.763E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	2.951E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	6.057E-07	0.0028	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	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	7.808E-18	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.261E-07	0.0006
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.792E-07	0.0022
H-3	1.077E-04	0.5030	5.744E-09	0.0000	0.000E+00	0.0000	6.556E-05	0.3061	5.761E-06	0.0269	3.450E-05	0.1611	2.136E-04	0.9972
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.893E-20	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.928E-16	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.763E-12	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.951E-10	0.0000
Total	1.077E-04	0.5030	5.744E-09	0.0000	0.000E+00	0.0000	6.556E-05	0.3061	5.761E-06	0.0269	3.450E-05	0.1611	2.142E-04	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	2.415E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	9.892E-08	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	4.550E-07	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	2.458E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.775E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.838E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	3.032E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.543E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	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	2.415E-17	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.892E-08	0.0002
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.550E-07	0.0007
H-3	2.997E-04	0.4904	1.642E-08	0.0000	0.000E+00	0.0000	1.929E-04	0.3156	1.920E-05	0.0314	9.878E-05	0.1616	6.106E-04	0.9991
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.458E-20	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.775E-15	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.838E-12	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.032E-10	0.0000
Total	2.997E-04	0.4904	1.642E-08	0.0000	0.000E+00	0.0000	1.929E-04	0.3156	1.920E-05	0.0314	9.878E-05	0.1616	6.112E-04	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	8.962E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	4.225E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	3.795E-07	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	2.215E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	2.142E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	2.125E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	3.333E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	4.221E-07	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.962E-17	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.225E-08	0.0001
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.795E-07	0.0007
H-3	2.622E-04	0.4890	1.441E-08	0.0000	0.000E+00	0.0000	1.698E-04	0.3166	1.710E-05	0.0319	8.669E-05	0.1617	5.358E-04	0.9992
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.215E-19	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.142E-14	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.125E-12	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.333E-10	0.0000
Total	2.622E-04	0.4890	1.441E-08	0.0000	0.000E+00	0.0000	1.698E-04	0.3166	1.710E-05	0.0319	8.669E-05	0.1617	5.363E-04	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	3.655E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	3.719E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	2.260E-07	0.0013	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	6.591E-18	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	2.440E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	3.237E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	4.365E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.302E-07	0.0013	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	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	3.655E-16	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.719E-09	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.260E-07	0.0013
H-3	8.577E-05	0.4888	4.714E-09	0.0000	0.000E+00	0.0000	5.553E-05	0.3164	5.594E-06	0.0319	2.835E-05	0.1616	1.753E-04	0.9987
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.591E-18	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.440E-13	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.237E-12	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.365E-10	0.0000
Total	8.577E-05	0.4888	4.714E-09	0.0000	0.000E+00	0.0000	5.553E-05	0.3164	5.594E-06	0.0319	2.835E-05	0.1616	1.755E-04	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	3.597E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Co-60	7.525E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	3.683E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	4.926E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	6.190E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.419E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	1.122E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	3.797E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

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	2.075E-04	0.7119	2.469E-06	0.0085	0.000E+00	0.0000	8.113E-05	0.2783	2.702E-07	0.0009	4.573E-08	0.0002	2.915E-04	0.9997
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.525E-13	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.683E-08	0.0001
H-3	2.437E-24	0.0000	1.352E-28	0.0000	0.000E+00	0.0000	1.609E-24	0.0000	1.683E-25	0.0000	8.138E-25	0.0000	5.028E-24	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.926E-16	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.190E-12	0.0000
U-235	3.539E-08	0.0001	3.970E-10	0.0000	0.000E+00	0.0000	1.381E-08	0.0000	1.823E-11	0.0000	7.770E-11	0.0000	4.972E-08	0.0002
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.122E-09	0.0000
Total	2.076E-04	0.7120	2.469E-06	0.0085	0.000E+00	0.0000	8.114E-05	0.2783	2.702E-07	0.0009	4.581E-08	0.0002	2.915E-04	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	2.549E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.177E-04	0.1186	2.272E-07	0.0001	1.872E-08	0.0000	0.000E+00	0.0000
Co-60	2.101E-23	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.430E-21	0.0000	6.222E-22	0.0000	1.418E-22	0.0000	0.000E+00	0.0000
Cs-137	2.065E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.066E-07	0.0002	2.335E-07	0.0001	1.418E-07	0.0001	0.000E+00	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	1.051E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.546E-04	0.0577	1.982E-07	0.0001	6.500E-09	0.0000	0.000E+00	0.0000
U-234	5.915E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.452E-04	0.1289	1.560E-06	0.0006	6.040E-06	0.0023	0.000E+00	0.0000
U-235	8.768E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.497E-04	0.2426	1.796E-05	0.0067	5.638E-06	0.0021	0.000E+00	0.0000
U-238	1.668E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.200E-04	0.1195	1.393E-06	0.0005	5.603E-06	0.0021	0.000E+00	0.0000
Total	1.835E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.788E-03	0.6674	2.158E-05	0.0081	1.745E-05	0.0065	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	6.019E-04	0.2247	7.162E-06	0.0027	0.000E+00	0.0000	2.354E-04	0.0879	7.859E-07	0.0003	1.328E-07	0.0000	1.163E-03	0.4343
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.215E-21	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.822E-07	0.0004
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	4.842E-15	0.0000	5.690E-17	0.0000	0.000E+00	0.0000	1.900E-15	0.0000	1.075E-16	0.0000	2.621E-16	0.0000	1.548E-04	0.0578
U-234	1.288E-10	0.0000	1.530E-12	0.0000	0.000E+00	0.0000	5.056E-11	0.0000	2.858E-12	0.0000	6.851E-12	0.0000	3.528E-04	0.1317
U-235	4.464E-06	0.0017	4.420E-08	0.0000	0.000E+00	0.0000	1.746E-06	0.0007	8.230E-08	0.0000	8.816E-09	0.0000	6.796E-04	0.2537
U-238	5.633E-15	0.0000	6.619E-17	0.0000	0.000E+00	0.0000	2.210E-15	0.0000	1.251E-16	0.0000	3.050E-16	0.0000	3.270E-04	0.1221
Total	6.064E-04	0.2264	7.206E-06	0.0027	0.000E+00	0.0000	2.372E-04	0.0885	8.682E-07	0.0003	1.416E-07	0.0001	2.678E-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 = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	3.624E-07	0.0000	1.170E-07	0.0000	0.000E+00	0.0000	3.032E-05	0.0032	2.651E-07	0.0000	1.468E-08	0.0000	2.609E-07	0.0000
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	2.740E-18	0.0000	1.152E-24	0.0000	0.000E+00	0.0000	1.677E-18	0.0000	7.645E-19	0.0000	4.814E-19	0.0000	4.911E-22	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	8.348E-09	0.0000	1.812E-08	0.0000	0.000E+00	0.0000	3.273E-06	0.0004	3.849E-08	0.0000	4.017E-08	0.0000	3.416E-08	0.0000
U-234	2.771E-05	0.0030	1.014E-05	0.0011	0.000E+00	0.0000	1.542E-03	0.1650	2.625E-05	0.0028	1.075E-04	0.0115	6.117E-06	0.0007
U-235	1.324E-03	0.1417	1.517E-05	0.0016	0.000E+00	0.0000	3.830E-03	0.4098	2.478E-04	0.0265	9.678E-05	0.0104	1.077E-05	0.0012
U-238	2.308E-04	0.0247	8.887E-06	0.0010	0.000E+00	0.0000	1.176E-03	0.1259	2.018E-05	0.0022	9.551E-05	0.0102	5.512E-06	0.0006
Total	1.583E-03	0.1694	3.433E-05	0.0037	0.000E+00	0.0000	6.582E-03	0.7042	2.946E-04	0.0315	2.998E-04	0.0321	2.269E-05	0.0024

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

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	3.024E-04	0.0324	3.598E-06	0.0004	0.000E+00	0.0000	1.183E-04	0.0127	3.953E-07	0.0000	6.672E-08	0.0000	4.560E-04	0.0488
Co-60	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.664E-18	0.0000
H-3	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	3.221E-11	0.0000	3.973E-13	0.0000	0.000E+00	0.0000	1.265E-11	0.0000	7.103E-13	0.0000	1.599E-12	0.0000	3.413E-06	0.0004
U-234	1.453E-07	0.0000	1.794E-09	0.0000	0.000E+00	0.0000	5.706E-08	0.0000	3.204E-09	0.0000	7.200E-09	0.0000	1.720E-03	0.1840
U-235	7.316E-05	0.0078	6.757E-07	0.0001	0.000E+00	0.0000	2.862E-05	0.0031	2.013E-06	0.0002	1.362E-07	0.0000	5.629E-03	0.6023
U-238	6.824E-11	0.0000	8.407E-13	0.0000	0.000E+00	0.0000	2.680E-11	0.0000	1.505E-12	0.0000	3.395E-12	0.0000	1.537E-03	0.1645
Total	3.757E-04	0.0402	4.276E-06	0.0005	0.000E+00	0.0000	1.470E-04	0.0157	2.412E-06	0.0003	2.101E-07	0.0000	9.346E-03	1.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	Am-241	1.000E+00	8.927E-23	9.301E-23	1.010E-22	1.345E-22	3.053E-22	7.286E-02	2.903E-01	1.118E-01
Am-241	Np-237	1.000E+00	0.000E+00	1.952E-15	6.038E-15	2.240E-14	9.136E-14	5.235E-08	4.957E-04	2.186E-03
Am-241	U-233	1.000E+00	0.000E+00	4.745E-25	4.428E-24	5.588E-23	7.236E-22	1.794E-12	3.156E-09	4.583E-08
Am-241	Th-229	1.000E+00	0.000E+00	8.632E-25	2.401E-23	9.872E-22	3.593E-20	3.798E-18	1.791E-10	1.504E-08
Am-241	∑DSR(j)		8.927E-23	1.952E-15	6.038E-15	2.240E-14	9.136E-14	7.286E-02	2.908E-01	1.140E-01
Co-60	Co-60	1.000E+00	7.121E-05	6.306E-05	4.946E-05	2.113E-05	1.860E-06	3.763E-10	1.607E-18	0.000E+00
Cs-137	Cs-137	1.000E+00	1.230E-06	1.198E-06	1.138E-06	9.488E-07	5.650E-07	9.207E-08	2.456E-06	1.416E-17
H-3	H-3	1.000E+00	0.000E+00	2.670E-04	7.633E-04	6.698E-04	2.191E-04	6.285E-24	0.000E+00	0.000E+00
Pu-238	Pu-238	1.000E+00	4.588E-18	4.688E-18	4.893E-18	5.688E-18	8.740E-18	3.932E-17	3.866E-02	7.002E-04
Pu-238	U-234	1.000E+00	0.000E+00	1.167E-22	3.679E-22	1.461E-21	7.241E-21	1.419E-19	2.869E-05	1.271E-04
Pu-238	Th-230	1.000E+00	0.000E+00	5.393E-27	5.106E-26	6.774E-25	1.013E-23	6.714E-22	4.109E-08	8.297E-07
Pu-238	Ra-226	1.000E+00	0.000E+00	4.542E-20	1.251E-18	4.969E-17	1.639E-15	1.231E-13	1.848E-07	1.227E-05
Pu-238	Pb-210	1.000E+00	0.000E+00	1.597E-31	1.341E-29	1.878E-27	2.196E-25	1.042E-22	1.885E-07	1.281E-05
Pu-238	∑DSR(j)		4.588E-18	4.733E-18	6.145E-18	5.538E-17	1.648E-15	1.232E-13	3.869E-02	8.532E-04
U-234	U-234	1.000E+00	4.014E-17	4.131E-17	4.376E-17	5.354E-17	9.524E-17	7.153E-16	8.585E-02	3.418E-01
U-234	Th-230	1.000E+00	0.000E+00	3.814E-21	1.210E-20	4.903E-20	2.570E-19	6.038E-18	1.838E-04	2.610E-03
U-234	Ra-226	1.000E+00	0.000E+00	4.815E-14	4.437E-13	5.354E-12	6.100E-11	1.548E-09	1.040E-03	4.166E-02
U-234	Pb-210	1.000E+00	0.000E+00	2.254E-25	6.306E-24	2.649E-22	1.035E-20	1.526E-18	1.122E-03	4.384E-02
U-234	∑DSR(j)		4.014E-17	4.819E-14	4.437E-13	5.354E-12	6.100E-11	1.548E-09	8.820E-02	4.299E-01
U-235	U-235	1.000E+00	4.319E-10	4.408E-10	4.592E-10	5.297E-10	7.966E-10	3.324E-09	8.107E-02	6.452E-01
U-235	Pa-231	1.000E+00	0.000E+00	6.361E-14	1.972E-13	7.371E-13	3.068E-12	3.218E-11	6.894E-02	5.744E-01
U-235	Ac-227	1.000E+00	0.000E+00	8.998E-15	8.178E-14	9.426E-13	9.584E-12	1.243E-05	1.990E-02	1.877E-01
U-235	∑DSR(j)		4.319E-10	4.409E-10	4.594E-10	5.313E-10	8.093E-10	1.243E-05	1.699E-01	1.407E+00
U-238	U-238	1.000E+00	7.280E-08	7.379E-08	7.580E-08	8.331E-08	1.091E-07	2.806E-07	8.168E-02	3.833E-01
U-238	U-234	1.000E+00	0.000E+00	1.171E-22	3.722E-22	1.518E-21	8.101E-21	2.028E-19	7.305E-05	9.705E-04
U-238	Th-230	1.000E+00	0.000E+00	5.407E-27	5.145E-26	6.947E-25	1.091E-23	8.519E-22	7.706E-08	3.528E-06
U-238	Ra-226	1.000E+00	0.000E+00	4.548E-20	1.258E-18	5.064E-17	1.734E-15	1.476E-13	3.026E-07	4.221E-05
U-238	Pb-210	1.000E+00	0.000E+00	1.741E-31	1.348E-29	1.907E-27	2.300E-25	1.219E-22	2.984E-07	4.302E-05
U-238	∑DSR(j)		7.280E-08	7.379E-08	7.580E-08	8.331E-08	1.091E-07	2.806E-07	8.175E-02	3.843E-01

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 25 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	*3.430E+12	*3.430E+12	*3.430E+12	*3.430E+12	*3.430E+12	3.431E+02	8.596E+01	2.193E+02
Co-60	3.511E+05	3.964E+05	5.055E+05	1.183E+06	1.344E+07	6.644E+10	*1.131E+15	*1.131E+15
Cs-137	2.033E+07	2.087E+07	2.198E+07	2.635E+07	4.425E+07	2.715E+08	1.018E+07	*8.701E+13
H-3	*9.594E+15	9.365E+04	3.275E+04	3.733E+04	1.141E+05	*9.594E+15	*9.594E+15	*9.594E+15
Pu-238	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	6.462E+02	2.930E+04
U-234	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	2.835E+02	5.815E+01
U-235	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	2.011E+06	1.471E+02	1.776E+01
U-238	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	3.058E+02	6.505E+01

*At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 1.000E+03 years

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	4.000E-03	320.6 ± 0.6	2.918E-01	8.569E+01	1.140E-01	2.193E+02
Co-60	2.000E-03	0.000E+00	7.121E-05	3.511E+05	0.000E+00	*1.131E+15
Cs-137	4.000E-01	125.0 ± 0.3	3.457E-04	7.232E+04	1.416E-17	*8.701E+13
H-3	8.000E-01	4.677 ± 0.009	8.278E-04	3.020E+04	0.000E+00	*9.594E+15
Pu-238	4.000E-03	226.4 ± 0.5	4.377E-02	5.711E+02	8.532E-04	2.930E+04
U-234	4.000E-03	1.000E+03	4.299E-01	5.815E+01	4.299E-01	5.815E+01
U-235	4.000E-03	1.000E+03	1.407E+00	1.776E+01	1.407E+00	1.776E+01
U-238	4.000E-03	1.000E+03	3.843E-01	6.505E+01	3.843E-01	6.505E+01

*At specific activity limit

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 25 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Am-241	*3.430E+12	*3.430E+12	*3.430E+12	*3.430E+12	*3.430E+12	3.431E+02	8.596E+01	2.193E+02
Co-60	3.511E+05	3.964E+05	5.055E+05	1.183E+06	1.344E+07	6.644E+10	*1.131E+15	*1.131E+15
Cs-137	2.033E+07	2.087E+07	2.198E+07	2.635E+07	4.425E+07	2.715E+08	1.018E+07	*8.701E+13
H-3	*9.594E+15	9.365E+04	3.275E+04	3.733E+04	1.141E+05	*9.594E+15	*9.594E+15	*9.594E+15
Pu-238	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	*1.711E+13	6.462E+02	2.930E+04
U-234	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	*6.245E+09	2.835E+02	5.815E+01
U-235	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	*2.160E+06	2.011E+06	1.471E+02	1.776E+01
U-238	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05	3.058E+02	6.505E+01

*At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 1.000E+03 years

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	4.000E-03	320.6 ± 0.6	2.918E-01	8.569E+01	1.140E-01	2.193E+02
Co-60	2.000E-03	0.000E+00	7.121E-05	3.511E+05	0.000E+00	*1.131E+15
Cs-137	4.000E-01	125.0 ± 0.3	3.457E-04	7.232E+04	1.416E-17	*8.701E+13
H-3	8.000E-01	4.677 ± 0.009	8.278E-04	3.020E+04	0.000E+00	*9.594E+15
Pu-238	4.000E-03	226.4 ± 0.5	4.377E-02	5.711E+02	8.532E-04	2.930E+04
U-234	4.000E-03	1.000E+03	4.299E-01	5.815E+01	4.299E-01	5.815E+01
U-235	4.000E-03	1.000E+03	1.407E+00	1.776E+01	1.407E+00	1.776E+01
U-238	4.000E-03	1.000E+03	3.843E-01	6.505E+01	3.843E-01	6.505E+01

*At specific activity limit

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	3.571E-25	3.720E-25	4.038E-25	5.380E-25	1.221E-24	2.915E-04	1.161E-03	4.473E-04
Np-237	Am-241	1.000E+00	0.000E+00	7.808E-18	2.415E-17	8.962E-17	3.655E-16	2.094E-10	1.983E-06	8.742E-06
U-233	Am-241	1.000E+00	0.000E+00	1.898E-27	1.771E-26	2.235E-25	2.894E-24	7.174E-15	1.262E-11	1.833E-10
Th-229	Am-241	1.000E+00	0.000E+00	3.453E-27	9.605E-26	3.949E-24	1.437E-22	1.519E-20	7.165E-13	6.016E-11
Co-60	Co-60	1.000E+00	1.424E-07	1.261E-07	9.892E-08	4.225E-08	3.719E-09	7.525E-13	3.215E-21	0.000E+00
Cs-137	Cs-137	1.000E+00	4.918E-07	4.792E-07	4.550E-07	3.795E-07	2.260E-07	3.683E-08	9.822E-07	5.664E-18
H-3	H-3	1.000E+00	0.000E+00	2.136E-04	6.106E-04	5.358E-04	1.753E-04	5.028E-24	0.000E+00	0.000E+00
Pu-238	Pu-238	1.000E+00	1.835E-20	1.875E-20	1.957E-20	2.275E-20	3.496E-20	1.573E-19	1.546E-04	2.801E-06
U-234	Pu-238	1.000E+00	0.000E+00	4.667E-25	1.472E-24	5.845E-24	2.896E-23	5.676E-22	1.147E-07	5.083E-07
U-234	U-234	1.000E+00	1.605E-19	1.652E-19	1.750E-19	2.141E-19	3.810E-19	2.861E-18	3.434E-04	1.367E-03
U-234	U-238	1.000E+00	0.000E+00	4.684E-25	1.489E-24	6.071E-24	3.240E-23	8.113E-22	2.922E-07	3.882E-06
U-234	∑DOSE(j):		1.605E-19	1.652E-19	1.750E-19	2.142E-19	3.810E-19	2.863E-18	3.438E-04	1.372E-03
Th-230	Pu-238	1.000E+00	0.000E+00	2.157E-29	2.042E-28	2.709E-27	4.051E-26	2.686E-24	1.644E-10	3.319E-09
Th-230	U-234	1.000E+00	0.000E+00	1.526E-23	4.840E-23	1.961E-22	1.028E-21	2.415E-20	7.350E-07	1.044E-05
Th-230	U-238	1.000E+00	0.000E+00	2.163E-29	2.058E-28	2.779E-27	4.365E-26	3.408E-24	3.083E-10	1.411E-08
Th-230	∑DOSE(j):		0.000E+00	1.526E-23	4.840E-23	1.961E-22	1.028E-21	2.416E-20	7.355E-07	1.046E-05
Ra-226	Pu-238	1.000E+00	0.000E+00	1.817E-22	5.004E-21	1.988E-19	6.556E-18	4.925E-16	7.392E-10	4.909E-08
Ra-226	U-234	1.000E+00	0.000E+00	1.926E-16	1.775E-15	2.142E-14	2.440E-13	6.190E-12	4.161E-06	1.666E-04
Ra-226	U-238	1.000E+00	0.000E+00	1.819E-22	5.033E-21	2.026E-19	6.936E-18	5.903E-16	1.210E-09	1.688E-07
Ra-226	∑DOSE(j):		0.000E+00	1.926E-16	1.775E-15	2.142E-14	2.440E-13	6.191E-12	4.163E-06	1.668E-04
Pb-210	Pu-238	1.000E+00	0.000E+00	0.000E+00	5.364E-32	7.514E-30	8.783E-28	4.168E-25	7.539E-10	5.125E-08
Pb-210	U-234	1.000E+00	0.000E+00	9.014E-28	2.522E-26	1.060E-24	4.138E-23	6.102E-21	4.488E-06	1.753E-04
Pb-210	U-238	1.000E+00	0.000E+00	0.000E+00	5.391E-32	7.630E-30	9.201E-28	4.878E-25	1.193E-09	1.721E-07
Pb-210	∑DOSE(j):		0.000E+00	9.014E-28	2.522E-26	1.060E-24	4.138E-23	6.103E-21	4.490E-06	1.756E-04
U-235	U-235	1.000E+00	1.728E-12	1.763E-12	1.837E-12	2.119E-12	3.186E-12	1.330E-11	3.243E-04	2.581E-03
Pa-231	U-235	1.000E+00	0.000E+00	2.544E-16	7.887E-16	2.948E-15	1.227E-14	1.287E-13	2.758E-04	2.297E-03
Ac-227	U-235	1.000E+00	0.000E+00	3.599E-17	3.271E-16	3.771E-15	3.834E-14	4.970E-08	7.961E-05	7.510E-04
U-238	U-238	1.000E+00	2.912E-10	2.951E-10	3.032E-10	3.333E-10	4.365E-10	1.122E-09	3.267E-04	1.533E-03

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	4.000E-03	3.976E-03	3.929E-03	3.768E-03	3.345E-03	2.203E-03	6.683E-04	1.028E-05
Np-237	Am-241	1.000E+00	0.000E+00	1.292E-09	3.850E-09	1.256E-08	3.540E-08	9.577E-08	1.695E-07	1.632E-07
U-233	Am-241	1.000E+00	0.000E+00	2.825E-15	2.529E-14	2.758E-13	2.354E-12	2.181E-11	1.210E-10	3.425E-10
Th-229	Am-241	1.000E+00	0.000E+00	8.899E-20	2.393E-18	8.738E-17	2.266E-15	7.312E-14	1.368E-12	1.784E-11
Co-60	Co-60	1.000E+00	2.000E-03	1.750E-03	1.341E-03	5.276E-04	3.672E-05	3.265E-09	8.701E-21	0.000E+00
Cs-137	Cs-137	1.000E+00	4.000E-01	3.843E-01	3.546E-01	2.677E-01	1.199E-01	7.204E-03	2.336E-06	1.435E-18
H-3	H-3	1.000E+00	8.000E-01	4.190E-01	1.150E-01	1.243E-03	3.004E-09	6.584E-29	0.000E+00	0.000E+00
Pu-238	Pu-238	1.000E+00	4.000E-03	3.968E-03	3.906E-03	3.696E-03	3.154E-03	1.812E-03	3.720E-04	1.457E-06
U-234	Pu-238	1.000E+00	0.000E+00	1.129E-08	3.360E-08	1.089E-07	3.014E-07	7.704E-07	1.223E-06	1.107E-06
U-234	U-234	1.000E+00	4.000E-03	3.999E-03	3.996E-03	3.988E-03	3.965E-03	3.884E-03	3.661E-03	2.976E-03
U-234	U-238	1.000E+00	0.000E+00	1.134E-08	3.399E-08	1.131E-07	3.372E-07	1.101E-06	3.115E-06	8.450E-06
U-234	∑S(j):		4.000E-03	3.999E-03	3.997E-03	3.988E-03	3.965E-03	3.885E-03	3.665E-03	2.986E-03
Th-230	Pu-238	1.000E+00	0.000E+00	5.090E-14	4.556E-13	4.967E-12	4.237E-11	3.944E-10	2.308E-09	9.856E-09
Th-230	U-234	1.000E+00	0.000E+00	3.600E-08	1.080E-07	3.595E-07	1.075E-06	3.546E-06	1.032E-05	3.100E-05
Th-230	U-238	1.000E+00	0.000E+00	5.103E-14	4.591E-13	5.094E-12	4.566E-11	5.003E-10	4.328E-09	4.190E-08
Th-230	∑S(j):		0.000E+00	3.600E-08	1.080E-07	3.595E-07	1.075E-06	3.547E-06	1.033E-05	3.106E-05
Ra-226	Pu-238	1.000E+00	0.000E+00	7.352E-18	1.975E-16	7.191E-15	1.849E-13	5.810E-12	1.028E-10	1.259E-09
Ra-226	U-234	1.000E+00	0.000E+00	7.794E-12	7.006E-11	7.748E-10	6.882E-09	7.303E-08	5.786E-07	4.275E-06
Ra-226	U-238	1.000E+00	0.000E+00	7.362E-18	1.987E-16	7.329E-15	1.956E-13	6.964E-12	1.683E-10	4.332E-09
Ra-226	∑S(j):		0.000E+00	7.794E-12	7.006E-11	7.748E-10	6.882E-09	7.305E-08	5.789E-07	4.280E-06
Pb-210	Pu-238	1.000E+00	0.000E+00	5.680E-20	4.525E-18	5.274E-16	3.647E-14	2.755E-12	7.807E-11	1.160E-09
Pb-210	U-234	1.000E+00	0.000E+00	8.013E-14	2.127E-12	7.437E-11	1.718E-09	4.034E-08	4.649E-07	3.969E-06
Pb-210	U-238	1.000E+00	0.000E+00	6.190E-20	4.547E-18	5.355E-16	3.820E-14	3.225E-12	1.236E-10	3.896E-09
Pb-210	∑S(j):		0.000E+00	8.013E-14	2.127E-12	7.437E-11	1.718E-09	4.034E-08	4.651E-07	3.974E-06
U-235	U-235	1.000E+00	4.000E-03	3.999E-03	3.996E-03	3.988E-03	3.965E-03	3.885E-03	3.664E-03	2.985E-03
Pa-231	U-235	1.000E+00	0.000E+00	8.455E-08	2.531E-07	8.376E-07	2.462E-06	7.640E-06	1.878E-05	3.295E-05
Ac-227	U-235	1.000E+00	0.000E+00	1.330E-09	1.167E-08	1.190E-07	8.517E-07	5.007E-06	1.537E-05	2.885E-05
U-238	U-238	1.000E+00	4.000E-03	3.999E-03	3.996E-03	3.988E-03	3.965E-03	3.885E-03	3.664E-03	2.985E-03

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