ENVIRONMENTAL CONSEQUENCES TO WATER
RESOURCES FROM ALTERNATIVES OF MANAGING
SPENT NUCLEAR FUEL AT HANFORD

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ABSTRACT

With an environmental restoration and waste management program, the U.S. Department of Energy (DOE) is involved in developing policies pertinent to the transport, storage, and management of spent nuclear fuel (SNF). The DOE Environmental Impact Statement (EIS) for Programmatic SNF management is documented in a Volume 1 report, which contains an assessment of the Hanford installation, among others. Because the Hanford installation contains approximately 80% of the SNF associated with the DOE complex, it has been included in the decision for the ultimate disposition of the fuel.

The Pacific Northwest Laboratory performed a series of assessments on five alternatives at Hanford for managing the SNF: No-Action, Decentralization, 1992/1993 Planning Basis, Regionalization, and Centralization. The environmental consequences associated with implementing these assessment alternatives potentially impact socioeconomic conditions; environmental quality of the air, groundwater, surface water, and surface soil; ecological, cultural, and geological resources; and land-use considerations. The purpose of this report is to support the Programmatic SNF-EIS by investigating the environmental impacts associated with water quality and related consequences, as they apply to the five assessment alternatives at the Hanford installation. The results of these scenarios are discussed and documented.

SUMMARY

The U.S. Department of Energy (DOE), with its environmental restoration and waste management program, is involved in developing policies pertinent to the transport, storage, and management of spent nuclear fuel (SNF). The DOE Environmental Impact Statement (EIS) for Programmatic SNF management is documented in a Volume 1 report, which contains an assessment of the Hanford installation. Because the Hanford installation contains approximately 80% of the SNF associated with the DOE complex, it has been included in the decision for the ultimate disposition of the fuel. To develop these disposition policies, it is necessary to examine available options.

In a response to a request from DOE, Pacific Northwest Laboratory investigated five alternatives at Hanford that are being considered for management of the SNF: No-Action, Decentralization, 1992/1993 Planning Basis, Regionalization, and Centralization. These assessment alternatives cover activities ranging from 1) maintaining safe and secure storage at the SNF's current location to 2) distributing existing and projected SNF among DOE installations, based primarily on fuel type or geographic location, to 3) managing all existing and projected SNF inventories at one site until ultimate disposition.

The environmental consequences associated with implementing these five assessment alternatives potentially impact socioeconomic conditions; environmental quality of the air, groundwater, surface water, and surface soil; ecological, cultural, and geological resources; and land-use considerations. The purpose of this report is to support the Programmatic SNF-EIS by investigating the environmental impacts associated with water quality and related consequences, as they apply to the five assessment alternatives at the Hanford installation. Under these alternatives, a number of accidental and operational release scenarios were evaluated and summarized as follows:

- 105-KE and 105-KW Basins Accident Release to the Subsurface Environment in the 100 Area at Hanford Scenario -- Radionuclides are accidentally released in the 100 Area where the overflow is assumed to leach through the subsurface environment (vadose and saturated zones) to the Columbia River. This accidental release scenario was assessed for all alternatives, except for the Centralization Alternative. The risk of fatal cancer due to this scenario, considering all exposure pathways, was found to be less than one chance in a trillion.
- 105-KE and 105-KW Basins Direct Release to the Columbia River at Hanford Scenario -- Radionuclides are released in the 100 Area to the Columbia River as a point source. This release scenario was assessed for all alternatives, except for the Centralization Alternative. The risk of fatal cancer due to this scenario, considering all exposure pathways, was found to be less than one chance in a billion.
- Wet Storage of Nuclear Fuels New Pool Storage Facility Accident Scenario -- Radionuclides are accidentally released in the 200 Area by assuming a leak in a water supply pipe inside the pool building. This accidental release scenario was assessed for all alternatives, except for No-Action and Centralization. The risk of fatal cancer due to this scenario, considering all exposure pathways, was found to be about seven chances in a trillion.
- Wet Storage/Fuel Transfer Scenario -- The source term represents the maximum potential water releases that would be expected if a secondary containment failure and/or piping leak occurred and went undetected for one month at a state-of-the-art wet storage fuel/transfer facility utilizing water treatment technology now available. Releases resulting from such failure should not be thought of as operational or planned releases. However, for the purposes of a nonzero release source term, this scenario addresses those situations where an unexpected release may occur. The risk of fatal cancers, considering all exposure pathways, was found to be significantly less than one chance in a trillion.
- Process and Package of All Fuel: Shear, Leach, and Solvent Extraction Facility Scenario -- Radionuclides and chemicals are operationally released at very low rates to the Hanford Treated Effluent Disposal Facility (TEDF), which also receives effluent discharges from other operational facilities. The assessment is based on the discharge target allowable concentrations in the TEDF. This assumed operational release scenario was assessed for all alternatives, except for the No-Action Alternative. The maximum radionuclide and chemical carcinogenic risks were found to be less than 50 chances in a billion for all of the constituents through all of the exposure routes. Likewise, noncarcinogenic chemical individual doses were found to be below their respective

reference doses, except for chromium VI, which had a dose about 50% higher than its reference dose.

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1.0 INTRODUCTION

The U.S. Department of Energy (DOE) Spent Nuclear Fuel (SNF) Program is intended to a) provide interim storage and management of fuel at specified locations until ultimate disposition, b) stabilize the fuel as required for environmentally safe storage and protection of human health, c) increase safe storage capacity by replacing facilities that cannot meet current standards and providing additional capacity for newly generated SNF, d) conduct research and development initiatives to support safe storage or ultimate disposition, and e) examine fuel generated by the Naval Nuclear Propulsion Program. The primary goals of the management program are to reduce the risk of nuclear accidents during transportation and storage and to minimize the release of radionuclides to the environment where they can pose hazards to human health, plants, and animals. Thus, DOE established an integrated complex-wide program that provides safe and effective management for present and reasonably foreseeable quantities of SNF, pending its permanent disposition.

A range of reasonable alternatives that supports the decisions to be made was determined to include variations of several components: a) amounts of SNF shipped, b) multiple-storage locations, c) fuel stabilization methods, d) number and type of storage facilities to be constructed, and e) scope of technology research and development efforts for management technologies. Each assessment alternative is briefly described as follows:

1. The No-Action Alternative would preclude any additional transportation of SNF to or from sites of origin, but could include activities to maintain safe and secure materials and facilities. New SNF facilities would not be built, and Hanford SNF would continue to be managed in the current mode.
2. The Decentralization Alternative would require that DOE-owned fuel be managed at the location where it is removed from the reactor. Hanford SNF would be safely stored with some limited SNF shipments. To accommodate this mission, existing facilities would be upgraded, and new storage systems would be constructed.

3. The 1992/1993 Planning Basis Alternative would not include building an SNF facility and the SNF would continue to be managed in the current mode, which includes upgrades, fuel processing, and some transport to either the INEL or the Savannah River installation.
4. The Regionalization Alternative would provide for safe storage at Hanford of existing Hanford SNF and some SNF from other DOE installations. The type of SNF to be processed and managed at Hanford would depend on overall DOE needs and inventories of SNF currently being stored at Hanford and other DOE installations. Existing facilities would be upgraded and new storage systems would be constructed, as in the Decentralization Alternative.
5. The Centralization Alternative would require all Hanford SNF shipped off site to another location where all SNF would be centralized, or Hanford would become the central repository for all DOE SNF.

All of the alternatives are carefully designed to avoid environmental degradation and to provide protection for human health and safety at Hanford and the surrounding region. Environmental consequences associated with these alternatives impact land use, socioeconomic conditions, cultural resources, aesthetic and scenic resources, geological resources, air quality, water quality, ecological resources, noise, traffic and transportation, occupational and public-health safety, site services, materials and waste management, cumulative impacts and impacts from connected or similar actions, adverse environmental impacts that cannot be avoided, relationships between short-term uses of the environment and the maintenance and enhancement of long-term productivity, irreversible and irretrievable commitment of resources, and mitigation measures. Under these alternatives a number of accidental and operational release scenarios are evaluated.

The Pacific Northwest Laboratory^(a) (PNL) is performing an assessment for DOE associated with its environmental restoration and waste management program involving the transport, storage, and management of SNF at Hanford.

(a) Pacific Northwest Laboratory is operated by Battelle Memorial Institute for the U.S. Department of Energy under Contract DE-AC06-76RLO 1830.

Because the Hanford installation contains approximately 80% of the SNF associated with the DOE complex, it must be included in the decision for the ultimate disposition of the fuel. PNL has been charged with evaluating the potential impacts to groundwater and surface water resources from the construction or operation of a SNF and associated support facilities at the Hanford installation and from hypothetical SNF-related hydrologic accidents. Evaluated are potential impacts to groundwater and surface water, water use, and water quality due to the potential release of contaminants into and migration through hydrologic based environments. The potential significance of these impacts is evaluated with respect to environmental contaminant levels due to potential releases of contaminants into the environment and the health impacts due to these contaminant levels. Contaminant waste streams include radionuclide and chemical carcinogens and noncarcinogenic chemicals.

This report is divided into eight additional sections. The next two sections present a description of the installation and discuss the approach utilized in the contaminant assessment, respectively. The next five sections discuss the assessments that have been limited to the following five scenarios: 1) No-Action Alternative, 2) Decentralization Alternative, 3) 1992-1993 Planning Basis Alternative, 4) Regionalization Alternative, and 5) Centralization Alternative. The final section presents the references that are cited in the report.

2.0 SITE DESCRIPTION

The DOE Hanford installation was established in 1943 to produce plutonium for the war effort, and its operation (plutonium production missions and research effort) has continued throughout the cold war years. The Hanford installation occupies an area of approximately 1450 km² (560 mi²) of semiarid land in southeastern Washington State (Figure 1). The average annual precipitation in this region is less than 20 cm/year (approximately 8 in./year).

The Columbia and Yakima Rivers are the principal surface water features at the installation. The Columbia River flows through the northern portion of the installation, and as the river turns southward, it becomes part of the eastern boundary of the installation. The Columbia River is the third largest river in the United States (Whelan et al. 1987). Based on 27 years of records since the operation of Priest Rapids Dam began, the median flow of the Columbia River is about 2905 m³/s (102,600 ft³/s) in the Hanford Reach (Whelan et al. 1987). A minimum flow of about 1020 m³/s (36,000 ft³/s) is maintained along the Hanford installation. The Yakima River flows through part of the southern boundary before joining the Columbia River. The average annual Yakima River flow, based on 57 years of record, is about 104 m³/s (3673 ft³/s), which represents approximately 3% of the Columbia River average flow. Over this same period, the monthly maximum and minimum flows of the Yakima River were 490 m³/s (17,305 ft³/s) and 4.6 m³/s (162 ft³/s), respectively (DOE 1994^(a)).

The Hanford installation resides within the western Pasco Basin (a structural depression on the Columbia Plateau) and has a heterogeneous

(a) DOE. 1994. *Hanford Site Spent Nuclear Fuel Management Program: Appendix A to Volume 1*. Prepared for the U.S. Department of Energy by Pacific Northwest Laboratory, Richland, Washington, Section 4.8. (Predecisional Draft, April 1994).

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FIGURE 1. Location of 100, 200, 300, 400, and 1100 Aggregate Areas at Hanford

geological cross section (Schramke 1993^(a)). Figure 2 illustrates the principal geological units that underlie Hanford, in ascending order: the Columbia River Basalt Group, Ringold Formation, and a series of deposits informally referred to as the Hanford formation (Woodruff and Hanf 1992). The Columbia River Basalt group consists of numerous basaltic lava flows, while the Ringold Formation is composed of a wide range of sediment types, ranging from weakly cemented coarse sandy gravel to compacted silt and clay (Woodruff and Hanf 1992). The Hanford formation within the Pasco Basin consists mostly of coarse gravel and sand (Woodruff and Hanf 1992). The groundwater depths range from less than 0.3 m (1 ft) at the Columbia River to more than 106 m (348 ft) at the center of the installation (Woodruff and Hanf 1992). Groundwater at the installation generally moves from the recharge areas on the western portion to the north and east, discharging into the Columbia River.

At Hanford, specific areas are designated for different operations: 100 Areas for reactor operations, 200 Areas for fuel-reprocessing operations (chemical processing), 300 Areas for laboratory test operations, 400 Areas for test facility (research reactor), and 1100 Areas for maintenance operations. The cities of Richland, Kennewick, and Pasco (situated southeast of the Hanford installation) constitute the nearest population center.

(a) Schramke, J. A. 1993. *Hanford Hydrologic Data for the PEIS*, prepared for the DOE. Letter Report. Pacific Northwest Laboratory, Richland, Washington.

FIGURE 2. Geologic Cross Section at Hanford (Woodruff and Hanf 1992)

3.0 METHODOLOGY

Liquid discharges containing radioactive and chemical pollutants can potentially affect the groundwater and surface water environments. When released into the subsurface environment, contaminants migrate through the vadose and saturated zones to surrounding wells and represent inflow to surface water bodies, such as rivers and streams. The surface water can be utilized for recreational activities (such as swimming, boating, and fishing) where humans and aquatic life can be exposed to potentially unacceptable levels. Contaminants can also migrate to intake structures where the water can be used for a variety of purposes. Withdrawal wells and surface water intake structures can distribute contaminated water as irrigation to crops, a drinking water supply for animals and humans, and a source of water for bathing.

The Multimedia Environmental Pollutant Assessment System (MEPAS) is utilized to simulate the release, migration, fate, exposure, and risk to surrounding sensitive receptors of wastes that are discharged into the environment from the operation of SNF facilities. MEPAS is a fully integrated, physics-based, PC-platform, intermedia transport- and risk-computation code used to assess health impacts from actual and potential releases of both hazardous chemicals and radioactive materials. MEPAS is designed for site-specific assessments using readily available information. It follows U.S. Environmental Protection Agency (EPA) risk-assessment guidance, as it evaluates 1) the release of contaminants into the environment; 2) their movement through and transfer between various environmental media (for example, subsurface [vadose and saturated zones], surface water, overland [surface soil], and atmosphere); 3) exposure to surrounding sensitive receptors through inhalation, ingestion, dermal contact, and external dose; and 4) risk to carcinogens and hazard to noncarcinogens. MEPAS follows guidelines set forth by the EPA, the International Commission on Radiological Protection, and the National Council on Radiation and Measurement.

4.0 IMPACTS OF NO-ACTION ALTERNATIVE

The No-Action Alternative would preclude any additional transportation of SNF to or from sites of origin, but could include activities to maintain secure materials and safe facilities. New SNF facilities would not be built, and the Hanford SNF would continue to be managed in the current mode.

4.1 GROUNDWATER: 105-KE AND 105-KW BASINS ACCIDENTAL RELEASE SCENARIO

The only release to the environment that might affect the subsurface is associated with an accidental release scenario at the 105-KE and 105-KW Basins (McCormack 1993^(a)). Under this scenario, an overflow of 2272 m³ (600,000 gal) is experienced during an 8-hr period. All of the constituents in this assessment are radionuclides. The specific radionuclide inventory in the overflow pond is assumed as follows: 0.48 Ci ³H, 1.3E-03 Ci ⁶⁰Co, 3.1E-03 Ci ¹³⁴Cs, 0.22 Ci ¹³⁷Cs, 1.1 Ci ⁹⁰Sr, 5.9E-06 Ci ²³⁸Pu, and 3.1E-05 Ci ²³⁹Pu. The overflow is assumed to leach through the subsurface environment to the Columbia River. Because the transmission rate of the soil is estimated as 570 cm/d (224 in/d) (based on the DOE Programmatic Environmental Impact Statement [PEIS] [Schramke 1993^(b)]), a leaching rate of 26.3 cm/d (600,000 gal/8 hr/6.4 acres) will not result in a ponded situation; therefore, the entire 2272 m³ (600,000 gal) of overflow will leach into the soil over an 8-hr period. Contaminants are assumed to leach through the vadose zone, through the saturated zone to the Columbia River, and in the Columbia River to receptors downstream. The flow discharge in the Columbia River is assumed to be under low-flow conditions 1008 m³ (36,000 ft³/s) (Whelan et al. 1987), which represents the most conservative case for maximizing surface water

(a) McCormack, R. 1993. *Hanford Engineering Laboratories INEL SNF EIS Data*. Westinghouse Hanford Company, Richland, Washington (Draft).

(b) Schramke, J. A. 1993. *Hanford Hydrologic Data for the PEIS*, prepared for the DOE. Letter Report. Pacific Northwest Laboratory, Richland, Washington.

concentrations. As a conservative assumption, the removal of water from the Columbia River is assumed to be 100 m (328 ft) downstream of the contaminant influent point to the river.^(a) The assessment will address recreational activities (such as boating, swimming, and fishing) in the Columbia River and use of the water as a drinking-water supply, for bathing, and for irrigation.

A summary of the data associated with the transport and fate modeling is presented in Tables 1 through 6:

- Table 1 presents a listing of the constituents and their source-term characteristics. A more detailed listing is presented in Appendix A.
- Table 2 presents the source-term release information, Darcian release rate, and source dimensions. A more detailed listing is presented in Appendix A.
- Table 3 presents the vadose-zone characteristics. A more detailed listing is presented in Appendix A.
- Tables 4 and 5 present the saturated-zone characteristics. A more detailed listing is presented in Appendix A.
- Table 6 presents the surface water characteristics. A more detailed listing is presented in Appendix A.

Table 7 presents the information associated with the exposure assessment, including intake and production rates, population locations and sizes, and exposure activities. Bolded areas in Table 7 refer to titles.

A summation of the exposure and health effects analysis for each constituent and exposure pathway is presented in Table 8. In addition to parent radionuclides, results associated with decay products are also presented. The decay products include ^{234}U , ^{230}Th , ^{235}U , and ^{90}Y . Table 8 presents the risks in terms of the number of fatalities and indicates that maximum risk is extremely small for all of the constituents.

(a) 328 ft represents 100 m, which was chosen to maximize contaminant concentrations in the river.

TABLE 1. Constituents, Source-Term Flux, and Time Used for Accidental Release from 105-KE and 105-KW Basins to Ground

PARAMETER	PARAMETER VALUES								REFERENCE
FS-CNAME	Constituent	Cesium-134	Cesium-137+D	Cobalt-60	Plutonium-238	Plutonium-239	Strontium-90	Tritium	McCormack (1993) ^(a)
WA-SUBKD	Kd (mL/g)	10	10	0	10	10	7	0	Serne and Wood (1990) ^(b)
	Half-life (yr)	2.06E0	3.01E1	5.28E0	8.79E1	2.41E4	2.88E1	1.23E1	Streng et al. (1989)
WS-TLIFE	Active life (yr)	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	McCormack (1993)
WS-NUM	Number of rates	2	2	2	2	2	2	2	McCormack (1993)
WS-CDATE	Starting date	01/01/97	01/01/97	01/01/97	01/01/97	01/01/97	01/01/97	01/01/97	McCormack (1993)
WS-FLUX	Flux (Ci/yr)	3.4E0	2.4E2	1.4E0	6.5E-3	3.4E-2	1.2E3	5.3E2	McCormack (1993)
WS-TIME	Time (yr)	0-0.0009	0-0.0009	0-0.0009	0-0.0009	0-0.0009	0-0.0009	0-0.0009	McCormack (1993)
WS-INVENT	Inventory (Ci)	3.1E-3	2.2E-1	1.3E-3	5.9E-6	3.1E-5	1.1E0	4.8E-1	McCormack (1993)
TFINAL	(yr)	7.0E3	7.0E3	7.0E3	7.0E3	7.0E3	7.0E3	7.0E3	N/A

(a) McCormack, R. 1993. Hanford Engineering Laboratories INEL SNF EIS Data. Westinghouse Hanford Company, Richland, Washington (Draft).
(b) From Table B.2 in Serne and Wood (1990).
N/A = Not Applicable.

**TABLE 2. Source-Term Release, Timing, and Source Dimension
Parameter Values Used for Accidental Release
from the 105-KE and 105-KW Basins to Ground**

MEPAS PARAMETER	PARAMETER	VALUE	REFERENCE
WS-DATE	Starting date of the release unit	01/01/97	McCormack (1993) ^(a)
WS-TDISC	Starting date for discounting	01/01/97	McCormack (1993)
WS-TRISK	Starting date for risk	01/18/93	N/A
WS-LENGTH	Length of site (ft)	528	McCormack (1993)
WS-WIDTH	Width of site (ft)	528	McCormack (1993)
WS-LEACHV	Waste liquid infiltration rate (ft/d)	0.8635	McCormack (1993)
(a) McCormack, R. 1993. Hanford Engineering Laboratories INEL SNF EIS Data. Westinghouse Hanford Company, Richland, Washington (Draft). N/A = Not Applicable.			

**TABLE 3. Partially Saturated Zone Parameter Values Used for Accidental
Release from the 105-KE and 105-KW Basins to Ground**

MEPAS PARAMETER	PARAMETER	PARAMETER VALUES		REFERENCE
		PSZ ^(a) 1 of 2 layers	PSZ 2 of 2 layers	
WP-CLASS	Soil classification in PSZ	Sand	Loamy sand	PEIS ^(b)
WP-SAND	% sand in PSZ	90	87	PEIS
WP-SILT	% silt in PSZ	7	11	PEIS
WP-CLAY	% clay in PSZ	3	2	PEIS
WP-OMC	% organic matter content in PSZ	0	0	PEIS
WP-IRON	% iron and aluminum in PSZ	0	0	PEIS
WP-PH	pH of the pore water in PSZ	8.5	7.0	PEIS
WP-THICK	Thickness of PSZ (ft)	60	10	Estimated from Dresel et al. (1993) ^(c)
WP-BULKD	Bulk density of PSZ (g/cm ³)	1.99	1.90	PEIS
WP-TOTPOR	Total porosity of PSZ (%)	30	30	PEIS
WP-FIELD	Field capacity of PSZ (%)	9	12	PEIS
WP-LDISP	Longitudinal dispersivity of PSZ (ft)	0.6	0.1	PEIS
WP-CONduc	Saturated hydraulic conductivity (ft/d)	40	5.95	PEIS
(a) PSZ refers to partially saturated zone. (b) The U.S. Department of Energy complex-wide Programmatic Environmental Impact Statement environmental setting database associated with the Hanford installation. (c) A depth to groundwater of about 70 ft was reported in Dresel et al. (1993).				

TABLE 4. Saturated Zone Values Used for Accidental Release from the 105-KE and 105-KW Basins to Ground

MEPAS PARAMETER	PARAMETER	PARAMETER VALUES	REFERENCE
WZ-CLASS	Soil classification in SZ ^(a)	Loamy sand	PEIS ^(b)
WZ-SAND	% sand in SZ	87.0	PEIS
WZ-SILT	% silt in SZ	11.0	PEIS
WZ-CLAY	% clay in SZ	2.0	PEIS
WZ-OMC	% organic matter content in SZ	0.0	PEIS
WZ-IRON	% iron and aluminum in SZ	0.0	PEIS
WZ-PH	pH of the pore water in SZ	7.7	PEIS
WZ-THICK	Thickness of SZ (ft)	35.0	PEIS
WZ-BULKD	Bulk density of SZ (g/cm ³)	1.90	PEIS
WZ-TOTPOR	Total porosity of SZ (%)	30.0	PEIS
WZ-EFFPOR	Effective porosity of SZ (%)	11.0	PEIS
WZ-PVELOC	Pore-water velocity of SZ (ft/d)	0.31	Maximum value in Gilmore et al. (1992)

(a) SZ refers to saturated zone.
(b) The U.S. Department of Energy complex-wide Programmatic Environmental Impact Statement environmental setting database associated with the Hanford installation.

TABLE 5. Parameter Values Used for Accidental Release from the 105-KE and 105-KW Basins to Ground

RECEPTOR LOCATION	PARAMETER VALUE				REFERENCE
		Dispersivity (ft)			
FS-LOCNAM	WZ-DIST Travel distance (ft)	WZ-LDISP Longitudinal	WZ-TDISP Transverse	WZ-VDISP Vertical	
Aquatic Foods	2357.0	235.7	47.14	0.2828	Estimated ^(a)
Benton Co.	2357.0	235.7	47.14	0.2828	Estimated
Franklin Co.	2357.0	235.7	47.14	0.2828	Estimated
Walla Walla Co.	2357.0	235.7	47.14	0.2828	Estimated
Kennewick	2357.0	235.7	47.14	0.2828	Estimated
Pasco	2357.0	235.7	47.14	0.2828	Estimated
Richland	2357.0	235.7	47.14	0.2828	Estimated
Restricted	2357.0	235.7	47.14	0.2828	Estimated

(a) Travel distance was estimated from Plate 1 in Evans et al. (1989). Dispersivities were estimated based on Droppo et al. (1989).

TABLE 6. Surface Water Parameter Values Used for Accidental Release from 105-KE and 105-KW Basins to Ground

MEPAS PARAMETERS	PARAMETER	VALUE	REFERENCE
WW-VELC	River flow velocity (ft/s)	1.73	Whelan et al. (1987) ^(a)
WW-DEPTH	River depth (ft)	16	Estimated ^(b)
WW-WIDTH	River width (ft)	1300	Estimated
WW-DIST	Distance to closest receptor (ft)	328	Conservative value
WW-DISCHG	Discharge (ft ³ /s)	36000	Whelan et al. (1987) ^(c)

(a) Calculated from the depth, width, and discharge.
 (b) Estimated from Whelan et al. (1987), page 4.
 (c) The minimum allowable discharge at Priest Rapids Dam (Whelan et al. 1987, page 4).

4.2 SURFACE WATER: 105-KE AND 105-KW BASINS DIRECT RELEASE TO THE COLUMBIA RIVER SCENARIO

The only release directly to the surface water was associated with the 105-KE and 105-KW Basins. The 105-KE and 105-KW Basins were combined as one release and represented by a "single liquid release point to the Columbia River" (McCormack 1993).^(a) The annual liquid discharge is assumed to be $1.4\text{E}+06 \text{ m}^3/\text{year}$ ($3.7\text{E}+08 \text{ gal}/\text{year}$) with a total activity of approximately 0.4 Ci: 0.26 Ci ^3H , 0.066 Ci ^{60}Co , 0.01 Ci ^{137}Cs , 0.0010 Ci ^{90}Sr , and $9.2\text{E}-06 \text{ Ci } ^{239}\text{Pu}$. All of the constituents in this assessment are radionuclides. The release is assumed to occur over the 18-year period from 1997 through 2015. The basins are assumed to withstand seismic activity. All of the 105-K Basins discharge to the Columbia River, and this discharge to the river has been monitored and regulated as part of the National Pollutant Discharge Elimination System 1908-KE Outfall (McCormack 1993).^(a) Contaminant migration is from the point-source discharge point to the Columbia River, and in the Columbia River to receptors downstream. The flow discharge in the Columbia River is assumed to be under low-flow conditions $1.008 \text{ m}^3/\text{s}$ ($36,000 \text{ ft}^3/\text{s}$) (Whelan et al. 1987), which represent the most conservative case for maximizing surface water concentrations. As a conservative assumption, the

(a) McCormack, R. 1993. *Hanford Engineering Laboratories INEL SNF EIS Data*. Westinghouse Hanford Company, Richland, Washington, (Draft).

TABLE 7. Exposure Parameter Values Used in All the Waterborne Scenarios

MEPAS PARAMETER	PARAMETER	PARAMETER VALUE	REFERENCE
FS-LOCNAM	AQUATIC FOODS		
EW-PRODFF	Finfish production (kg/yr)	15000	PEIS ^(a)
EW-PRODSF	Shellfish production (kg/yr)	0	PEIS
FS-LOCNAM	BENTON CO.		
EW-PRODLV	Leafy vegetable production (kg/yr)	0	PEIS
EW-PRODOV	Other vegetable production (kg/yr)	1.4E8	PEIS
EW-PRODMT	Meat production (kg/yr)	1.2E6	PEIS
EW-PRODMK	Milk production (kg/yr)	2.1E6	PEIS
EW-IRRATE	Irrigation rate (L/m ² /month)	128	PEIS
FS-LOCNAM	FRANKLIN CO.		
EW-PRODLV	Leafy vegetable production (kg/yr)	0	PEIS
EW-PRODOV	Other vegetable production (kg/yr)	5.8E5	PEIS
EW-PRODMT	Meat production (kg/yr)	8.4E3	PEIS
EW-PRODMK	Milk production (kg/yr)	2.8E4	PEIS
EW-IRRATE	Irrigation rate (L/m ² /month)	128	PEIS
FS-LOCNAM	WALLA WALLA CO.		
EW-PRODLV	Leafy vegetable production (kg/yr)	1.6E5	PEIS
EW-PRODOV	Other vegetable production (kg/yr)	8.3E6	PEIS
EW-PRODMT	Meat production (kg/yr)	1.8E5	PEIS
EW-PRODMK	Milk production (kg/yr)	2.8E5	PEIS
EW-IRRATE	Irrigation rate (L/m ² /month)	128	PEIS
FS-LOCNAM	KENNEWICK		
EW-PRODRW	Drinking population served	42155	PEIS
FS-LOCNAM	PASCO		
EW-POPDRW	Drinking population served	20337	PEIS
FS-LOCNAM	RICHLAND		
EW-POPDRW	Drinking population served	32315	PEIS
EW-POPPEC	Population involved in recreation	333000	PEIS
EW-POPPEC	RESTRICTED		
EW-POPDRW	Drinking population served	1	PEIS
EW-POPPEC	Population involved in recreation	1	PEIS

(a) The U.S. Department of Energy complex-wide Programmatic Environmental Impact Statement environmental setting database associated with the Hanford installation.

TABLE 8. Risks Associated with the 105-KE and 105-KW Basins Accidental Release Scenario

	CONSTITUENT											Max. Risk	Time for Max. Risk (yr)
	Cesium-134	Cesium-137	Cobalt-60	Plutonium-238	Uranium-234	Thorium-230	Plutonium-239	Uranium-235	Strontium-90	Yttrium-90	Tritium		
INGESTION/DERMAL													
Drinking Water	0.00E+00	6.89E-21	6.70E-15	3.07E-19	4.40E-19	1.53E-20	9.52E-14	2.42E-20	8.34E-19	5.66E-20	1.00E-13	1.00E-13	0-70
Finfish	0.00E+00	4.95E-20	3.56E-14	3.54E-19	1.02E-19	7.09E-21	1.10E-13	5.58E-21	6.73E-19	2.00E-21	3.24E-16	1.10E-13	2800-2870
Shellfish	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Leafy Vegetables	0.00E+00	3.33E-21	1.44E-14	1.83E-19	2.66E-19	9.14E-21	5.67E-14	1.46E-20	3.04E-18	1.37E-20	3.68E-15	5.67E-14	2800-2870
Other Vegetables	0.00E+00	2.93E-21	1.18E-14	1.16E-19	1.88E-19	5.80E-21	3.60E-14	1.03E-20	9.32E-18	2.97E-27	2.31E-14	3.60E-14	2800-2870
Meat	0.00E+00	4.50E-21	1.93E-14	6.01E-24	3.52E-21	3.61E-24	1.86E-18	1.93E-22	7.63E-20	6.16E-24	1.17E-14	1.93E-14	0-70
Milk	0.00E+00	1.10E-20	1.37E-14	8.96E-24	7.74E-20	2.24E-23	2.78E-18	4.25E-21	1.47E-18	1.15E-22	1.48E-14	1.48E-14	0-70
Swimming	0.00E+00	1.12E-23	1.16E-16	5.44E-22	7.80E-22	2.72E-23	1.69E-16	4.34E-23	5.17E-21	4.01E-22	1.24E-16	1.69E-16	2800-2870
Soil Ingestion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Special Foods	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
INHALATION													
Inhalation	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Showering	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
EXTERNAL RADIATION													
Boating	0.00E+00	8.68E-25	3.72E-17	1.70E-28	4.25E-27	1.72E-28	4.04E-23	3.15E-25	3.18E-25	1.18E-24	0.00E+00	3.72E-17	0-70
Shoreline	0.00E+00	2.08E-21	2.45E-14	3.87E-24	6.44E-23	1.16E-24	5.47E-19	7.44E-22	3.92E-21	1.87E-24	0.00E+00	2.45E-14	0-70
Ground	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Max. Risk	0.00E+00	4.95E-20	3.56E-14	3.54E-19	4.40E-19	1.53E-20	1.10E-13	2.42E-20	9.32E-18	5.66E-20	1.00E-13	1.10E-13	
Time of Max. Risk (yr)	N/A	490-560	0-70	910-980	2100-2170	2100-2170	2800-2870	3640-3710	420-490	420-490	0-70	2800-2870	
Maximum Risk for Scenario: 1.10E-13, Plutonium-239, Ingestion-Finfish. N/A = Not Applicable.													

removal of water from the Columbia River is assumed to be 100 m (328 ft) downstream of the contaminant influent point to the river. The assessment will address recreational activities (such as boating, swimming, and fishing) in the Columbia River and use of the water as a drinking-water supply, for bathing, and for irrigation.

A summary of the data associated with the transport and fate modeling is presented in Tables 9 through 11:

- Tables 9 and 10 present a listing of the constituents and their source-term characteristics, and source-term release information. A more detailed listing is presented in Appendix B.
- Table 11 presents a listing of surface water characteristics. A more detailed listing is presented in Appendix B.

Table 7 presents the information associated with the exposure assessment, including intake and production rates, population locations and sizes, and exposure activities.

A summation of the exposure and health effects analysis is presented in Table 12 for each constituent and exposure pathway. In addition to parent radionuclides, results associated with decay products are also presented. The decay products include ^{235}U and ^{90}Y . Table 12 presents the risks in terms of the number of fatalities and indicates the maximum risk for each constituent for each exposure route is extremely small.

TABLE 9. Constituents, Source-Term Flux, and Time Used for Single Liquid Release from 105-KE and 105-KW Basins to the Columbia River

PARAMETER	PARAMETER VALUES						REFERENCE
FS-CNAME	Constituent	Cesium-137+D	Cobalt-60	Plutonium-239	Strontium-90	Tritium	McCormack (1993) ^(a)
	Half-life (yr)	3.01E1	5.28E0	2.41E4	2.88E1	1.23E1	Strenge et al. (1989)
WS-TLIFE	Active life (yr)	18	18	18	18	18	McCormack (1993)
WS-NUM	Number of rates	2	2	2	2	2	McCormack (1993)
WS-CDATE	Starting date	01/01/97	01/01/97	01/01/97	01/01/97	01/01/97	McCormack (1993)
WS-FLUX	Flux (Ci/yr)	1.0E-2	6.6E-2	9.2E-6	1.0E-3	2.6E-1	McCormack (1993)
WS-TIME	Time (yr)	0 - 18	0 - 18	0 - 18	0 - 18	0 - 18	McCormack (1993)
WS-INVENT	Inventory (Ci)	1.0E-02	6.6E-2	9.2E-06	1.0E-03	2.6E-01	McCormack (1993)
TFINAL	Simulation time (yr)	7.0E3	7.0E3	7.0E3	7.0E3	7.0E3	N/A
(a) McCormack, R. 1993. Hanford Engineering Laboratories INEL SNF EIS Data. Westinghouse Hanford Company, Richland, Washington, (Draft).							
N/A = Not Applicable.							

TABLE 10. Source-Term Release and Timing Parameters Used for Single Liquid Release from the 105-KE and 105-KW Basins to the Columbia River

MEPAS PARAMETER	PARAMETER	VALUE	REFERENCE
WS-DATE	Starting date of the release unit	01/01/97	McCormack (1993) ^(a)
WS-TDISC	Starting date for discounting	01/01/97	McCormack (1993)
WS-TRISK	Starting date for risk	11/18/93	N/A
(a) McCormack, R. 1993. Hanford Engineering Laboratories INEL SNF EIS Data. Westinghouse Hanford Company, Richland, Washington, (Draft).			
N/A = Not Applicable.			

TABLE 11. Surface Water Values Used for Single Liquid Release from 105-KE and 105-KW Basins to Columbia River

MEPAS PARAMETERS	PARAMETERS	VALUE	REFERENCE
WO-RIVLEN	Length of river adjacent to release unit (ft)	1.0	Assumed
WW-VELC	River flow velocity (ft/s)	1.73	Whelan et al. (1987) ^(a)
WW-DEPTH	River depth (ft)	16	Estimated ^(b)
WW-WIDTH	River width (ft)	1300	Estimated
WW-DIST	Distance to closest receptor (ft)	328	Conservative value
WW-DISCHG	Columbia River flow (ft ³ /s)	36000	Whelan et al. (1987) ^(c)
(a) Calculated from the depth, width, and discharge.			
(b) Estimated from Whelan et al. (1987), page 4.			
(c) The minimum allowable discharge at Priest Rapids Dam (Whelan et al. 1987, page 4).			

TABLE 12. Risks Associated with the 105-KE and 105-KW Basins Continuous Discharge to the Columbia River Scenario

	CONSTITUENT							Max. Risk	Time for Max. Risk (yr)
	Cesium-137	Cobalt-60	Plutonium-239	Uranium-235	Strontium-90	Yttrium-90	Tritium		
INGESTION/DERMAL									
Drinking Water	6.20E-12	4.89E-12	3.14E-13	3.11E-26	3.86E-13	4.97E-22	2.26E-13	6.20E-12	0-70
Finfish	4.45E-11	2.60E-11	3.63E-13	7.19E-27	3.12E-13	1.75E-23	7.29E-16	4.45E-11	0-70
Shellfish	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Leafy Vegetables	3.00E-12	1.05E-11	1.87E-13	1.88E-26	1.41E-12	1.20E-22	8.28E-15	1.05E-11	0-70
Other Vegetables	2.64E-12	8.59E-12	1.19E-13	1.33E-26	4.31E-12	2.61E-29	5.21E-14	8.59E-12	0-70
Meat	4.05E-12	1.41E-11	6.15E-18	2.49E-28	3.53E-14	5.41E-26	2.63E-14	1.41E-11	0-70
Milk	9.94E-12	1.00E-11	9.17E-18	5.47E-27	6.82E-13	1.01E-24	3.33E-14	1.00E-11	0-70
Swimming	1.01E-14	8.47E-14	5.56E-16	5.59E-29	2.39E-15	3.52E-24	2.80E-16	8.47E-14	0-70
Soil Ingestion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Special Foods	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
INHALATION									
Inhalation	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Showering	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
EXTERNAL RADIATION									
Boating	7.80E-16	2.72E-14	1.33E-22	4.06E-31	1.47E-19	1.04E-26	0.00E+00	2.72E-14	0-70
Shoreline	1.87E-12	1.79E-11	1.80E-18	9.58E-28	1.81E-15	1.64E-26	0.00E+00	1.79E-11	0-70
Ground	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Max. Risk	4.45E-11	2.60E-11	3.63E-13	3.11E-26	4.31E-12	4.97E-22	2.26E-13	4.45E-11	
Time of Max. Risk	0-70	0-70	0-70	0-70	0-70	0-70	0-70	0-70	
Maximum Risk for Scenario: 4.45E-11, Cesium-137, Ingestion - Finfish. N/A = Not Applicable.									

5.0 IMPACTS OF DECENTRALIZATION ALTERNATIVE

The Decentralization Alternative would require that DOE-owned SNF be managed at the location where the SNF is removed from the reactor. Hanford SNF would be safely stored with some limited SNF shipments. To accommodate this mission, existing facilities would be upgraded, and new storage systems would be constructed.

5.1 GROUNDWATER

Four groundwater scenarios are postulated for release to the subsurface environment. Two are accident scenarios, and two represent releases to the 200 Area TEDF. Each groundwater scenario is discussed as follows.

5.1.1 Wet Storage of Nuclear Fuels New Pool Storage Facility Accident Scenario

A bounding liquid release scenario has been postulated for the Wet Storage of Nuclear Fuels New Pool Storage Facility. The leak is based on a 20-cm (8-in.) water-supply pipe breaking inside of the pool building and releasing 10,900 m³/d (2000 gal/min). The flow is not shut off for an 8-hr period, adding 3635 m³ (960,000 gal) of liquid to the pool. Because the pool cannot contain this quantity, an overflow of 2272 m³ (600,000 gal) is experienced in this 8-hr period. The transmission rate of the soil is estimated as 570 cm/d (222.3 in.) (based on the DOE PEIS), so a leaching rate of 26.3 cm/d (600,000 gal/8 hr/6.4 acres) will not result in a ponded situation; therefore, the entire 2272 m³ (600,000 gal) of overflow will leach into the soil during an 8-hr period. The basin overflow does contain 61% of the basin-water radionuclide inventory, which is estimated as 1.8 Ci. The specific radionuclide inventory in the overflow pond is assumed as follows: 0.48 Ci ³H, 1.3E-03 Ci ⁶⁰Co, 3.1E-3 Ci ¹³⁴Cs, 0.22 Ci ¹³⁷Cs, 1.1 Ci ⁹⁰Sr, 5.9E-06 Ci ²³⁸Pu, and 3.1E-05 Ci ²³⁹Pu. All of the constituents in this assessment are radionuclides. Contaminant migration is through the vadose zone, through the saturated zone

to the Columbia River, and in the Columbia River to receptors downstream. The flow discharge in the Columbia River is assumed to be under low-flow conditions of 1008 m^3 ($36,000 \text{ ft}^3/\text{s}$) (Whelan et al. 1987), representing the most conservative case for maximizing surface water concentrations. As a conservative assumption, the removal of water from the Columbia River is assumed to be 100 m (328 ft) downstream of the contaminant influent point to the river. The assessment will address recreational activities (such as boating, swimming, and fishing) in the Columbia River and use of the water as a drinking-water supply, for bathing, and for irrigation.

A summary of the data associated with the transport and fate modeling is presented in Tables 13 through 18:

- Table 13 presents a listing of the constituents and their source-term characteristics. A more detailed listing is presented in Appendix C.
- Table 14 presents the source-term release information, Darcian release rate, and source dimensions. A more detailed listing is presented in Appendix C.
- Table 15 presents vadose-zone characteristics. A more detailed listing is presented in Appendix C.
- Tables 16 and 17 present the saturated-zone characteristics. A more detailed listing is presented in Appendix C.
- Table 18 presents the surface water characteristics. A more detailed listing is presented in Appendix C.

Table 7 presents the information associated with the exposure assessment, including intake and production rates, population locations and sizes, and exposure activities.

A summation of the exposure and health effects analysis is presented in Table 19 for each constituent and exposure pathway. In addition to parent radionuclides, results associated with decay products are also presented. The decay products include ^{234}U , ^{230}Th , ^{235}U , and ^{90}Y . Table 19 presents the risks in terms of the number of fatalities and indicates that maximum risk is extremely small for all of the constituents.

TABLE 13. Constituents, Source-Term Flux, and Time Used for Accidental Release from Wet Storage of Nuclear Fuels New Pool Storage Facility to Ground

PARAMETER	PARAMETER VALUES								REFERENCE
FS-CNAME	Constituent	Cesium-134	Cesium-137+D	Cobalt-60	Plutonium-238	Plutonium-239	Strontium-90	Tritium	McCormack (1993) ^(a)
WA-SUBKD	Kd (mL/g)	10	10	0	10	10	7	0	Serne and Wood (1990) ^(b)
	Half-life (yr)	2.06E0	3.01E1	5.28E0	8.79E1	2.41E4	2.88E1	1.23E1	Streng et al. (1989)
WS-TLIFE	Active life (yr)	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	McCormack (1993)
WS-NUM	Number of rates	2	2	2	2	2	2	2	McCormack (1993)
WS-CDATE	Starting date	01/01/00	01/01/00	01/01/00	01/01/00	01/01/00	01/01/00	01/01/00	McCormack (1993)
WS-FLUX	Flux (Ci/yr)	3.4E0	2.4E2	1.4E0	6.5E-3	3.4E-2	1.2E3	5.3E2	McCormack (1993)
WS-TIME	Time (yr)	0-0.0009	0-0.0009	0-0.0009	0-0.0009	0-0.0009	0-0.0009	0-0.0009	McCormack (1993)
WS-INVENT	Inventory (Ci)	3.1E-3	2.2E-1	1.3E-3	5.8E-6	3.1E-5	1.1E0	4.7E-1	McCormack (1993)
TFINAL	(yr)	7.0E3	7.0E3	7.0E3	7.0E3	7.0E3	7.0E3	7.0E3	N/A

(a) McCormack, R. 1993. Hanford Engineering Laboratories INEL SNF EIS Data. Westinghouse Hanford Company, Richland, Washington (Draft).

(b) From Table B.2 in Serne and Wood (1990).

N/A = Not Applicable.

TABLE 14. Source-Term Release, Timing, and Source-Dimension Parameter Values Used for Accidental Release from Wet Storage of Nuclear Fuels New Pool Storage Facility to Ground

MEPAS PARAMETER	PARAMETER	VALUE	REFERENCE
WS-DATE	Starting date of the release unit	01/01/00	McCormack (1993) ^(a)
WS-TDISC	Starting date for discounting	01/01/00	McCormack (1993)
WS-TRISK	Starting date for risk	01/01/00	N/A
WS-LENGTH	Length of site (ft)	528	McCormack (1993)
WS-WIDTH	Width of site (ft)	528	McCormack (1993)
WS-LEACHV	Liquid infiltration rate (ft/d)	0.864	McCormack (1993)
(a) McCormack, R. 1993. <u>Hanford Engineering Laboratories INEL SNF EIS Data</u> . Westinghouse Hanford Company, Richland, Washington (Draft). N/A = Not Applicable.			

5.1.2 105-KE and 105-KW Basins Accidental Release Scenario

The accident scenario at the 105-KE and 105-KW Basins under the Decentralization Alternative is the same as the 105-KE and 105-KW Basins accident scenario described under the No-Action Alternative.

5.1.3 Wet Storage/Fuel Transfer Facility Scenario

The Spent Nuclear Fuel Wet Storage/Fuel Transfer Facility scenario was documented by Creed (1994).^(a) The source term represents the maximum potential water releases that would be expected if a secondary containment failure and/or piping leak occurred and went undetected for one month at a state-of-the-art wet storage fuel/transfer facility utilizing the water treatment technology. Releases resulting from such failure should not be thought of as operational or planned releases. However, for the purposes of a nonzero

(a) Creed, R. 1994. *Non-Zero Source Term for Spent Nuclear Fuel (SNF) Wet Transfer and Storage and Criteria Checklist Compliance* (OPE-EIS-94.169). Memorandum from Mr. Robert Creed, dated March 30, 1994, U.S. Department of Energy, Idaho Operations Office, Idaho Falls, Idaho.

TABLE 15. Partially Saturated Zone Parameter Values Used for Accidental Release from Nuclear Fuels New Pool Storage Facility to Ground

MEPAS PARAMETER	PARAMETER	PARAMETER VALUES			REFERENCE
		PSZ ^(a) 1 of 3 layers	PSZ 2 of 3 layers	PSZ 3 of 3 layers	
WP-CLASS	Soil classification in PSZ	Sand	Sand	Sand	PEIS ^(b)
WP-SAND	% sand in PSZ	90	95	90	PEIS
WP-SILT	% silt in PSZ	9	3	9	PEIS
WP-CLAY	% clay in PSZ	1	2	1	PEIS
WP-OMC	% organic matter content in PSZ	0	0	0	PEIS
WP-IRON	% iron and aluminum in PSZ	2	2	2	PEIS
WP-PH	pH of the pore water in PSZ	8.5	8.5	8.5	PEIS
WP-THICK	Thickness of PSZ (ft)	33	164	62	PEIS
WP-BULKD	Bulk density of PSZ (g/cm ³)	1.76	1.60	1.76	PEIS
WP-TOTPOR	Total porosity of PSZ (%)	36	42	36	PEIS
WP-FIELD	Field capacity of PSZ (%)	19	8.5	19	PEIS
WP-LDISP	Longitudinal dispersivity of PSZ (ft)	0.33	1.64	0.62	PEIS
WP-CONDOC	Saturated hydraulic conductivity (ft/d)	4.34	14.2	4.34	PEIS
<p>(a) PSZ refers to partially saturated zone.</p> <p>(b) The U.S. Department of Energy complex-wide Programmatic Environmental Impact Statement environmental setting database associated with the Hanford installation.</p>					

release source term, this scenario addresses those situations where an unexpected release may occur. The source-term information was derived from data related to the operation of the Flourinel and Storage Facility (FAST) at the Idaho National Engineering Laboratory's Idaho Chemical Processing Plant (ICPP-666). This information is considered to be extremely conservative, given the state-of-the-art engineering practices, monitoring, and leak-detection equipment, and the surveillance procedures likely to be used at any new SNF facility, such as FAST.

TABLE 16. Saturated Zone Parameter Values Used for Accidental Release from Wet Storage of Nuclear Fuels New Pool Storage Facility to Ground

MEPAS PARAMETER	PARAMETER	PARAMETER VALUES	REFERENCE
WZ-CLASS	Soil classification in SZ ^(a)	Sand	PEIS ^(b)
WZ-SAND	% sand in SZ	92.0	PEIS
WZ-SILT	% silt in SZ	6.0	PEIS
WZ-CLAY	% clay in SZ	2.0	PEIS
WZ-OMC	% organic matter content in SZ	0.0	PEIS
WZ-IRON	% Iron and aluminum in SZ	0.0	PEIS
WZ-PH	pH of the pore water in SZ	7.1	PEIS
WZ-THICK	Thickness of SZ (ft)	34.0	PEIS
WZ-BULKD	Bulk density of SZ (g/cm ³)	2.06	PEIS
WZ-TOTPOR	Total porosity of SZ (%)	26.0	PEIS
WZ-EFFPOR	Effective porosity of SZ (%)	23.2	PEIS
WZ-PVELOC	Pore-Water velocity of SZ (ft/d)	35.0	PEIS
<p>(a) SZ refers to saturated zone. (b) The U.S. Department of Energy complex-wide Programmatic Environmental Impact Statement environmental setting database associated with the Hanford installation.</p>			

Any new facility would be built using state-of-the-art technologies, including leak detection and water-balance monitoring equipment. This equipment, together with the uncertainties associated with evaporation monitoring will have a minimum detection sensitivity. It is possible that the new SNF facility could experience a failure resulting in a leak that is below the sensitivity detection system. Based on the size of the facility and the current monitoring programs at similar facilities, 19 L/d (5 gal/d) have been established as a conservative value to account for potential undetected leakage from the facility. The nonzero release source term would then exceed what could be expected for a new SNF wet storage or transfer facility. Factors contributing to the conservatism in volume estimates are the design

TABLE 17. Parameter Values for Accidental Release from Wet Storage of Nuclear Fuels New Pool Storage Facility to Ground

RECEPTOR LOCATION	PARAMETER VALUE				REFERENCE
	WZ-DIST Travel distance (ft)	Dispersivity (ft)			
		WZ-LDISP Longitudinal	WZ-TDISP Transverse	WZ-VDISP Vertical	
FS-LOCNAM					
Aquatic foods	79200.0	7920.0	1580.0	9.2	Estimated ^(a)
Benton Co.	79200.0	7920.0	1580.0	9.2	Estimated
Franklin Co.	79200.0	7920.0	1580.0	9.2	Estimated
Walla Walla Co.	79200.0	7920.0	1580.0	9.2	Estimated
Kennewick	79200.0	7920.0	1580.0	9.2	Estimated
Pasco	79200.0	7920.0	1580.0	9.2	Estimated
Richland	79200.0	7920.0	1580.0	9.2	Estimated
Restricted	79200.0	7920.0	1580.0	9.2	Estimated

(a) Travel distance was estimated from Plate 1 in Dresel et al. (1993). Dispersivities were estimated based on Droppo et al. (1989).

TABLE 18. Surface Water Values for Accidental Release from Wet Storage of Nuclear Fuels New Pool Storage Facility to Ground

MEPAS PARAMETERS	PARAMETER	VALUE	REFERENCE
WW-VELC	River flow velocity (ft/s)	1.73	Whelan et al. (1987) ^(a)
WW-DEPTH	River depth (ft)	16	Estimated ^(b)
WW-WIDTH	River width (ft)	1300	Estimated
WW-DIST	Distance to closest receptor (ft)	328	Conservative value
WW-DISCHG	Discharge (ft ³ /s)	36000	Whelan et al. (1987) ^(c)
(a) Calculated from the depth, width, and discharge.			
(b) Estimated from Whelan et al. (1987), page 4.			
(c) The minimum allowable discharge at Priest Rapids Dam (Whelan et al. 1987, page 4).			

**TABLE 19. Risks Associated with the Wet Storage of Nuclear Fuels New Pool Storage Facility
Accidental Release Scenario**

	CONSTITUENT											Max. Risk	Time for Max. Risk (yr)
	Cesium- 134	Cesium- 137	Cobalt- 60	Plutonium- 238	Uranium- 234	Thorium- 230	Plutonium- 239	Uranium- 235	Strontium- 90	Yttrium- 90	Tritium		
INGESTION/DERMAL													
Drinking Water	0.00E+00	4.25E-14	3.69E-14	2.95E-15	1.76E-18	1.31E-20	3.19E-13	1.29E-20	5.90E-13	4.01E-14	2.50E-13	5.90E-13	140-210
Finfish	0.00E+00	3.05E-13	1.96E-13	3.41E-15	4.06E-19	6.04E-21	3.69E-13	2.98E-21	4.77E-13	1.41E-15	8.08E-16	4.77E-13	140-210
Shellfish	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Leafy Vegetables	0.00E+00	2.05E-14	7.92E-14	1.76E-15	1.06E-18	7.79E-21	1.90E-13	7.79E-21	2.15E-12	9.69E-15	9.18E-15	2.15E-12	140-210
Other Vegetables	0.00E+00	1.81E-14	6.48E-14	1.12E-15	7.50E-19	4.94E-21	1.21E-13	5.51E-21	6.60E-12	2.10E-21	5.77E-14	6.60E-12	140-210
Meat	0.00E+00	2.77E-14	1.06E-13	5.78E-20	1.41E-20	3.07E-24	6.25E-18	1.03E-22	5.41E-14	4.37E-18	2.91E-14	1.06E-13	0-70
Milk	0.00E+00	6.81E-14	7.56E-14	8.62E-20	3.09E-19	1.91E-23	9.33E-18	2.27E-21	1.04E-12	8.13E-17	3.70E-14	1.04E-12	140-210
Swimming	0.00E+00	6.92E-17	6.38E-16	5.23E-18	3.11E-21	2.32E-23	5.65E-16	2.32E-23	3.66E-15	2.84E-16	3.10E-16	3.66E-15	140-210
Soil Ingestion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Special Foods	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
INHALATION													
Inhalation	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Showering	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
EXTERNAL RADIATION													
Boating	0.00E+00	5.34E-18	2.05E-16	1.63E-24	1.70E-26	1.47E-28	1.35E-22	1.68E-25	2.25E-19	8.36E-19	0.00E+00	2.05E-16	0-70
Shoreline	0.00E+00	1.28E-14	1.35E-13	3.72E-20	2.57E-22	9.91E-25	1.83E-18	3.97E-22	2.78E-15	1.33E-18	0.00E+00	1.35E-13	0-70
Ground	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Max. Risk	0.00E+00	3.05E-13	1.96E-13	3.41E-15	1.76E-18	1.31E-20	3.69E-13	1.29E-20	6.60E-12	4.01E-14	2.50E-13	6.60E-12	
Time of Max. Risk (yr)	N/A	210-280	0-70	280-350	420-490	560-630	280-350	560-630	140-210	140-210	0-70	140-210	
Maximum Risk for Scenario: 6.60E-12, Strontium-90, Ingestion - Other Vegetables. N/A = Not Applicable.													

criteria, which states the new facility will contain leak-detection systems (Hale 1994)^(a) and will have the surface area (2000 m² [6600 ft²]) available for leakage as compared to FAST (3830 m² [12,560 ft²]) (Hale 1994). For the purposes of this assessment, the entire release is assumed as a point source, the most conservative assumption. The concentration data associated with the release were contained in or derived from the January 6, 1986, to February 14, 1994, weekly water quality reports for FAST and are considered to be reasonable nonzero release source terms at the 95% confidence level (Creed 1994).^(b) Although the surveillance at the FAST facility occurs on a daily basis with radiological surveys occurring weekly, the aqueous release assumes that liner or piping leaks and secondary containment failure is undetected for one month.

The specific radionuclide activities in the release solution are assumed as follows: 10,000 pCi/L ³H, 280 pCi/L ⁹⁰Sr, 3360 pCi/L ⁶⁰Co, 160 pCi/L ⁵⁷Co,^(c) 93 pCi/L ¹³⁷Cs, and 100 pCi/L ¹²⁵Sb. All of the constituents in this assessment are radionuclides. Contaminant migration is through the vadose zone, through the saturated zone to the Columbia River, and in the Columbia River to receptors downstream. The flow discharge in the Columbia River is assumed to be under low-flow conditions (36,000 ft³/s) (Whelan et al. 1987), which represents the most conservative case for maximizing surface water

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- (a) Hale, D. 1994. *Description of a Generic Spent Nuclear Fuel Infrastructure for the Programmatic Environmental Impact Statement*. EGG-WM-11230. Internal Technical Report. Predecisional Draft. EG&G, Idaho, Inc., Idaho National Engineering Laboratory, Idaho Falls, Idaho. March 10, 1994.
- (b) Creed, R. 1994. *Non-Zero Source Term for Spent Nuclear Fuel (SNF) Wet Transfer and Storage and Criteria Checklist Compliance (OPE-EIS-94.169)*. Memorandum from Mr. Robert Creed, dated March 30, 1994, U.S. Department of Energy, Idaho Operations Office, Idaho Falls, Idaho.
- (c) ⁵⁷Co is substituted in the analysis for ⁵⁸Co because the MEPAS database only contains ⁵⁷Co. Although the half-life of ⁵⁷Co (0.74 yr) is nearly four times longer than that of ⁵⁸Co (0.19 yr) and the dose factor is 20 to 30% of ⁵⁸Co, the analysis presented in Table 26 indicates that this substitution has no impact on the results.

concentrations. As a conservative assumption, the removal of water from the Columbia River is assumed to be 100 m (328 ft) downstream of the contaminant influent point to the river. The assessment will address recreational activities such as boating, swimming, and fishing on the Columbia River and use of the water as a drinking-water supply and for bathing and irrigation.

A summary of the data associated with the transport and fate modeling is presented in Tables 20 through 26:

- Table 20 presents a listing of the constituents and their source-term characteristics. A more detailed listing is presented in Appendix D.
- Table 21 presents the source-term release information, Darcian release rate, and source dimensions. A more detailed listing is presented in Appendix D.
- Table 22 presents vadose-zone characteristics. A more detailed listing is presented in Appendix D.
- Tables 23 and 24 present the saturated-zone characteristics. A more detailed listing is presented in Appendix D.
- Table 25 presents the surface water characteristics. A more detailed listing is presented in Appendix D.

Table 7 presents the information associated with the exposure assessment, including intake and production rates, population locations and sizes, and exposure activities.

A summation of the exposure and health effects analysis is presented in Table 26 for each constituent and exposure pathway. In addition to parent radionuclides, results associated with decay products are also presented. The decay product is ^{90}Y . This table presents the risks in terms of the number of fatalities and indicates that maximum risk is extremely small for all of the constituents.

TABLE 20. Constituents, Source-Term Flux, and Time Used for Accidental Release from Wet Transfer and Storage Facility to Ground

PARAMETER	PARAMETER VALUES							REFERENCE
FS-CNAME	Constituent	Antimony-125	Cesium-137+D	Cobalt-60	Cobalt-57	Strontium-90	Tritium	McCormack (1993) ^(a)
WA-SUBKD	Kd (mL/g)	2 ^(b)	10	0	0	7	0	Serne and Wood (1990) ^(c)
	Half-life (yr)	2.77E0	3.01E1	5.28E0	7.39E-1	2.88E1	1.23E1	Streng et al. (1989)
WS-TLIFE	Active life (yr)	0.0821	0.0821	0.0821	0.0821	0.0821	0.0821	Creed (1994) ^(d)
WS-NUM	Number of rates	2	2	2	2	2	2	Creed (1994)
WS-CDATE	Starting date	01/01/00	01/01/00	01/01/00	01/01/00	01/01/00	01/01/00	Creed (1994)
WS-FLUX	Flux (Ci/yr)	5.17E-6	4.81E-6	1.74E-4	8.27E-6	1.45E-5	5.17E-4	Creed (1994)
WS-TIME	Time (yr)	0-0.0821	0-0.0821	0-0.0821	0-0.0821	0-0.0821	0-0.0821	Creed (1994)
WS-INVENT	Inventory (Ci)	4.25E-7	3.95E-7	1.43E-5	6.79E-7	1.19E-6	4.24E-5	Creed (1994)
TFINAL	(yr)	7.0E3	7.0E3	7.0E3	7.0E3	7.0E3	7.0E3	N/A

(a) McCormack, R. 1993. Hanford Engineering Laboratories INEL SNF EIS Data. Westinghouse Hanford Company, Richland, Washington (Draft). From Table B.2 in Serne and Wood (1990).
 (b) MEPAS 2.3h default value (personal communication, R. J. Serne 1994 at Pacific Northwest Laboratory, Richland, Washington).
 (c) From Table B.2 in Serne and Wood (1990).
 (d) Creed, R. 1994. Non-Zero Source Term for Spent Nuclear Fuel (SNF) Wet Transfer and Storage and Criteria Checklist Compliance (OPE-EIS-94.169). Memorandum from Mr. Robert Creed, dated March 30, 1994, U.S. Department of Energy, Idaho Operations Office, Idaho Falls, Idaho.
 N/A = Not Applicable.

TABLE 21. Source-Term Release, Timing, and Source-Dimension Parameters Values Used for Accidental Release from Wet Transfer and Storage Facility to Ground

MEPAS PARAMETER	PARAMETER	VALUE	REFERENCE
WS-DATE	Starting date of the release unit	01/01/00	Creed (1994) ^(a)
WS-TDISC	Starting date for discounting	01/01/00	Creed (1994)
WS-TRISK	Starting date for risk	01/01/00	N/A
WS-LENGTH	Length of site (ft)	1	Creed (1994)
WS-WIDTH	Width of site (ft)	1	Creed (1994)
WS-LEACHV	Waste liquid infiltration rate (ft/d)	0.668	Creed (1994)
(a) Creed, R. 1994. <u>Non-Zero Source Term for Spent Nuclear Fuel (SNF) Wet Transfer and Storage and Criteria Checklist Compliance (OPE-EIS-94.169)</u> . Memorandum from Mr. Robert Creed, dated March 30, 1994, U.S. Department of Energy, Idaho Operation Office, Idaho Falls, Idaho. N/A = Not Applicable.			

5.1.4 Process and Package of All Fuel: Shear, Leach, and Solvent Extraction Facility Scenario

The Hanford 200 Area TEDF receives liquid effluent from many facilities in the 200 Area. The discharge target allowable concentrations in the TEDF are presented in McCormack (1993).^(a) Only 379 L/d (100 gal/d) will be discharged to the TEDF basin from this operation, although other facilities will also be discharging to the basin. For a ponded situation, the maximum outflow from the basin is equal to the transmission rate of the soil immediately below the basin, 23,725 L/d (6260 gal/d). To maximize the flow velocity through the vadose zone and the mass flux of contaminant leaving the basin (that is, concentration times area times flow velocity), the assessment assumes this facility leaks into the vadose zone over a 4-year period at an

(a) McCormack, R. 1993. *Hanford Engineering Laboratories INEL SNF EIS Data*. Westinghouse Hanford Company, Richland, Washington (Draft).

TABLE 22. Partially Saturated Zone Values Used for Accidental Release from Wet Transfer and Storage Facility to Ground

MEPAS PARAMETER	PARAMETER	PARAMETER VALUES			REFERENCE
		PSZ ^(a) 1 of 3 layers	PSZ 2 of 3 layers	PSZ 3 of 3 layers	
WP-CLASS	Soil classification in PSZ	Sand	Sand	Sand	PEIS ^(b)
WP-SAND	% sand in PSZ	90	95	90	PEIS
WP-SILT	% silt in PSZ	9	3	9	PEIS
WP-CLAY	% clay in PSZ	1	2	1	PEIS
WP-OMC	% organic matter content in PSZ	0	0	0	PEIS
WP-IRON	% iron and aluminum in PSZ	2	2	2	PEIS
WP-PH	pH of the pore water in PSZ	8.5	8.5	8.5	PEIS
WP-THICK	Thickness of PSZ (ft)	33	164	62	PEIS
WP-BULKD	Bulk density of PSZ (g/cm ³)	1.76	1.60	1.76	PEIS
WP-TOTPOR	Total porosity of PSZ (%)	36	42	36	PEIS
WP-FIELD	Field capacity of PSZ (%)	19	8.5	19	PEIS
WP-LDISP	Longitudinal dispersivity of PSZ (ft)	0.33	1.64	0.62	PEIS
WP-CONDOC	Saturated hydraulic conductivity (ft/d)	4.34	14.2	4.34	PEIS

(a) SPZ refers to partially saturated zone.
(b) The U.S. Department of Energy complex-wide Programmatic Environmental Impact Statement environmental setting database associated with the Hanford installation.

infiltration rate limited by the transmission rate of the soil. The discharge from the pond is assumed to last for 4 years, from 2002 through 2006.

Based on the movement of the second tritium plume from the PUREX cribs in the 200 Area to Well 699-24-33 (a distance of 6 km [3.7 mi]) in a 5-year period (1983 to 1988), the average pore-water velocity in the saturated zone was 329 cm/d (10.8 ft/d) (Schramke^(a) 1993; Thorne^(b) 1992). Davis et al.

- (a) Schramke, J. A. 1993. *Hanford Hydrologic Data for the PEIS*, prepared for the DOE. Letter Report. Pacific Northwest Laboratory, Richland, Washington.
- (b) Thorne, P. D. 1992. *Information to Support Hanford PEIS*. Memorandum. Pacific Northwest Laboratory, Richland, Washington.

TABLE 23. Saturated Zone Parameter Values Used for Accidental Release from Wet Transfer and Storage Facility to Ground

MEPAS PARAMETER	PARAMETER	PARAMETER VALUES	REFERENCE
WZ-CLASS	Soil classification in SZ ^(a)	Sand	PEIS ^(b)
WZ-SAND	% sand in SZ	92.0	PEIS
WZ-SILT	% silt in SZ	6.0	PEIS
WZ-CLAY	% clay in SZ	2.0	PEIS
WZ-OMC	% organic matter content in SZ	0.0	PEIS
WZ-IRON	% iron and aluminum in SZ	0.0	PEIS
WZ-PH	pH of the pore water in SZ	7.1	PEIS
WZ-THICK	Thickness of SZ (ft)	34.0	PEIS
WZ-BULKD	Bulk density of SZ (g/cm ³)	2.06	PEIS
WZ-TOTPOR	Total porosity of SZ (%)	26.0	PEIS
WZ-EFFPOR	Effective porosity of SZ (%)	23.2	PEIS
WZ-PVELOC	Pore-water velocity of SZ (ft/d)	35.0	PEIS
<p>(a) SZ refers to saturated zone.</p> <p>(b) The U.S. Department of Energy complex-wide Programmatic Environmental Impact Statement environmental setting database associated with the Hanford installation.</p>			

(1993) performed a more recent analysis and determined the pore-water velocity was 24 cm/d (0.08 ft/d) just below the TEDF site, although this is not necessarily indicative of the velocity as the water moves toward the river. Both velocities were used in assessing the migration of contamination from the basin. The highest pore-water velocity 329 cm/d (10.8 ft/d) was used because 1) it is consistent with other assessments at the installation (such as PEIS), 2) the contaminants reached the river and receptors earlier, and 3) the resulting exposure analysis provided more risk over the 7000-year assessment time frame.

Radionuclides, chemical carcinogens, and noncarcinogens are contained in the waste stream. The concentrations in the TEDF were represented by the

TABLE 24. Parameter Values Used for Accidental Release from Wet Transfer and Storage Facility to Ground

RECEPTOR LOCATION	PARAMETER VALUE				REFERENCE
	WZ-DIST Travel distance (ft)	Dispersivity (ft)			
FS-LOCNAM			WZ-LDISP Longitudinal	WZ-TDISP Transverse	WZ-VDISP Vertical
Aquatic Foods	79200	7920	1580	9.2	Estimated ^(a)
Benton Co.	79200	7920	1580	9.2	Estimated
Franklin Co.	79200	7920	1580	9.2	Estimated
Walla Walla Co.	79200	7920	1580	9.2	Estimated
Kennewick	79200	7920	1580	9.2	Estimated
Pasco	79200	7920	1580	9.2	Estimated
Richland	79200	7920	1580	9.2	Estimated
Restricted	79200	7920	1580	9.2	Estimated

(a) Travel distance was estimated from Plate 1 in Dresel et al. (1993). Dispersivities were estimated based on Droppo et al. (1989).

TABLE 25. Surface Water Values for Accidental Release from Wet Transfer and Storage Facility to Ground

MEPAS PARAMETERS	PARAMETER	VALUE	REFERENCE
WW-VELC	River flow velocity (ft/s)	1.73	Whelan et al. (1987) ^(a)
WW-DEPTH	River depth (ft)	16	Estimated ^(b)
WW-WIDTH	River width (ft)	1300	Estimated
WW-DIST	Distance to closest receptor (ft)	328	Conservative value
WW-DISCHG	Discharge (ft ³ /s)	36000	Whelan et al. (1987) ^(c)
(a) Calculated from the depth, width, and discharge.			
(b) Estimated from Whelan et al. (1987), page 4.			
(c) The minimum allowable discharge at Priest Rapids Dam (Whelan et al. 1987, page 4).			

TABLE 26. Risks Associated with the Wet Transfer and Storage Fuel Facility Release Scenario

	CONSTITUENT							Max. Risk	*Time for Max. Risk
	Antimony-125	Cesium-137	Cobalt-60	Cobalt-57	Strontium-90	Yttrium-90	Tritium		
INGESTION/DERMAL									
Drinking Water	5.82E-24	2.75E-20	4.37E-16	1.94E-20	3.22E-19	2.19E-20	2.47E-17	4.37E-16	0-70
Finfish	5.34E-24	1.98E-19	2.33E-15	1.01E-19	2.60E-19	7.71E-22	7.99E-20	2.33E-15	0-70
Shellfish	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Leafy Vegetables	3.43E-24	1.33E-20	9.39E-16	3.99E-20	1.17E-18	5.29E-21	9.08E-19	9.39E-16	0-70
Other Vegetables	2.10E-24	1.17E-20	7.68E-16	2.82E-20	3.60E-18	1.15E-27	5.71E-18	7.68E-16	0-70
Meat	2.24E-25	1.80E-20	1.26E-15	5.23E-20	2.95E-20	2.38E-24	2.88E-18	1.26E-15	0-70
Milk	1.68E-25	4.41E-20	8.96E-16	3.85E-20	5.69E-19	4.43E-23	3.66E-18	8.96E-16	0-70
Swimming	3.87E-26	4.49E-23	7.57E-18	3.46E-22	2.00E-21	1.55E-22	3.07E-20	7.57E-18	0-70
Soil Ingestion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Special Foods	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
INHALATION									
Inhalation	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Showering	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
EXTERNAL RADIATION									
Boating	1.42E-26	3.47E-24	2.43E-18	1.13E-22	1.23E-25	4.56E-25	0.00E+00	2.43E-18	0-70
Shoreline	5.56E-24	8.31E-21	1.60E-15	1.12E-20	1.51E-21	7.23E-25	0.00E+00	1.60E-15	0-70
Ground	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Max. Risk	5.82E-24	1.98E-19	2.33E-15	1.01E-19	3.60E-18	2.19E-20	2.47E-17	2.33E-15	
Time of Max. Risk (yr)	0-70	210-280	0-70	280-350	140-210	140-210	0-70	0-70	
Maximum Risk for Scenario: 2.33E-15, Cobalt-60, Ingestion - Finfish N/A = Not Applicable.									

discharge target allowable concentrations (McCormack 1993).^(a) Contaminant migration is from the ponded water, through the vadose zone, through the saturated zone to the Columbia River, and in the Columbia River to receptors downstream. The flow discharge in the Columbia River is assumed to be under low-flow conditions of 1008 m³ (36,000 ft³/s) (Whelan et al. 1987), which represents the most conservative case for maximizing surface water concentrations. As a conservative assumption, the removal of water from the Columbia River is assumed to be 100 m (328 ft) downstream of the contaminant influent point to the river. The assessment will address recreational activities such as boating, swimming, and fishing on the Columbia River and use of the water as a drinking-water supply, for bathing, and for irrigation.

A summary of the data associated with the transport and fate modeling is presented in Tables 27 through 32:

- Table 27 presents a listing of the constituents and their source-term characteristics. A more detailed listing is presented in Appendix E.
- Table 28 presents the source-term release information, Darcian release rate, and source dimensions. A more detailed listing is presented in Appendix E.
- Table 29 presents the vadose zone characteristics. A more detailed listing is presented in Appendix E.
- Tables 30 and 31 present the saturated zone characteristics. A more detailed listing is presented in Appendix E.
- Table 32 presents the surface water characteristics. A more detailed listing is presented in Appendix E.

Table 7 presents the information associated with the exposure assessment, including intake and production rates, population locations and sizes, and exposure activities.

(a) McCormack, R. 1993. *Hanford Engineering Laboratories INEL SNF EIS Data*. Westinghouse Hanford Company, Richland, Washington (Draft).

TABLE 27. Constituents, Source-Term Flux, and Time Used for Release to the Treated Effluent Disposal Facility

MEPAS Parameters								
FS-CNAME Constituent ^(a)	WA-SUBKD Kd (mL/g)	Half-Life (yrs) ^(b)	WS-TLIFE Active Life (yrs) ^(a)	WS-NUM Number of Flux Rates	WS-CDATE Begin Date for Release ^(a)	WS-FLUX Release Rate (g or Ci/year) ^(d)	WS-TIME Duration of Known Flux (yrs)	WS-INVEN Constituent Inventory (g or Ci)
Aluminum	35300.0 ^(b)	n/a	4.0	2	01/01/00	6.23E+05	4.0	2.49E+06
Arsenic	5.86 ^(b)	n/a	4.0	2	01/01/00	6.23E+05	4.0	2.49E+06
Barium	10.0 ^(c)	n/a	4.0	2	01/01/00	1.25E+07	4.0	4.99E+07
Boron	0.0 ^(b)	n/a	4.0	2	01/01/00	1.99E+05	4.0	7.98E+05
Cadmium	5.0 ^(c)	n/a	4.0	2	01/01/00	1.25E+05	4.0	4.99E+05
Chromium VI	0.0 ^(c)	n/a	4.0	2	01/01/00	6.23E+05	4.0	2.49E+06
Copper	1.0 ^(c)	n/a	4.0	2	01/01/00	1.25E+07	4.0	4.99E+07
Iron	10.0 ^(c)	n/a	4.0	2	01/01/00	3.74E+06	4.0	1.50E+07
Lead	10.0 ^(c)	n/a	4.0	2	01/01/00	6.23E+05	4.0	2.49E+06
Magnesium	70.0 ^(b)	n/a	4.0	2	01/01/00	1.96E+05	4.0	7.83E+05
Mercury	5.0 ^(c)	n/a	4.0	2	01/01/00	2.49E+04	4.0	9.97E+04
Potassium	0.0 ^(b)	n/a	4.0	2	01/01/00	8.96E+06	4.0	3.59E+07
Selenium	0.0 ^(c)	n/a	4.0	2	01/01/00	1.25E+05	4.0	4.99E+05
Silver	10.0 ^(c)	n/a	4.0	2	01/01/00	6.23E+05	4.0	2.49E+06
Sodium	1.0 ^(c)	n/a	4.0	2	01/01/00	2.58E+07	4.0	1.03E+08
Strontium	7.0 ^(c)	n/a	4.0	2	01/01/00	1.13E+06	4.0	4.53E+06
Uranium	0.0 ^(c)	n/a	4.0	2	01/01/00	7.35E+05	4.0	2.94E+06
Zinc	3.0 ^(c)	n/a	4.0	2	01/01/00	6.23E+07	4.0	2.49E+08
Ammonia	0.0 ^(b)	n/a	4.0	2	01/01/00	1.62E+07	4.0	6.48E+07
Nitrate	0.0 ^(c)	n/a	4.0	2	01/01/00	6.43E+06	4.0	2.57E+07

TABLE 27. (contd)

MEPAS Parameters								
FS-CNAME Constituent ^(a)	WA-SUBKD Kd (mL/g)	Half-Life (yrs) ^(b)	WS-TLIFE Active Life (yrs) ^(a)	WS-NUM Number of Flux Rates	WS-CDATE Begin Date for Release ^(a)	WS-FLUX Release Rate (g or Ci/year) ^(d)	WS-TIME Duration of Known Flux (yrs)	WS-INVEN Constituent Inventory (g or Ci)
Silicate	5.0 ^(a)	n/a	4.0	2	01/01/00	3.20E+07	4.0	1.28E+08
Sulfate	0.0 ^(c)	n/a	4.0	2	01/01/00	3.12E+09	4.0	1.25E+10
Chloroform	0.0 ^(a)	n/a	4.0	2	01/01/00	7.48E+04	4.0	2.99E+05
Fluoride	0.0 ^(c)	n/a	4.0	2	01/01/00	2.49E+07	4.0	9.97E+07
Am-241	10.0 ^(c)	4.33E+02	4.0	2	01/01/00	1.28E-03	4.0	5.14E-03
C-14	0.0 ^(c)	5.72E+03	4.0	2	01/01/00	2.49E+01	4.0	9.97E+01
Cs-137	10.0 ^(c)	3.01E+01	4.0	2	01/01/00	2.49E+00	4.0	9.97E+00
H-3	0.0 ^(c)	1.23E+01	4.0	2	01/01/00	2.85E+00	4.0	1.14E+01
Pu-238	10.0 ^(c)	8.79E+01	4.0	2	01/01/00	1.99E-02	4.0	7.98E-02
Pu-239	10.0 ^(c)	2.41E+04	4.0	2	01/01/00	1.50E-02	4.0	5.98E-02
U-234	0.0 ^(c)	2.45E+05	4.0	2	01/01/00	4.99E-01	4.0	1.99E+00
U-238	0.0 ^(c)	4.46E+09	4.0	2	01/01/00	4.99E-01	4.0	1.99E+00

^(a) Strenge et al. (1989).
^(b) McCormack (1993). Because butylated hydroxytoluene is not in the MEPAS constituent database (Strenge et al. 1987), this constituent was not simulated.
^(c) Table B.2 in Serne and Wood (1990).
^(d) Contaminant discharge rates are based on an inflow to the TEF of 6261 gpm (the maximum capacity based on dimensions of 527' by 527' and a Darcy infiltration rate of 4.34 ft/day) and the Discharge Target concentrations provided in McCormack (1993). The units in this table are in ug/L unless otherwise noted.

TABLE 28. Source-Term Release, Timing, and Source Dimension Parameter Values Used for Release to the Treated Effluent Disposal Facility

MEPAS PARAMETER	PARAMETER	VALUE	REFERENCE
WS-DATE	Starting date of the release unit	01/01/00	McCormack (1993) ^(a)
WS-TDISC	Starting date for discounting	01/01/00	McCormack (1993)
WS-TRISK	Starting date for risk	01/01/00	N/A
WS-LENGTH	Length of site (ft)	527	Kaiser Engineering Hanford (KEH) ^(b)
WS-WIDTH	Width of site (ft)	527	KEH
WS-LEACHV	Waste liquid infiltration rate (ft/d)	4.34	PEIS ^(c) and Davis et al. (1993) ^(d)
<p>(a) McCormack, R. 1993. <i>Hanford Engineering Laboratories INEL SNF EIS Data</i>. Westinghouse Hanford Company, Richland, Washington (Draft).</p> <p>(b) Dave Messinger, TEDF design engineer, personal communication (from Engineering Sheet H2-815110, Sheet 1 of 1).</p> <p>(c) The U.S. Department of Energy complex-wide Programmatic Environmental Impact Statement environmental setting database associated with the Hanford installation.</p> <p>(d) From PEIS, but very similar to the calibrated value in Davis et al. (1993).</p> <p>N/A = Not Applicable.</p>			

A summation of the exposure and health effects analysis is presented in Tables 33 through 35 for each constituent and exposure pathway. In addition to parent radionuclides, results associated with decay products are also presented. The decay products include ²³⁷Np, ²³³Pa, ²³³U, ²³⁴U, ²³⁰Th, and ²³⁵U.

Table 33 presents the radionuclide risks in terms of the number of fatalities, Table 34 presents the chemical carcinogens in terms of incidence

TABLE 29. Partially Saturated Zone Parameter Values Used for Release to the Treated Effluent Disposal Facility

MEPAS PARAMETER	PARAMETER	PARAMETER VALUES			REFERENCE
		PSZ (a) 1 of 3 layers	PSZ 2 of 3 layers	PSZ 3 of 3 layers	
WP-CLASS	Soil classification in PSZ	Sand	Sand	Sand	PEIS (b)
WP-SAND	% sand in PSZ	90	95	90	PEIS
WP-SILT	% silt in PSZ	9	3	9	PEIS
WP-CLAY	% clay in PSZ	1	2	1	PEIS
WP-OMC	% organic matter content in PSZ	0	0	0	PEIS
WP-IRON	% iron and aluminum in PSZ	2	2	2	PEIS
WP-PH	pH of the pore water in PSZ	8.5	8.5	8.5	PEIS
WP-THICK	Thickness of PSZ (ft)	33.0	164.0	62.0	PEIS
WP-BULKD	Bulk density of PSZ (g/cm ³)	1.76	1.60	1.76	PEIS
WP-TOTPOR	Total porosity of PSZ (%)	36.0	42.0	36.0	PEIS
WP-FIELD	Field capacity of PSZ (%)	19.0	8.5	19.0	PEIS
WP-LDISP	Longitudinal dispersivity of PSZ (ft)	0.330	1.64	0.62	PEIS
WP-CONduc	Saturated hydraulic con- ductivity (ft/d)	4.34	14.2	4.34	PEIS
(a) PSZ refers to partially saturated zone. (b) The U.S. Department of Energy complex-wide Programmatic Environmental Impact Statement environmental setting database associated with the Hanford installation.					

TABLE 30. Saturated Zone Values Used for Release to the Treated Effluent Disposal Facility

MEPAS PARAMETER	PARAMETER	VALUES	REFERENCE
WZ-CLASS	Soil classification in SZ ^(a)	Loamy sand	PEIS ^(b)
WZ-SAND	% sand in SZ	86.0	PEIS
WZ-SILT	% silt in SZ	12.0	PEIS
WZ-CLAY	% clay in SZ	2.0	PEIS
WZ-OMC	% organic matter content in SZ	0.0	PEIS
WZ-IRON	% iron and aluminum in SZ	0.0	PEIS
WZ-PH	pH of the pore water in SZ	7.7	PEIS
WZ-THICK	Thickness of SZ (ft)	30.0	PEIS
WZ-BULKD	Bulk density of SZ (g/cm ³)	1.64	PEIS
WZ-TOTPOR	Total porosity of SZ (%)	18.0	PEIS
WZ-EFFPOR	Effective porosity of SZ (%)	10.0	PEIS
WZ-PVELOC	Pore water velocity of SZ (ft/d)	10.8	PEIS
<p>(a) SZ = saturated zone.</p> <p>(b) The U.S. Department of Energy complex-wide Programmatic Environmental Impact Statement environmental setting database associated with the Hanford installation.</p>			

TABLE 31. Parameter Values Used for Release to the Treated Effluent Disposal Facility

RECEPTOR LOCATION	PARAMETER VALUE				REFERENCE
	WZ-DIST Travel distance (ft)	Dispersivity (ft)			
		WZ-LDISP Longitudinal	WZ-TDISP Transverse	WZ-VDISP Vertical	
FS-LOCNAM					
Aquatic Foods	42240.0	4224.0	844.8	4.9	Estimated ^(a)
Benton Co.	42240.0	4224.0	844.8	4.9	Estimated
Franklin Co.	42240.0	4224.0	844.8	4.9	Estimated
Walla Walla Co.	42240.0	4224.0	844.8	4.9	Estimated
Kennewick	42240.0	4224.0	844.8	4.9	Estimated
Pasco	42240.0	4224.0	844.8	4.9	Estimated
Richland	42240.0	4224.0	844.8	4.9	Estimated
Restricted	42240.0	4224.0	844.8	4.9	Estimated
(a) Travel distance was estimated from Plate 1 in Dresel et al. (1993). Dispersivities were estimated based on Droppo et al. (1989).					

TABLE 32. Surface Water Parameter Values Used for Release to the Treated Effluent Disposal Facility

MEPAS PARAMETERS	PARAMETER	VALUE	REFERENCE
WO-RIVLEN	River length adjacent to release unit (ft)	1.0	Assumed
WW-VELC	River flow velocity (ft/s)	1.73	Whelan et al. (1987) ^(a)
WW-DEPTH	River depth (ft)	16	Estimated ^(b)
WW-WIDTH	River width (ft)	1300	Estimated
WW-DIST	Distance to closest receptor (ft)	328	Conservative value
WW-DISCHG	Discharge (ft ³ /s)	36000	Whelan et al. (1987) ^(c)
<p>(a) Calculated from the depth, width, and discharge. (b) Estimated from Whelan et al. (1987), page 4. (c) The minimum allowable discharge at Priest Rapids Dam (Whelan et al. 1987, page 4).</p>			

of cancer, and Table 35 presents the chemical noncarcinogens in terms of the ratio of the individual dose to the reference dose. Tables 33 and 34 indicate that maximum radionuclide and chemical carcinogenic risks are less than 10^{-6} for all of the constituents through all of the exposure routes. Likewise, Table 35 indicates that noncarcinogenic chemical individual doses are below their respective reference doses, except chromium VI, which has a dose just above the reference dose (a factor of 1.47). Chromium VI had an assigned distribution coefficient (K_d) of zero (Serne and Wood 1990), representing the most mobile condition.

TABLE 33. Risks from Radioactive Constituents Associated with Releases to the Treated Effluent Disposal Facility

	CONSTITUENT														
	Americium-241	Neptunium-237	Protactinium-233	Uranium-233	Carbon-14	Calcium-137	Plutonium-238	Uranium-234	Thorium-230	Plutonium-239	Uranium-235		Uranium-238	Max. Risk	Time for Max. Risk (yr)
INGESTION/DERMAL															
Drinking Water	1.1E-12	1.6E-15	1.3E-18	5.0E-19	2.8E-09	2.0E-16	1.2E-13	5.1E-09	8.9E-13	7.8E-11	9.2E-18	4.9E-12	4.6E-09	5.1E-09	0-70
Finfish	1.2E-12	1.9E-15	5.1E-20	1.1E-19	4.2E-08	1.4E-15	1.4E-13	1.2E-09	4.1E-13	9.1E-11	2.1E-18	1.6E-14	1.1E-09	4.2E-08	0-70
Shellfish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A
Leafy Vegetables	6.4E-13	9.6E-16	5.1E-19	3.0E-19	6.2E-09	9.5E-17	7.0E-14	3.1E-09	5.3E-13	4.7E-11	5.6E-18	1.8E-13	2.8E-09	6.2E-09	0-70
Other Vegetables	4.1E-13	6.6E-16	7.3E-20	2.1E-19	3.9E-08	8.3E-17	4.5E-14	2.2E-09	3.4E-13	3.0E-11	3.9E-18	1.1E-12	2.0E-09	3.9E-08	0-70
Meat	1.5E-16	3.5E-18	2.5E-22	4.0E-21	1.4E-08	1.3E-16	2.3E-18	4.1E-11	2.1E-16	1.5E-15	7.4E-20	5.8E-13	3.7E-11	1.4E-08	0-70
Milk	1.3E-16	2.3E-18	1.3E-21	8.7E-20	4.9E-09	3.1E-16	3.4E-18	8.9E-10	1.3E-15	2.3E-15	1.6E-18	7.3E-13	8.1E-10	4.9E-09	0-70
Swimming	1.9E-15	2.8E-18	4.6E-21	8.8E-22	3.5E-12	3.2E-19	2.1E-16	9.0E-12	1.6E-15	1.4E-13	1.7E-20	6.1E-15	8.1E-12	9.0E-12	0-70
Soil Ingestion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A
Special Foods	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A
INHALATION															
Inhalation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A
Showering	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A
EXTERNAL RADIATION															
Boating	8.7E-20	1.3E-22	1.2E-21	9.7E-27	6.4E-17	2.5E-20	8.5E-23	4.9E-17	1.0E-20	3.3E-20	1.2E-22	0	2.2E-17	6.4E-17	0-70
Shoreline	4.4E-16	5.7E-19	1.2E-20	6.8E-23	8.3E-13	5.9E-17	1.5E-18	7.4E-13	6.8E-17	4.5E-16	2.8E-19	0	5.5E-13	8.3E-13	0-70
Ground	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A
Max. Risk	1.2E-12	1.9E-15	1.3E-18	5.0E-19	4.2E-08	1.4E-15	1.4E-13	5.1E-09	8.9E-13	9.1E-11	9.2E-18	4.9E-12	4.6E-09	4.2E-08	
Time of Max. Risk (yr)	980-1050	1400-1470	1400-1470	1680-1750	0-70	350-420	560-630	0-70	0-70	1400-1470	1680-1750	0-70	0-70	0-70	
N/A = Not Applicable.															

TABLE 34. Risks from Carcinogenic Chemicals Associated with Releases to the Treated Effluent Disposal Facility

	CONSTITUENT				Max. Risk	Time for Max. Risk (yr)
	Arsenic	Cadmium	Chloroform	Chromium VI		
INGESTION/DERMAL						
Drinking Water	2.54E-09	N/A	4.43E-11	N/A	2.54E-09	840-910
Finfish	1.17E-09	N/A	1.27E-12	N/A	1.17E-09	840-910
Shellfish	0.00E+00	N/A	0.00E+00	N/A	0.00E+00	N/A
Leafy Vegetables	1.52E-09	N/A	9.92E-12	N/A	1.52E-09	840-910
Other Vegetables	1.01E-09	N/A	1.25E-11	N/A	1.01E-09	840-910
Meat	2.00E-10	N/A	1.88E-15	N/A	2.00E-10	840-910
Milk	4.44E-11	N/A	3.36E-15	N/A	4.44E-11	840-910
Swimming	6.15E-12	N/A	2.44E-12	N/A	6.15E-12	840-910
Soil Ingestion	0.00E+00	N/A	0.00E+00	N/A	0.00E+00	N/A
Special Foods	0.00E+00	N/A	0.00E+00	N/A	0.00E+00	N/A
INHALATION						
Inhalation	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Showering	0.00E+00	0.00E+00	1.03E-09	0.00E+00	1.03E-09	0-70
Max. Risk	2.54E-09	0.00E+00	1.03E-09	0.00E+00	2.54E-09	
Time of Max. Risk (yr)	840-910	N/A	0-70	N/A	840-910	
N/A = Not Applicable.						

5.2 SURFACE WATER: 105-KE AND 105-KW BASINS DIRECT RELEASE TO THE COLUMBIA RIVER SCENARIO

The direct discharge release scenario to the Columbia River at the 105-KE and 105-KW Basins under the No-Action Alternative is the same as the direct discharge scenario assumed under this alternative.

TABLE 35. Hazard Quotients and Indexes for Noncarcinogenic Chemicals Associated with Releases to the Treated Effluent Disposal Facility

	CONSTITUENT												
	Aluminum	Barium	Boron	Cadmium	Chromium-VI	Copper	Fluorine	Iron	Lead	Magnesium	Mercury	Potassium	Selenium
INGESTION/DERMAL													
Drinking Water	0.00E+00	3.55E-07	1.06E-07	1.87E-03	1.47E+00	3.52E-07	1.99E-05	1.15E-09	7.83E-07	8.33E-13	1.75E-07	6.91E-10	9.05E-07
Finfish	0.00E+00	2.25E-07	7.54E-11	1.94E-03	7.55E-01	9.44E-08	6.43E-07	3.63E-08	2.81E-07	1.34E-13	1.03E-06	2.48E-09	5.98E-07
Shellfish	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Leafy Vegetables	0.00E+00	1.47E-07	6.38E-08	1.43E-03	4.89E-01	3.00E-07	8.90E-06	2.35E-09	3.64E-07	5.23E-13	1.57E-07	4.83E-10	4.64E-07
Other Vegetables	0.00E+00	1.05E-07	1.53E-07	1.90E-03	3.22E-01	5.12E-07	9.15E-06	1.50E-09	2.37E-07	1.34E-12	2.40E-07	1.24E-09	3.54E-07
Meat	0.00E+00	1.46E-09	4.02E-09	5.56E-05	1.77E-01	2.21E-07	1.22E-05	3.09E-09	7.19E-09	2.09E-13	2.84E-06	7.73E-10	4.64E-07
Milk	0.00E+00	2.50E-08	6.38E-08	6.31E-04	3.58E-01	1.88E-07	2.89E-05	2.87E-10	4.45E-08	7.50E-13	3.03E-08	1.21E-09	8.94E-07
Swimming	0.00E+00	1.57E-09	1.66E-10	1.56E-05	7.04E-02	9.54E-10	3.12E-08	1.07E-11	1.08E-09	1.57E-15	3.00E-09	9.66E-13	7.07E-09
Soil Ingestion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Special Foods	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
INHALATION													
Inhalation	0.00E+00	0.00E+00	0.00E+00	N/A ^(a)	N/A	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Showering	0.00E+00	0.00E+00	0.00E+00	N/A	N/A	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Max. Risk	0.00E+00	3.55E-07	1.53E-07	1.94E-03	1.47E+00	5.12E-07	2.89E-05	3.63E-08	7.83E-07	1.34E-12	2.84E-06	2.48E-09	9.05E-07
Time of Max. Risk (yr)	N/A	1400-1470	0-70	700-770	2240-2310	140-210	0-70	1400-1470	1400-1470	6930-7000	700-770	0-70	0-70

TABLE 35. (contd)

	CONSTITUENT									Max. Risk	Time for Max. Risk (yr)
	Silver	Sodium	Strontium	Uranium	Zinc	Ammonia	Nitrate	Sulfate	Silicate		
INGESTION/DERMAL											
Drinking Water	1.75E-07	3.80E-09	1.04E-09	1.75E-05	5.34E-07	2.35E-05	1.84E-07	2.01E-06	7.34E-07	1.47E+00	0-70
Finfish	1.81E-09	1.36E-09	8.39E-10	3.88E-06	1.08E-05	0.00E+00	8.91E-05	4.86E-06	4.95E-09	7.55E-01	0-70
Shellfish	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Leafy Vegetables	1.02E-07	1.85E-09	3.79E-09	1.01E-05	8.60E-07	9.76E-06	2.20E-06	2.00E-06	2.55E-07	4.89E-01	0-70
Other Vegetables	6.52E-08	1.68E-09	1.17E-08	7.17E-06	2.28E-06	6.19E-06	1.35E-05	7.89E-06	1.63E-07	3.22E-01	0-70
Meat	2.01E-08	6.88E-09	9.52E-11	1.34E-07	6.93E-06	0.00E+00	1.76E-05	1.80E-05	6.72E-10	1.77E-01	0-70
Milk	9.96E-07	3.04E-08	1.84E-09	2.95E-06	3.03E-06	0.00E+00	6.29E-06	7.90E-06	1.25E-08	3.58E-01	0-70
Swimming	9.74E-10	6.46E-12	7.56E-12	1.40E-07	1.86E-09	3.67E-08	2.88E-10	3.14E-09	2.09E-08	7.04E-02	0-70
Soil Ingestion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Special Foods	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
INHALATION											
Inhalation	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Showering	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Max. Risk	9.96E-07	3.04E-08	1.17E-08	1.75E-05	1.08E-05	2.35E-05	8.91E-05	1.80E-05	7.34E-07	1.47E+00	
Time of Max. Risk (yr)	1400-1470	0-70	980-1050	0-70	420-490	0-70	0-70	0-70	700-770	0-70	
(a) Not Applicable because risk values are used for inhalation and showering (see Table 34). Maximum Reference Dose Ratio for Scenario: 1.47E+00, Chromium VI, Drinking Water N/A = Not Applicable.											

6.0 IMPACTS OF 1992/1993 PLANNING BASIS ALTERNATIVE

The 1992/1993 Planning Basis Alternative would not include building an SNF facility. The SNF would continue to be managed in the current mode, which includes upgrades, fuel processing, and some transport to either the INEL or the Savannah River installation.

6.1 GROUNDWATER

Four groundwater scenarios are postulated for release to the subsurface environment. These scenarios are identical to the groundwater scenarios outlined under the Decentralization Alternative.

6.1.1 Wet Storage of Nuclear Fuels New Pool Storage Facility Accident Scenario

The release scenario associated with the Wet Storage of Nuclear Fuels New Pool Storage Facility Accident Scenario under the Decentralization Alternative represents the same scenario that was assessed under this alternative.

6.1.2 105-KE and 105-KW Basins Accidental Release Scenario

The accident scenario at the 105-KE and 105-KW Basins under the Decentralization Alternative is the same as the 105-KE and 105-KW Basins accident scenario described under the No-Action Alternative.

6.1.3 Wet Storage/Fuel Transfer Facility Scenario

The release scenario associated with the Wet Storage/Fuel Transfer Facility under the Decentralization Alternative represents the same scenario that was assessed under this alternative.

6.1.4 Process and Package of All Fuel: Shear, Leach, and Solvent Extraction Facility Scenario

The release scenario associated with the Dry Storage of All Fuel: Shear, Leach, and Calcine All Fuel Facility; Stabilize DP Fuel under the Decentralization Alternative represents the same scenario that was assessed under this alternative.

6.2 SURFACE WATER: 105-KE AND 105-KW BASINS DIRECT RELEASE TO THE COLUMBIA RIVER SCENARIO

The direct-discharge release scenario to the Columbia River at the 105-KE and 105-KW Basins under the No-Action Alternative is the same as the direct discharge scenario assumed under this alternative.

7.0 IMPACTS OF REGIONALIZATION ALTERNATIVE

The Regionalization Alternative would safely store at Hanford the existing Hanford SNF and some SNF from other DOE installations. The type of SNF to be processed and managed at Hanford would depend on overall DOE needs and inventories of SNF currently being stored at Hanford and other DOE installations. Existing facilities would be upgraded and new storage systems would be constructed, as in the Decentralization Alternative.

7.1 GROUNDWATER

Four groundwater scenarios are postulated for release to the subsurface environment. Two are accident scenarios, and two scenarios represent releases to the 200 Area TEDF. These scenarios are identical to the groundwater scenarios outlined under the Decentralization Alternative.

7.1.1 Wet Storage of Nuclear Fuels New Pool Storage Facility Accident Scenario

The release scenario associated with the Wet Storage of Nuclear Fuels New Pool Storage Facility Accident Scenario under the Decentralization Alternative represents the same scenario that was assessed under this alternative.

7.1.2 105-KE and 105-KW Basins Accidental Release Scenario

The accident scenario at the 105-KE and 105-KW Basins under the Decentralization Alternative is the same as the 105-KE and 105-KW Basins accident scenario described under the No-Action Alternative.

7.1.3 Wet Storage/Fuel Transfer Facility Scenario

The release scenario associated with the Wet Storage/Fuel Transfer Facility Scenario under the Decentralization Alternative represents the same scenario that was assessed under this alternative.

7.1.4 Process and Package of All Fuel: Shear, Leach, and Solvent Extraction Facility Scenario

The release scenario associated with the Dry Storage of All Fuel: Shear, Leach, and Calcine All Fuel Facility; Stabilize DP Fuel under the Decentralization Alternative represents the same scenario that was assessed under this alternative.

7.2 SURFACE WATER: 105-KE AND 105-KW BASINS DIRECT RELEASE TO THE COLUMBIA RIVER SCENARIO

The direct discharge release scenario to the Columbia River at the 105-KE and 105-KW Basins under the No-Action Alternative is the same as the direct discharge scenario assumed under this alternative.

8.0 IMPACTS OF CENTRALIZATION ALTERNATIVE

The Centralization Alternative would either direct all Hanford SNF shipments to another off-site location where all SNF would be centralized, or Hanford would become the central repository for all DOE SNF.

The New Fuel Drying and Passivation Facility is the only additional option associated with the Centralization Alternative. The release scenario associated with the Dry Storage of All Fuel: Shear, Leach, and Calcine All Fuel Facility; Stabilize DP Fuel under the Decentralization Alternative represents the same scenario that was assessed under this alternative, except the scenario is assumed to occur for 4 years from 2000 through 2004.

9.0 REFERENCES

- Davis, J. D., D. B. Barnett, L. C. Swanson, W. J. McMahon, and C. D. Palmares. 1993. *Site Characterization Report: Results of Detailed Evaluation of the Suitability of the Site Proposed for Disposal of 200 Areas Treated Effluent*. WHC-SD-EN-SE-004, Westinghouse Hanford Company, Richland, Washington.
- Dresel, P. E., D. R. Newcomer, J. C. Evans, W. D. Webber, F. A. Spane, Jr., R. G. Raymond, and B. E. Opitz. 1993. *Hanford Site Groundwater Monitoring for 1992*. PNL-8716, Pacific Northwest Laboratory, Richland, Washington.
- Droppo, J. G. Jr., D. L. Streng, J. W. Buck, B. L. Hoopes, R. D. Brockhouse, M. B. Walter, and G. Whelan. 1989. *Multimedia Environmental Pollutant Assessment System Application Guidance, Volume 2 -- Guidelines for Evaluating MEPAS Input Parameters*. PNL-7216, Pacific Northwest Laboratory, Richland, Washington.
- Evans, J. C., R. W. Bryce, D. R. Sherwood, M. L. Kemner, and D. R. Newcomer. 1989. *Hanford Site Ground-Water Monitoring for July Through December 1988*. PNL-7120, Pacific Northwest Laboratory, Richland, Washington.
- Gilmore, T. J., D. R. Newcomer, S. K. Wurster, and F. A. Spane. 1992. *Calculation of Groundwater Discharge to the Columbia River in the 100-N Area*. PNL-8057, Pacific Northwest Laboratory, Richland, Washington.
- Serne, R. J. and M. I. Wood. 1990. *Hanford Waste-Form Release and Sediment Interaction: A Status Report with Rationale and Recommendations for Additional Studies*. PNL-7297, Pacific Northwest Laboratory, Richland, Washington.
- Streng, D. L., S. R. Peterson, and S. Sager. 1989. *Chemical Data Bases for the Multimedia Environmental Pollutant Assessment System (MEPAS): Version 1*. PNL-7145, Pacific Northwest Laboratory, Richland, Washington.
- Whelan, G., D. W. Damschen and R. D. Brockhaus. 1987. *Columbia River Statistical Update Model - Version 4.0 (COLSTAT): Background Documentation and User's Guide*. PNL-6041, Pacific Northwest Laboratory, Richland, Washington.
- Woodruff, R. K. and R. W. Hanf. 1992. *Hanford Site Environmental Report for Calendar Year 1991*. PNL-8148, Pacific Northwest Laboratory, Richland, Washington.

APPENDIX A

105-KE AND 105-KW BASINS ACCIDENTAL RELEASE

*****4/17/1993 VERSION I1ldarc*****

RADCON -- WATERBORNE TRANSPORT COMPONENT for the Multimedia
Environmental Pollutant Assessment System (MEPAS):
Models movement of radionuclides and other chemicals
in groundwater, surface water, and overland pathways.

Battelle, Pacific Northwest Laboratory (PNL)
P.O. Box 999, Richland, WA 99352

Developed for the U.S. Department of Energy

Input file for this run is 105KLOW.WIN

Modeling Scenario Number 1

Name of Facility = DOE Hanford
Name of Waste Unit = PEIS 100W Area GW->SW Scenario
Transport Scenario = SS-T3 Surface soil >Groundwater
Exposure Scenario = SW-E2
Usage Location Number = 6
Usage Location Medium = 3
Usage Location Name =

TLIFE is the duration of release for each contaminant expressed in years.
TDIFF is the time difference in years between the current date and the
date when contaminants were first released into the environment.

Constituent Name	TLIFE (years)	TDIFF (years)	TFINAL (years)
CESIUM-1	9.000E-04-3.118E+00		7.001E+03
CESIUM-1	9.000E-04-3.118E+00		7.001E+03
COBALT-6	9.000E-04-3.118E+00		7.001E+03
PLUTONIUM	9.000E-04-3.118E+00		7.001E+03
PLUTONIUM	9.000E-04-3.118E+00		7.001E+03
STRONTIUM	9.000E-04-3.118E+00		7.001E+03
TRITIUM	9.000E-04-3.118E+00		7.001E+03

#	Constituent	NUM
1	CESIUM-1	2
2	CESIUM-1	2
3	COBALT-6	2
4	PLUTONIUM	2
5	PLUTONIUM	2
6	STRONTIUM	2
7	TRITIUM	2

Known Infiltration Rate to Unsaturated Zone (VLEACH) = 2.63E+01 cm/day

Source-Term Type (ISTYPE) = 1
Source-Term Flux Boundary Conditions (ISOURC) = 2
Liquid Impoundment Index (IPOND) = 2
Source-Term Decay Index (IDECAY) = 1
Direct Discharge Surface Water Index (IDDSW) = 0
Number of Parent Constituents (NUMCON) = 7

Source-Term Configuration (ISCONF) = 4
Number of Media (NMED) = 4
Number of Integration Time Steps (NTIMES) = 40

Medium # 1 Equals Medium Type (MED) # 1
Medium # 2 Equals Medium Type (MED) # 1
Medium # 3 Equals Medium Type (MED) # 4
Medium # 4 Equals Medium Type (MED) # 5

Length of Release Unit (AL1 OR CLEN) = 1.61E+04 cm
Width of release Unit (B1) = 1.61E+04 cm

Water concentration units are: ATTO (1.000E-18) Ci OR g

Constituent	CAS ID	Half-Life (Years)	Initial Conc.	Surface Equilibrium Coeff. (ml/g)	Solubility limit (g/ml)	Constituent Inventory (g OR Ci)
CESIUM-1	CS134	2.06E+00	-9.99E+01	-9.99E+01	1.00E+23	3.06E-03
CESIUM-1	CS137	3.01E+01	-9.99E+01	-9.99E+01	1.00E+23	2.17E-01
COBALT-6	CO60	5.28E+00	-9.99E+01	-9.99E+01	1.00E+23	1.28E-03
PLUTONIUM	PU238	8.79E+01	-9.99E+01	-9.99E+01	1.00E+23	5.82E-06
URANIUM-	U234	2.45E+05				
THORIUM-	TH230	7.69E+04				
PLUTONIUM	PU239	2.41E+04	-9.99E+01	-9.99E+01	1.00E+23	3.06E-05
URANIUM-	U235	7.04E+08				
STRONTIUM	SR90	2.88E+01	-9.99E+01	-9.99E+01	1.00E+23	1.09E+00
YTTRIUM-	Y90	7.39E+03				
TRITIUM	H3	1.23E+01	-9.99E+01	-9.99E+01	1.00E+23	4.73E-01

Constituent Flux (g/yr or Ci/yr) and Time (Years) at the Release Unit

Constituent #	Flux	Time	Constituent #	Flux	Time
1 1	3.40E+00	0.000E+00	1 2	3.40E+00	9.000E-04
2 1	2.41E+02	0.000E+00	2 2	2.41E+02	9.000E-04
3 1	1.42E+00	0.000E+00	3 2	1.42E+00	9.000E-04
4 1	6.47E-03	0.000E+00	4 2	6.47E-03	9.000E-04
5 1	3.40E-02	0.000E+00	5 2	3.40E-02	9.000E-04
6 1	1.21E+03	0.000E+00	6 2	1.21E+03	9.000E-04
7 1	5.26E+02	0.000E+00	7 2	5.26E+02	9.000E-04

New Constituent Flux (g/yr or Ci/yr) and Time (Years) at the Release Unit

Constituent #	Flux	Time	Constituent #	Flux	Time
1 1	3.40E+00	0.000E+00	1 2	3.40E+00	8.999E-04
2 1	2.41E+02	0.000E+00	2 2	2.41E+02	9.000E-04
3 1	1.42E+00	0.000E+00	3 2	1.42E+00	9.000E-04
4 1	6.47E-03	0.000E+00	4 2	6.47E-03	9.000E-04
5 1	3.40E-02	0.000E+00	5 2	3.40E-02	9.000E-04
6 1	1.21E+03	0.000E+00	6 2	1.21E+03	9.000E-04
7 1	5.26E+02	0.000E+00	7 2	5.26E+02	9.000E-04

The New Duration of Time that Constituents are Released from the Release Unit

#	Constituent	New TLIFE (Years)
1	CESIUM-1	8.999E-04
2	CESIUM-1	9.000E-04
3	COBALT-6	9.000E-04
4	PLUTONIUM	9.000E-04
5	PLUTONIUM	9.000E-04
6	STRONTIUM	9.000E-04
7	TRITIUM	9.000E-04

Modeling Medium # = 1
Medium Type (MED) = 1
Source Configuration = 4
Source Term Discharge Type = 1
PARTIALLY SATURATED ZONE

Thickness of Unsaturated Layer (H1) = 1.83E+03 cm
X-Direction Dispersivity (A1) = 1.83E+01 cm
Bulk Density (R2) = 2.00E+00 g/cm**3

Total Porosity (AN4) = 3.00E-01 (fraction)
 Field Capacity (AN5) = 9.00E-02 (fraction)
 Permeability (X2) = 1.22E+03 cm/day
 Leach Rate (VLEACH) = 2.63E+01 cm/day
 Soil-Type Coefficient (A2) = 4.05E+00

Moisture Content (AN5) = 21.24 %
 Infiltration Rate (U) = 1.24E+02 cm/day

NO	PARENT	HALFLIFE YEARS	KD CC/GM	RETARDATION FACTOR
1	CESIUM-1	2.06200E+00	1.00000E+01	9.51832E+01
2	CESIUM-1	3.01200E+01	1.00000E+01	9.51832E+01
3	COBALT-6	5.28400E+00	0.00000E+00	1.00000E+00
4	PLUTONIUM	8.78900E+01	1.00000E+01	9.51832E+01
5	PLUTONIUM	2.41200E+04	1.00000E+01	9.51832E+01
6	STRONTIUM	2.87500E+01	7.00000E+00	6.69282E+01
7	TRITIUM	1.22900E+01	0.00000E+00	1.00000E+00

Constituent	CAS ID	Half-Life (Years)	Initial Conc.	Surface Equilibrium Coeff. (ml/g)	Solubility limit (g/ml)	Constituent Inventory (g OR Ci)
CESIUM-1	CS134	2.06E+00	-9.99E+01	-9.99E+01	1.00E+23	3.06E-03
CESIUM-1	CS137	3.01E+01	-9.99E+01	-9.99E+01	1.00E+23	2.17E-01
COBALT-6	CO60	5.28E+00	-9.99E+01	-9.99E+01	1.00E+23	1.28E-03
PLUTONIUM	PU238	8.79E+01	-9.99E+01	-9.99E+01	1.00E+23	5.82E-06
PLUTONIUM	PU239	2.41E+04	-9.99E+01	-9.99E+01	1.00E+23	3.06E-05
STRONTIUM	SR90	2.88E+01	-9.99E+01	-9.99E+01	1.00E+23	1.09E+00
TRITIUM	H3	1.23E+01	-9.99E+01	-9.99E+01	1.00E+23	4.73E-01

Computed Initial at the Release Unit (DMAX) = 1.36E-12

Computed Initial at the Release Unit (DMAX) = 9.69E-11

Computed Initial at the Release Unit (DMAX) = 5.72E-13

Computed Initial at the Release Unit (DMAX) = 2.60E-15

Computed Initial at the Release Unit (DMAX) = 1.36E-14

Computed Initial at the Release Unit (DMAX) = 4.84E-10

Computed Initial at the Release Unit (DMAX) = 2.11E-10

Modeling Medium # = 2
 Medium Type (MED) = 1
 Source Configuration = 4
 Source Term Discharge Type = 1
 PARTIALLY SATURATED ZONE

Thickness of Unsaturated Layer (H1) = 3.05E+02 cm
 X-Direction Dispersivity (A1) = 3.05E+00 cm
 Bulk Density (R2) = 1.90E+00 g/cm**3
 Total Porosity (AN4) = 3.00E-01 (fraction)
 Field Capacity (AN5) = 1.20E-01 (fraction)
 Permeability (X2) = 1.81E+02 cm/day
 Leach Rate (VLEACH) = 7.21E-02 cm/day
 Soil-Type Coefficient (A2) = 4.38E+00

Moisture Content (AN5) = 25.46 %

Infiltration Rate (U) = 1.03E+02 cm/day

NO	PARENT	DECAY RATE 1/YEARS	KD CC/GM	RETARDATION FACTOR
1	CESIUM-1	3.36153E-01	1.00000E+01	7.56278E+01
2	CESIUM-1	2.30129E-02	1.00000E+01	7.56278E+01
3	COBALT-6	1.31178E-01	0.00000E+00	1.00000E+00
4	PLUTONIUM	7.88653E-03	1.00000E+01	7.56278E+01
5	PLUTONIUM	2.87374E-05	1.00000E+01	7.56278E+01
6	STRONTIUM	2.41095E-02	7.00000E+00	5.32394E+01
7	TRITIUM	5.63993E-02	0.00000E+00	1.00000E+00

Modeling Medium # = 3
Medium Type (MED) = 4
Source Configuration = 4
Source Term Discharge Type = 1
SATURATED ZONE AT A RIVER

NO	PARENT	DECAY RATE 1/YEARS	KD CC/GM	RETARDATION FACTOR
1	CESIUM-1	3.36153E-01	1.00000E+01	1.73727E+02
2	CESIUM-1	2.30129E-02	1.00000E+01	1.73727E+02
3	COBALT-6	1.31178E-01	0.00000E+00	1.00000E+00
4	PLUTONIUM	7.88653E-03	1.00000E+01	1.73727E+02
5	PLUTONIUM	2.87374E-05	1.00000E+01	1.73727E+02
6	STRONTIUM	2.41095E-02	7.00000E+00	1.21909E+02
7	TRITIUM	5.63993E-02	0.00000E+00	1.00000E+00

Groundwater Velocity (U) = 9.45E+00 cm/day
Aquifer Thickness (H1) = 1.07E+03 cm
X-Direction Dispersivity (A1) = 7.18E+03 cm
Y-Direction Dispersivity (A2) = 1.44E+03 cm
Z-Direction Dispersivity (A3) = 8.62E+00 cm
Bulk Density (R2) = 1.90E+00 g/cm**3
Total Porosity (AN4) = 3.00E-01 (fraction)
Effective Porosity (AN5) = 1.10E-01 (fraction)
Length of Burial Area (AL1) = 1.61E+04 cm
Width of Burial Area (B1) = 1.61E+04 cm
Depth of Release Unit Below Water Table (HW) = 0.00E+00 cm
Distance Downgradient from Center of Source (X2) = 7.18E+04 cm
Lateral Hydraulic Conductivity (HC) = 0.00E+00 cm/day

Modeling Medium # = 4
Medium Type (MED) = 5
Source Configuration = 4
Source Term Discharge Type = 1
SURFACE WATER ENVIRONMENT

Number of River Receptor Locations (NUMREC) = 8
Flow Velocity (U1) = 1.66E+09 cm/year
Depth of Flow (H1) = 4.88E+02 cm
Width of River (B1) = 3.96E+04 cm
Downstream Discharge at First Receptor (QNEW) = 3.22E+16 cm**3/year
Distance Downstream from Center of Source (X3) = 1.00E+04 cm

Uniform Mixing Distance = 4.30E+02 cm

Present Concentration for CESIUM-1 IS 0.000E+00(g/ml or Ci/ml)
Present Concentration for CESIUM-1 IS 0.000E+00(g/ml or Ci/ml)
Present Concentration for COBALT-6 IS 0.000E+00(g/ml or Ci/ml)

Present Concentration for PLUTONIUM IS 0.000E+00(g/ml or Ci/ml)
 Present Concentration for URANIUM- IS 0.000E+00(g/ml or Ci/ml)
 Present Concentration for THORIUM- IS 0.000E+00(g/ml or Ci/ml)
 Present Concentration for PLUTONIUM IS 0.000E+00(g/ml or Ci/ml)
 Present Concentration for URANIUM- IS 0.000E+00(g/ml or Ci/ml)
 Present Concentration for STRONTIUM IS 0.000E+00(g/ml or Ci/ml)
 Present Concentration for YTTRIUM- IS 0.000E+00(g/ml or Ci/ml)
 Present Concentration for TRITIUM IS 0.000E+00(g/ml or Ci/ml)

Maximum Constituent Concentrations:

CESIUM-1:	0.000E+00 (g/ml or Ci/ml) at	3.1 Years (1996)
CESIUM-1:	4.130E-30 (g/ml or Ci/ml) at	595.7 Years (2588)
COBALT-6:	1.827E-22 (g/ml or Ci/ml) at	16.4 Years (2009)
PLUTONIUM:	3.781E-30 (g/ml or Ci/ml) at	913.7 Years (2906)
URANIUM-:	6.060E-29 (g/ml or Ci/ml) at	2165.8 Years (4158)
THORIUM-:	1.105E-30 (g/ml or Ci/ml) at	2165.8 Years (4158)
PLUTONIUM:	1.026E-24 (g/ml or Ci/ml) at	2978.1 Years (4971)
URANIUM-:	3.415E-30 (g/ml or Ci/ml) at	3678.1 Years (5671)
STRONTIUM:	8.145E-28 (g/ml or Ci/ml) at	453.4 Years (2446)
YTTRIUM-:	8.147E-28 (g/ml or Ci/ml) at	453.4 Years (2446)
TRITIUM :	1.837E-19 (g/ml or Ci/ml) at	18.2 Years (2011)

Modeling Scenario Number 2

Name of Facility = DOE Hanford
 Name of Waste Unit = PEIS 100N Area GW->SW Scenario
 Transport Scenario = SS-T3 Surface soil >Groundwater
 Exposure Scenario = SW-E3 SW-E4 SW-E5
 Usage Location Number = 1
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

CESIUM-1:	0.000E+00 (g/ml or Ci/ml) at	3.1 years (1996)
CESIUM-1:	4.987E-30 (g/ml or Ci/ml) at	595.7 years (2588)
COBALT-6:	2.206E-22 (g/ml or Ci/ml) at	16.4 years (2009)
PLUTONIUM:	4.566E-30 (g/ml or Ci/ml) at	913.7 years (2906)
URANIUM-:	7.317E-29 (g/ml or Ci/ml) at	2165.8 years (4158)
THORIUM-:	1.334E-30 (g/ml or Ci/ml) at	2165.8 years (4158)
PLUTONIUM:	1.239E-24 (g/ml or Ci/ml) at	2978.1 years (4971)
URANIUM-:	4.123E-30 (g/ml or Ci/ml) at	3678.1 years (5668)
STRONTIUM:	9.834E-28 (g/ml or Ci/ml) at	453.4 years (2443)
YTTRIUM-:	9.837E-28 (g/ml or Ci/ml) at	453.4 years (2443)
TRITIUM :	2.218E-19 (g/ml or Ci/ml) at	18.2 years (2008)

Modeling Scenario Number 3

Name of Facility = DOE Hanford
 Name of Waste Unit = PEIS 100N Area GW->SW Scenario

Transport Scenario = SS-T3 Surface soil >Groundwater
Exposure Scenario = SW-E3 SW-E4 SW-E5
Usage Location Number = 7
Usage Location Medium = 3
Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

CESIUM-1:	0.000E+00 (g/ml or Ci/ml) at	3.1 years (1996)
CESIUM-1:	4.987E-30 (g/ml or Ci/ml) at	595.7 years (2588)
COBALT-6:	2.206E-22 (g/ml or Ci/ml) at	16.4 years (2009)
PLUTONIUM:	4.566E-30 (g/ml or Ci/ml) at	913.7 years (2906)
URANIUM:	7.317E-29 (g/ml or Ci/ml) at	2165.8 years (4158)
THORIUM:	1.334E-30 (g/ml or Ci/ml) at	2165.8 years (4158)
PLUTONIUM:	1.239E-24 (g/ml or Ci/ml) at	2978.1 years (4971)
URANIUM:	4.123E-30 (g/ml or Ci/ml) at	3678.1 years (5668)
STRONTIUM:	9.834E-28 (g/ml or Ci/ml) at	453.4 years (2443)
YTTRIUM:	9.837E-28 (g/ml or Ci/ml) at	453.4 years (2443)
TRITIUM:	2.218E-19 (g/ml or Ci/ml) at	18.2 years (2008)

Modeling Scenario Number 4

Name of Facility = DOE Hanford
Name of Waste Unit = PEIS 100N Area GW->SW Scenario
Transport Scenario = SS-T3 Surface soil >Groundwater
Exposure Scenario = SW-E1 SW-E6
Usage Location Number = 4
Usage Location Medium = 3
Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

CESIUM-1:	0.000E+00 (g/ml or Ci/ml) at	3.1 years (1996)
CESIUM-1:	4.987E-30 (g/ml or Ci/ml) at	595.7 years (2588)
COBALT-6:	2.206E-22 (g/ml or Ci/ml) at	16.4 years (2009)
PLUTONIUM:	4.566E-30 (g/ml or Ci/ml) at	913.7 years (2906)
URANIUM:	7.317E-29 (g/ml or Ci/ml) at	2165.8 years (4158)
THORIUM:	1.334E-30 (g/ml or Ci/ml) at	2165.8 years (4158)
PLUTONIUM:	1.239E-24 (g/ml or Ci/ml) at	2978.1 years (4971)
URANIUM:	4.123E-30 (g/ml or Ci/ml) at	3678.1 years (5668)
STRONTIUM:	9.834E-28 (g/ml or Ci/ml) at	453.4 years (2443)
YTTRIUM:	9.837E-28 (g/ml or Ci/ml) at	453.4 years (2443)
TRITIUM:	2.218E-19 (g/ml or Ci/ml) at	18.2 years (2008)

Modeling Scenario Number 5

Name of Facility = DOE Hanford
Name of Waste Unit = PEIS 100N Area GW->SW Scenario
Transport Scenario = SS-T3 Surface soil >Groundwater
Exposure Scenario = SW-E1 SW-E6
Usage Location Number = 5
Usage Location Medium = 3
Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

CESIUM-1:	0.000E+00 (g/ml or Ci/ml) at	3.1 years (1996)
CESIUM-1:	4.987E-30 (g/ml or Ci/ml) at	595.7 years (2588)
COBALT-6:	2.206E-22 (g/ml or Ci/ml) at	16.4 years (2009)
PLUTONIUM:	4.566E-30 (g/ml or Ci/ml) at	913.7 years (2906)
URANIUM-:	7.317E-29 (g/ml or Ci/ml) at	2165.8 years (4158)
THORIUM-:	1.334E-30 (g/ml or Ci/ml) at	2165.8 years (4158)
PLUTONIUM:	1.239E-24 (g/ml or Ci/ml) at	2978.1 years (4971)
URANIUM-:	4.123E-30 (g/ml or Ci/ml) at	3678.1 years (5668)
STRONTIUM:	9.834E-28 (g/ml or Ci/ml) at	453.4 years (2443)
YTTRIUM-:	9.837E-28 (g/ml or Ci/ml) at	453.4 years (2443)
TRITIUM :	2.218E-19 (g/ml or Ci/ml) at	18.2 years (2008)

Modeling Scenario Number 6

Name of Facility = DOE Hanford
Name of Waste Unit = PEIS 100N Area GW->SW Scenario
Transport Scenario = SS-T3 Surface soil >Groundwater
Exposure Scenario = SW-E1 SW-E7 SW-E8
Usage Location Number = 3
Usage Location Medium = 3
Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

CESIUM-1:	0.000E+00 (g/ml or Ci/ml) at	3.1 years (1996)
CESIUM-1:	4.987E-30 (g/ml or Ci/ml) at	595.7 years (2588)
COBALT-6:	2.206E-22 (g/ml or Ci/ml) at	16.4 years (2009)
PLUTONIUM:	4.566E-30 (g/ml or Ci/ml) at	913.7 years (2906)
URANIUM-:	7.317E-29 (g/ml or Ci/ml) at	2165.8 years (4158)
THORIUM-:	1.334E-30 (g/ml or Ci/ml) at	2165.8 years (4158)
PLUTONIUM:	1.239E-24 (g/ml or Ci/ml) at	2978.1 years (4971)
URANIUM-:	4.123E-30 (g/ml or Ci/ml) at	3678.1 years (5668)
STRONTIUM:	9.834E-28 (g/ml or Ci/ml) at	453.4 years (2443)
YTTRIUM-:	9.837E-28 (g/ml or Ci/ml) at	453.4 years (2443)
TRITIUM :	2.218E-19 (g/ml or Ci/ml) at	18.2 years (2008)

Modeling Scenario Number 7

Name of Facility = DOE Hanford
Name of Waste Unit = PEIS 100N Area GW->SW Scenario
Transport Scenario = SS-T3 Surface soil >Groundwater
Exposure Scenario = SW-E1 SW-E6 SW-E7 SW-E8
Usage Location Number = 2
Usage Location Medium = 3
Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

CESIUM-1: 0.000E+00 (g/ml or Ci/ml) at 3.1 years (1996)

CESIUM-1: 4.987E-30 (g/ml or Ci/ml) at 595.7 years (2588)
 COBALT-6: 2.206E-22 (g/ml or Ci/ml) at 16.4 years (2009)
 PLUTONIUM-: 4.566E-30 (g/ml or Ci/ml) at 913.7 years (2906)
 URANIUM-: 7.317E-29 (g/ml or Ci/ml) at 2165.8 years (4158)
 THORIUM-: 1.334E-30 (g/ml or Ci/ml) at 2165.8 years (4158)
 PLUTONIUM-: 1.239E-24 (g/ml or Ci/ml) at 2978.1 years (4971)
 URANIUM-: 4.123E-30 (g/ml or Ci/ml) at 3678.1 years (5668)
 STRONTIUM-: 9.834E-28 (g/ml or Ci/ml) at 453.4 years (2443)
 YTTRIUM-: 9.837E-28 (g/ml or Ci/ml) at 453.4 years (2443)
 TRITIUM : 2.218E-19 (g/ml or Ci/ml) at 18.2 years (2008)

 Modeling Scenario Number 8

Name of Facility = DOE Hanford
 Name of Waste Unit = PEIS 100N Area GW->SW Scenario
 Transport Scenario = SS-T3 Surface soil >Groundwater
 Exposure Scenario = SW-E3 SW-E4 SW-E5
 Usage Location Number = 8
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm³/day

Maximum Constituent Concentrations:

CESIUM-1: 0.000E+00 (g/ml or Ci/ml) at 3.1 years (1996)
 CESIUM-1: 4.987E-30 (g/ml or Ci/ml) at 595.7 years (2588)
 COBALT-6: 2.206E-22 (g/ml or Ci/ml) at 16.4 years (2009)
 PLUTONIUM-: 4.566E-30 (g/ml or Ci/ml) at 913.7 years (2906)
 URANIUM-: 7.317E-29 (g/ml or Ci/ml) at 2165.8 years (4158)
 THORIUM-: 1.334E-30 (g/ml or Ci/ml) at 2165.8 years (4158)
 PLUTONIUM-: 1.239E-24 (g/ml or Ci/ml) at 2978.1 years (4971)
 URANIUM-: 4.123E-30 (g/ml or Ci/ml) at 3678.1 years (5668)
 STRONTIUM-: 9.834E-28 (g/ml or Ci/ml) at 453.4 years (2443)
 YTTRIUM-: 9.837E-28 (g/ml or Ci/ml) at 453.4 years (2443)
 TRITIUM : 2.218E-19 (g/ml or Ci/ml) at 18.2 years (2008)

Multimedia Environmental Pollutant Assessment System (MEPAS)

MEPAS Hazard Potential Output (VERSION 041292)
Pacific Northwest Laboratory
Richland, WA 99352
Developed for the U.S. Department of Energy

Run Date and Time: 11/22/1993 15: 5:56
(This run used 630. effects per million man-rem)
Run Title: PEIS 100N Area GW->SW Scenario
Ranking Unit 1 : 105KLOW

Number of Constituents is: 11
Time Discounted HPis are computed using 70 year time periods (Time Index = 0)

Num Constituent Names ----- CASID -----

1 CESIUM-134	CS134
2 CESIUM-137+D	CS137
3 COBALT-60	CO60
4 PLUTONIUM-238	PU238
5 URANIUM-234	U234
6 THORIUM-230	TH230
7 PLUTONIUM-239	PU239
8 URANIUM-235	U235
9 STRONTIUM-90	SR90
10 YTTRIUM-90	Y90
11 TRITIUM (as tritiated water, HTO)	H3

Summary of Data from MEPAS Constituent Database
CONSTITUENT DATA LIBRARY FOR MEPAS - UPDATED March 25, 1993 DLS/PEIS
This Database Contains Entries for 400 Constituents

Constituent Parameter	Parameter Units	Constituent 1	Constituent 2	Constituent 3	Constituent 4
ID / CAS #:	(None)	CS134	CS137	CO60	PU238
Toxicity Type:	(None)	1	1	1	1
Mol. Weight:	g/mole	1.340E+02	1.370E+02	6.000E+01	2.380E+02
Vapor Pressure:	mm-Hg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Henry's Law Con:	atm*m3/mole	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water Sol:	mg/L	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Carbon Mat Part:	ml/g	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Oct Wat Part:	(None)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1/2-life in AIR:	days	7.530E+02	1.100E+04	1.930E+03	3.210E+04
1/2-life in GW:	days	7.530E+02	1.100E+04	1.930E+03	3.210E+04
1/2-life in SW:	days	7.530E+02	1.100E+04	1.930E+03	3.210E+04
1/2-life in SOIL:	days	7.530E+02	1.100E+04	1.930E+03	3.210E+04
Ing Dose Fact:	1/Kg or rem/pCi	7.330E-08	5.000E-08	2.690E-08	3.200E-06
Inh Dose Fact:	1/Kg or rem/pCi	4.630E-08	3.200E-08	2.190E-07	3.920E-04
Air Imm Fact:	rem*m3/pCi*h	1.010E-09	3.400E-10	1.680E-09	6.490E-14
Soil Exp Fact:	rem*m2/pCi*h	2.020E-11	6.800E-12	3.130E-11	1.110E-14
Water Imm Fact:	rem*L/pCi*h	2.190E-09	6.900E-10	3.640E-09	1.510E-13
Fish Bioaccum:	(None)	2.000E+03	2.000E+03	3.300E+02	2.500E+02
Shell Bioaccum:	(None)	1.000E+02	1.000E+02	2.000E+02	1.000E+02
Veg Bioaccum:	(None)	1.230E-02	1.230E-02	1.000E-02	5.000E-05
Meat Trans Fact:	day/Kg	2.000E-02	2.000E-02	2.000E-02	5.000E-07
Milk Trans Fact:	day/L	7.000E-03	7.000E-03	2.000E-03	1.000E-07
Water Pur Fact:	(None)	9.000E-01	9.000E-01	2.000E-01	7.000E-01

Dep Velocity:	m/sec	1.000E-03	1.000E-03	1.000E-03	1.000E-03
Atmos Dis Class:	(None)	1	1	1	1
Inh Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ing Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Ref Dose:	mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ing Ref Dose:	mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Tox Uncert	HPI units	5	5	5	5
Ing Tox Uncert	HPI units	5	5	5	5
Phys Prop Uncert	HPI units	3	3	3	3
Tran Fact Uncert	HPI units	3	3	3	3

Toxicity Type 1: Radionuclide carcinogenic inhalation and ingestion
 Toxicity Type 2: Chemical carcinogenic inhalation and ingestion
 Toxicity Type 3: Chemical carcinogenic inhalation, non-carcinogenic ingestion
 Toxicity Type 4: Chemical non-carcinogenic inhalation, carcinogenic ingestion
 Toxicity Type 5: Chemical non-carcinogenic inhalation and ingestion

KEY for Constituent Table

Constituent 1 = CESIUM-134
 Constituent 2 = CESIUM-137+0
 Constituent 3 = COBALT-60
 Constituent 4 = PLUTONIUM-238

Summary of Data from MEPAS Constituent Database (Cont)
 CONSTITUENT DATA LIBRARY FOR MEPAS - UPDATED March 25, 1993 DLS/PEIS
 This Database Contains Entries for 400 Constituents

Constituent Parameter	Parameter Units	Constituent 5	Constituent 6	Constituent 7	Constituent 8
ID / CAS #:	(None)	U234	TH230	PU239	U235
Toxicity Type:	(None)	1	1	1	1
Mol. Weight:	g/mole	2.340E+02	2.300E+02	2.390E+02	2.350E+02
Vapor Pressure:	mm-Hg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Henry's Law Con:	atm*m3/mole	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water Sol:	mg/L	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Carbon Mat Part:	ml/g	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Oct Wat Part:	(None)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1/2-life in AIR:	days	8.930E+07	2.810E+07	8.810E+06	2.570E+11
1/2-life in GW:	days	8.930E+07	2.810E+07	8.810E+06	2.570E+11
1/2-life in SW:	days	8.930E+07	2.810E+07	8.810E+06	2.570E+11
1/2-life in SOIL:	days	8.930E+07	2.810E+07	8.810E+06	2.570E+11
Ing Dose Fact:	1/Kg or rem/pCi	2.830E-07	5.480E-07	3.540E-06	2.700E-07
Inh Dose Fact:	1/Kg or rem/pCi	1.320E-04	3.260E-04	4.290E-04	1.200E-04
Air Imm Fact:	rem*m3/pCi*h	1.020E-13	2.330E-13	5.640E-14	8.900E-11
Soil Exp Fact:	rem*m2/pCi*h	9.960E-15	9.990E-15	4.890E-15	2.000E-12
Water Imm Fact:	rem*L/pCi*h	2.330E-13	5.240E-13	1.280E-13	3.000E-10
Fish Bioaccum:	(None)	5.000E+01	1.000E+02	2.500E+02	5.000E+01
Shell Bioaccum:	(None)	6.000E+01	5.000E+02	1.000E+02	6.000E+01
Veg Bioaccum:	(None)	3.500E-03	3.000E-05	5.000E-05	3.500E-03
Meat Trans Fact:	day/Kg	2.000E-04	6.000E-06	5.000E-07	2.000E-04
Milk Trans Fact:	day/L	6.000E-04	5.000E-06	1.000E-07	6.000E-04
Water Pur Fact:	(None)	7.000E-01	7.000E-01	7.000E-01	7.000E-01
Dep Velocity:	m/sec	1.000E-03	1.000E-03	1.000E-03	1.000E-03
Atmos Dis Class:	(None)	1	1	1	1
Inh Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ing Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Ref Dose:	mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ing Ref Dose:	mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Tox Uncert	HPI units	5	5	5	5
Ing Tox Uncert	HPI units	5	5	5	5
Phys Prop Uncert	HPI units	3	3	3	3
Tran Fact Uncert	HPI units	3	3	3	3

Toxicity Type 1: Radionuclide carcinogenic inhalation and ingestion
 Toxicity Type 2: Chemical carcinogenic inhalation and ingestion
 Toxicity Type 3: Chemical carcinogenic inhalation, non-carcinogenic ingestion

Toxicity Type 4: Chemical non-carcinogenic inhalation, carcinogenic ingestion
 Toxicity Type 5: Chemical non-carcinogenic inhalation and ingestion

KEY for Constituent Table

Constituent 5 = URANIUM-234
 Constituent 6 = THORIUM-230
 Constituent 7 = PLUTONIUM-239
 Constituent 8 = URANIUM-235

Summary of Data from MEPAS Constituent Database (Cont)
 CONSTITUENT DATA LIBRARY FOR MEPAS - UPDATED March 25, 1993 DLS/PEIS
 This Database Contains Entries for 400 Constituents

Constituent Parameter	Parameter Units	Constituent 9	Constituent 10	Constituent 11
ID / CAS #:	(None)	SR90	Y90	H3
Toxicity Type:	(None)	1	1	1
Mol. Weight:	g/mole	9.000E+01	9.000E+01	2.000E+01
Vapor Pressure:	mm-Hg	0.000E+00	0.000E+00	2.380E+01
Henry's Law Con:	atm*m3/mole	0.000E+00	0.000E+00	6.000E-07
Water Sol:	mg/L	0.000E+00	0.000E+00	0.000E+00
Carbon Mat Part:	ml/g	0.000E+00	0.000E+00	0.000E+00
Oct Wat Part:	(None)	0.000E+00	0.000E+00	0.000E+00
1/2-life in AIR:	days	1.050E+04	2.700E+00	4.490E+03
1/2-life in GW:	days	1.050E+04	2.700E+00	4.490E+03
1/2-life in SW:	days	1.050E+04	2.700E+00	2.680E+01
1/2-life in SOIL:	days	1.050E+04	2.700E+00	6.240E+01
Ing Dose Fact:	1/Kg or rem/pCi	1.400E-07	1.080E-08	6.300E-11
Inh Dose Fact:	1/Kg or rem/pCi	1.300E-06	8.440E-09	6.300E-11
Air Imm Fact:	rem*m3/pCi*h	1.300E-12	2.530E-12	0.000E+00
Soil Exp Fact:	rem*m2/pCi*h	6.700E-14	7.090E-14	0.000E+00
Water Imm Fact:	rem*L/pCi*h	1.300E-12	4.830E-12	0.000E+00
Fish Bioaccum:	(None)	5.000E+01	2.500E+01	1.000E+00
Shell Bioaccum:	(None)	1.000E+02	1.000E+03	1.000E+00
Veg Bioaccum:	(None)	2.030E-01	1.500E-03	0.000E+00
Meat Trans Fact:	day/Kg	3.000E-04	3.000E-04	0.000E+00
Milk Trans Fact:	day/L	1.500E-03	2.000E-05	0.000E+00
Water Pur Fact:	(None)	2.000E-01	2.000E-01	1.000E+00
Dep Velocity:	m/sec	1.000E-03	1.000E-03	0.000E+00
Atmos Dis Class:	(None)	1	1	4
Inh Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00
Ing Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00
Inh Ref Dose:	mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00
Ing Ref Dose:	mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00
Inh Tox Uncert	HPI units	5	5	5
Ing Tox Uncert	HPI units	5	5	5
Phys Prop Uncert	HPI units	3	3	3
Tran Fact Uncert	HPI units	3	3	3

 Toxicity Type 1: Radionuclide carcinogenic inhalation and ingestion
 Toxicity Type 2: Chemical carcinogenic inhalation and ingestion
 Toxicity Type 3: Chemical carcinogenic inhalation, non-carcinogenic ingestion
 Toxicity Type 4: Chemical non-carcinogenic inhalation, carcinogenic ingestion
 Toxicity Type 5: Chemical non-carcinogenic inhalation and ingestion

KEY for Constituent Table

Constituent 9 = STRONTIUM-90
 Constituent 10 = YTTRIUM-90
 Constituent 11 = TRITIUM

USAGE LOCATION DATA FOR SURFACE WATER PATHWAY

Location Parameter	Units	Location 1	Location 2	Location 3	Location 4	Location 5
Drink Index:	(None)	0	0	0	2	2

Drink Pop:	People	0.000E+00	0.000E+00	0.000E+00	4.216E+04	2.034E+04
Rec Index:	(None)	0	0	0	0	0
Rec Pop:	People	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Aquatic Index:	(None)	1	0	0	0	0
FinFish Prod:	Kg/yr	1.500E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Shell Prod:	Kg/yr	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Irr Index:	(None)	0	1	1	0	0
Leaf Veg Prod:	Kg/yr	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Veg Product:	Kg/yr	0.000E+00	1.400E+08	5.800E+05	0.000E+00	0.000E+00
Meat Product:	Kg/yr	0.000E+00	1.200E+06	8.400E+03	0.000E+00	0.000E+00
Milk Product:	L/yr	0.000E+00	2.100E+06	2.800E+04	0.000E+00	0.000E+00
SW Trans Time:	days	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Irr. Rate:	L/mo	0.000E+00	1.280E+02	1.280E+02	0.000E+00	0.000E+00
Harvest Time:	days	6.000E+01	6.000E+01	3.000E+01	3.000E+01	0.000E+00
Transit Time:	days	0.000E+00	0.000E+00	0.000E+00	5.000E-01	5.000E-01
Water Treated:	yes/no	No	No	No	Yes	Yes
H2O Ing Rate:	L/day	2.000E+00	2.000E+00	2.000E+00	2.000E+00	2.000E+00
Fish Time Delay:	days	1.000E+01	1.000E+01	1.000E+01	1.000E+01	1.000E+01
Inv time delay:	days	1.000E+01	1.000E+01	1.000E+01	1.000E+01	1.000E+01

=====

Drinking Index ----> 0 = No Drinking or Bathing, 1 = Bathing Only, and
2 = Drinking and Bathing

Recreation Index --> 1 = Swimming Only, 2 = Boating Only,
3 = Shoreline Activities Only, and 4 = All of the Above

Aquatic Index -----> 0 = No Aquatic food, 1 = Aquatic Food

Irrigation Index --> -1 = Animals Drinking Only, 0 = No Farm Production,
1 = Crops and Animals [Feed and Water], and
2 = Crops and Animals Feed Only

=====

KEY for Usage Location in Table

Usage Location 1 = Aquatic Foods

Usage Location 2 = Benton Co.

Usage Location 3 = Franklin Co.

Usage Location 4 = Kennewick

Usage Location 5 = Pasco

USAGE LOCATION DATA FOR SURFACE WATER PATHWAY

Location Parameter	Units	Location 6	Location 7	Location 8
Drink Index:	(None)	2	2	0
Drink Pop:	People	1.000E+00	3.232E+04	0.000E+00
Rec Index:	(None)	4	4	0
Rec Pop:	People	1.000E+00	3.330E+05	0.000E+00
Aquatic Index:	(None)	0	0	0
FinFish Prod:	Kg/yr	0.000E+00	0.000E+00	0.000E+00
Shell Prod:	Kg/yr	0.000E+00	0.000E+00	0.000E+00
Irr Index:	(None)	0	0	1
Leaf Veg Prod:	Kg/yr	0.000E+00	0.000E+00	1.600E+05
Veg Product:	Kg/yr	0.000E+00	0.000E+00	8.300E+06
Meat Product:	Kg/yr	0.000E+00	0.000E+00	1.800E+05
Milk Product:	L/yr	0.000E+00	0.000E+00	2.800E+05
SW Trans Time:	days	0.000E+00	0.000E+00	0.000E+00
Irr. Rate:	L/mo	0.000E+00	0.000E+00	1.280E+02
Harvest Time:	days	0.000E+00	0.000E+00	0.000E+00
Transit Time:	days	5.000E-01	5.000E-01	0.000E+00
Water Treated:	yes/no	Yes	Yes	No
H2O Ing Rate:	L/day	2.000E+00	2.000E+00	2.000E+00
Fish Time Delay:	days	1.000E+01	1.000E+01	1.000E+01
Inv time delay:	days	1.000E+01	1.000E+01	1.000E+01

=====

Drinking Index ----> 0 = No Drinking or Bathing, 1 = Bathing Only, and
2 = Drinking and Bathing

Recreation Index --> 1 = Swimming Only, 2 = Boating Only,
3 = Shoreline Activities Only, and 4 = All of the Above

Aquatic Index -----> 0 = No Aquatic food, 1 = Aquatic Food

Irrigation Index --> -1 = Animals Drinking Only, 0 = No Farm Production,

1 = Crops and Animals [Feed and Water], and
2 = Crops and Animals Feed Only

=====

KEY for Usage Location in Table

Usage Location 6 = Restricted

Usage Location 7 = Richland

Usage Location 8 = Walla Walla Co.

Population Health Effects By Pollutant Table

#	Type	Health Effects, Unweighted			Weighted		
		Inhalation	Ingestion	Total	Inhalation	Ingestion	Total
1	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1	0.00E+00	1.85E-14	1.85E-14	0.00E+00	1.54E-16	1.54E-16
3	1	0.00E+00	1.89E-08	1.89E-08	0.00E+00	1.89E-08	1.89E-08
4	1	0.00E+00	1.07E-12	1.07E-12	0.00E+00	6.20E-16	6.20E-16
5	1	0.00E+00	1.79E-12	1.79E-12	0.00E+00	8.70E-18	8.70E-18
6	1	0.00E+00	4.73E-14	4.73E-14	0.00E+00	1.05E-19	1.05E-19
7	1	0.00E+00	1.75E-06	1.75E-06	0.00E+00	1.63E-12	1.63E-12
8	1	0.00E+00	5.31E-13	5.31E-13	0.00E+00	1.23E-19	1.23E-19
9	1	0.00E+00	2.64E-11	2.64E-11	0.00E+00	5.09E-13	5.09E-13
10	1	0.00E+00	1.98E-14	1.98E-14	0.00E+00	3.82E-16	3.82E-16
11	1	0.00E+00	2.82E-08	2.82E-08	0.00E+00	2.82E-08	2.82E-08

Population Health Effects Summary Table

Summary Results	Unweighted	Weighted
Radiation dose (person-rem):	2.85E-03	7.48E-05
Chemical cancer incidence:	0.00E+00	0.00E+00
Radiation cancer incidence:	4.84E-06	1.27E-07
Total cancer incidence:	4.84E-06	1.27E-07
Radiation cancer fatalities:	1.42E-06	3.72E-08
Radiation cancer hereditary:	3.77E-07	9.90E-09

HPI Values by Usage Location for the SURFACE WATER Transport Pathway

Usage Location	Constituent				
	1	2	3	4	5
Aquatic Foods	-250.00	-109.50	-36.47	-109.49	-135.38
Benton Co.	-250.00	-100.60	-20.37	-93.67	-112.00
Franklin Co.	-250.00	-123.60	-43.85	-117.50	-135.73
Kennewick	-250.00	-109.82	-35.49	-101.87	-120.78
Pasco	-250.00	-112.99	-38.66	-105.04	-123.94
Restricted	-250.00	-155.74	-75.86	-148.93	-167.84
Richland	-250.00	-104.82	-20.75	-102.95	-121.85
Walla Walla Co.	-250.00	-111.84	-31.79	-105.18	-123.54
Total for Constituent	-250.00	-98.13	-17.22	-92.08	-110.60

Usage Location	Constituent				
	6	7	8	9	10
Aquatic Foods	-151.13	-75.31	-153.99	-95.36	-120.65
Benton Co.	-131.33	-59.48	-130.61	-63.26	-128.08
Franklin Co.	-155.15	-83.31	-154.33	-87.05	-146.90
Kennewick	-139.53	-67.69	-139.38	-86.19	-97.88
Pasco	-142.70	-70.86	-142.55	-89.36	-101.04
Restricted	-186.59	-114.75	-186.31	-133.21	-144.91
Richland	-140.60	-68.77	-139.28	-86.89	-98.72
Walla Walla Co.	-142.83	-70.99	-142.14	-75.34	-113.00
Total for Constituent	-129.78	-57.89	-129.11	-62.93	-94.18

HPI Values by Usage Location for the SURFACE WATER Transport Pathway (Cont)

Usage Location	Constituent 11
Aquatic Foods	-56.89
Benton Co.	-17.57
Franklin Co.	-41.22
Kennewick	-23.74
Pasco	-26.91
Restricted	-70.80
Richland	-24.84
Walla Walla Co.	-29.62
Total for Constituent	-15.50

--- Constituent Names ---
11 = TRITIUM

Summary of Hazard Potential Index (HPI) Values For Run		
Constituent Name	HPI	
CESIUM-134	-250.00	
CESIUM-137+D	-98.13	
COBALT-60	-17.22	
PLUTONIUM-238	-92.08	
URANIUM-234	-110.60	
THORIUM-230	-129.78	
PLUTONIUM-239	-57.89	
URANIUM-235	-129.11	
STRONTIUM-90	-62.93	
YTTRIUM-90	-94.18	
TRITIUM	-15.50	

Maximum Individual Results by Pollutant

#	Type	Unweighted Results			Time Weighted Results		
		Total	Inhalation	Ingestion	Total	Inhalation	Ingestion
1	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1	8.03E-20	0.00E+00	8.03E-20	7.95E-22	0.00E+00	7.95E-22
3	1	1.26E-13	0.00E+00	1.26E-13	1.26E-13	0.00E+00	1.26E-13
4	1	9.61E-19	0.00E+00	9.61E-19	9.75E-22	0.00E+00	9.75E-22
5	1	1.08E-18	0.00E+00	1.08E-18	6.61E-24	0.00E+00	6.61E-24
6	1	3.74E-20	0.00E+00	3.74E-20	8.41E-26	0.00E+00	8.41E-26
7	1	2.98E-13	0.00E+00	2.98E-13	1.78E-18	0.00E+00	1.78E-18
8	1	5.99E-20	0.00E+00	5.99E-20	9.20E-26	0.00E+00	9.20E-26
9	1	1.54E-17	0.00E+00	1.54E-17	3.81E-19	0.00E+00	3.81E-19
10	1	7.28E-20	0.00E+00	7.28E-20	1.80E-21	0.00E+00	1.80E-21
11	1	1.54E-13	0.00E+00	1.54E-13	1.54E-13	0.00E+00	1.54E-13

Final Result Parameter Total

Radiation Results, Time Weighted

MIR Fatal Cancer	2.21E-13
MIR Cancer Incidence	7.56E-13
MIR Hereditary Effects	5.88E-14
MEI radiation dose (rem)	4.45E-10

Radiation Results, Unweighted

MIR Fatal Cancer	4.57E-13
MIR Cancer Incidence	1.56E-12
MIR Hereditary Effects	1.21E-13

MEI radiation dose (rem) 9.18E-10

Chemical Cancer Effects, Time Weighted

MIR Cancer Incidence 0.00E+00

Chemical Cancer Effects, Unweighted

MIR Cancer Incidence 0.00E+00

Chemical Non-Cancer Effects, Time Weighted

MI Hazard Index 0.00E+00

Chemical Non-Cancer Effects, Unweighted

MI Hazard Index 0.00E+00

Total cancer effects, radiation + chemicals, Time Weighted

MIR fatal cancers 2.21E-13

MIR Cancer Incidence 7.56E-13

MIR Hereditary Effects 5.88E-14

Total cancer effects, radiation + chemicals, Unweighted

MIR fatal cancers 4.57E-13

MIR Cancer Incidence 1.56E-12

MIR Hereditary Effects 1.21E-13

Maximum Individual Risk Values/RfD Ratios

Exposure Route	[CESIUM-134] 1				[CESIUM-137+D] 1			
	Time Weighted		Non-Time Weighted		Time Weighted		Non-Time Weighted	
	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INGESTION/DERMAL								
Drinking Water	0.00E+00	0	0.00E+00	0	6.82E-23	6	6.89E-21	8
Finfish	0.00E+00	0	0.00E+00	0	4.90E-22	6	4.95E-20	8
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	0.00E+00	0	0.00E+00	0	3.30E-23	6	3.33E-21	8
Other Vegetables	0.00E+00	0	0.00E+00	0	2.90E-23	6	2.93E-21	8
Meat	0.00E+00	0	0.00E+00	0	4.46E-23	6	4.50E-21	8
Milk	0.00E+00	0	0.00E+00	0	1.09E-22	6	1.10E-20	8
Swimming	0.00E+00	0	0.00E+00	0	1.11E-25	6	1.12E-23	8
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
EXTERNAL RADIATION								
Boating	0.00E+00	0	0.00E+00	0	8.58E-27	6	8.68E-25	8
Shoreline	0.00E+00	0	0.00E+00	0	2.06E-23	6	2.08E-21	8
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[COBALT-60]				[PLUTONIUM-238]			
	Time		Non-Time		Time		Non-Time	
	Weighted		Weighted		Weighted		Weighted	
	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INGESTION/DERMAL								
Drinking Water	6.70E-15	1	6.70E-15	1	3.12E-22	9	3.07E-19	14
Finfish	3.56E-14	1	3.56E-14	1	3.60E-22	9	3.54E-19	14
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	1.44E-14	1	1.44E-14	1	1.86E-22	9	1.83E-19	14
Other Vegetables	1.18E-14	1	1.18E-14	1	1.18E-22	9	1.16E-19	14
Meat	1.93E-14	1	1.93E-14	1	6.10E-27	9	6.01E-24	14
Milk	1.37E-14	1	1.37E-14	1	9.09E-27	9	8.96E-24	14
Swimming	1.16E-16	1	1.16E-16	1	5.52E-25	9	5.44E-22	14
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
EXTERNAL RADIATION								
Boating	3.72E-17	1	3.72E-17	1	1.72E-31	9	1.70E-28	14
Shoreline	2.45E-14	1	2.45E-14	1	3.93E-27	9	3.87E-24	14
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[URANIUM-234]				[THORIUM-230]			
	Time		Non-Time		Time		Non-Time	
	Weighted		Weighted		Weighted		Weighted	
	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INGESTION/DERMAL								
Drinking Water	2.70E-24	11	4.40E-19	31	3.45E-26	13	1.53E-20	31
Finfish	6.24E-25	11	1.02E-19	31	1.59E-26	13	7.09E-21	31
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	1.63E-24	11	2.66E-19	31	2.05E-26	13	9.14E-21	31
Other Vegetables	1.15E-24	11	1.88E-19	31	1.30E-26	13	5.80E-21	31
Meat	2.16E-26	11	3.52E-21	31	8.10E-30	13	3.61E-24	31
Milk	4.74E-25	11	7.74E-20	31	5.03E-29	13	2.24E-23	31
Swimming	4.78E-27	11	7.80E-22	31	6.11E-29	13	2.72E-23	31
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
EXTERNAL RADIATION								
Boating	0.00E+00	11	4.25E-27	31	0.00E+00	13	1.72E-28	31
Shoreline	3.95E-28	11	6.44E-23	31	2.61E-30	13	1.16E-24	31
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[PLUTONIUM-239]				[URANIUM-235]			
	Time Weighted		Non-Time Weighted		Time Weighted		Non-Time Weighted	
	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INGESTION/DERMAL								
Drinking Water	5.68E-19	12	9.52E-14	41	3.72E-26	12	2.42E-20	53
Finfish	6.56E-19	12	1.10E-13	41	8.58E-27	12	5.58E-21	53
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	3.38E-19	12	5.67E-14	41	2.24E-26	12	1.46E-20	53
Other Vegetables	2.15E-19	12	3.60E-14	41	1.59E-26	12	1.03E-20	53
Meat	1.11E-23	12	1.86E-18	41	2.97E-28	12	1.93E-22	53
Milk	1.66E-23	12	2.78E-18	41	6.53E-27	12	4.25E-21	53
Swimming	1.01E-21	12	1.69E-16	41	6.68E-29	12	4.34E-23	53
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

Maximum Individual Risk Values/RfD Ratios (Cont)

	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
EXTERNAL RADIATION								
Boating	2.41E-28	12	4.04E-23	41	4.84E-31	12	3.15E-25	53
Shoreline	3.26E-24	12	5.47E-19	41	1.14E-27	12	7.44E-22	53
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)

[STRONTIUM-90]		[YTTRIUM-90]	
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Exposure Route	-----				-----			
	Time Weighted		Non-Time Weighted		Time Weighted		Non-Time Weighted	
	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.

INGESTION/DERMAL								
Drinking Water	2.06E-20	6	8.34E-19	7	1.40E-21	6	5.66E-20	7
Finfish	1.66E-20	6	6.73E-19	7	4.93E-23	6	2.00E-21	7
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	7.51E-20	6	3.04E-18	7	3.38E-22	6	1.37E-20	7
Other Vegetables	2.30E-19	6	9.32E-18	7	7.33E-29	6	2.97E-27	7
Meat	1.89E-21	6	7.63E-20	7	1.52E-25	6	6.16E-24	7
Milk	3.64E-20	6	1.47E-18	7	2.83E-24	6	1.15E-22	7
Swimming	1.28E-22	6	5.17E-21	7	9.91E-24	6	4.01E-22	7
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

EXTERNAL RADIATION								
Boating	7.85E-27	6	3.18E-25	7	2.92E-26	6	1.18E-24	7
Shoreline	9.69E-23	6	3.92E-21	7	4.63E-26	6	1.87E-24	7
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[TRITIUM]			
	Time Weighted		Non-Time Weighted	
	Risk Value	Time Per.	Risk Value	Time Per.

INGESTION/DERMAL				
Drinking Water	1.00E-13	1	1.00E-13	1
Finfish	3.24E-16	1	3.24E-16	1
Shellfish	0.00E+00	0	0.00E+00	0
Leafy Vegetables	3.68E-15	1	3.68E-15	1
Other Vegetables	2.31E-14	1	2.31E-14	1
Meat	1.17E-14	1	1.17E-14	1
Milk	1.48E-14	1	1.48E-14	1
Swimming	1.24E-16	1	1.24E-16	1
Soil Ingestion	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0

INHALATION				
Inhalation	0.00E+00	0	0.00E+00	0

Showering 0.00E+00 0 0.00E+00 0

	Risk Value	Time Per.	Risk Value	Time Per.
EXTERNAL RADIATION				
Boating	0.00E+00	0	0.00E+00	0
Shoreline	0.00E+00	0	0.00E+00	0
Ground	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

File Title Summary For Run

Run Title: PEIS 100N Area GW->S --- 105KLOW .HIM

Run Date and Time: 11/22/1993 15: 6:17

Constituent Database:UPDATED March 25, 1993 DLS/PEIS

Water Data File: DOE Ha --- 105KLOW .WAT

APPENDIX B

105-KE AND 105-KW BASINS DIRECT RELEASE TO THE COLUMBIA RIVER

*****4/17/1993 VERSION IIIdarc*****

RADCON -- WATERBORNE TRANSPORT COMPONENT for the Multimedia
Environmental Pollutant Assessment System (MEPAS):
Models movement of radionuclides and other chemicals
in groundwater, surface water, and overland pathways.

Battelle, Pacific Northwest Laboratory (PNL)
P.O. Box 999, Richland, WA 99352

Developed for the U.S. Department of Energy

Input file for this run is LOWFLOW .WIN

Modeling Scenario Number 1

Name of Facility = DOE Hanford
Name of Waste Unit = SNF-EIS 100K Area
Transport Scenario = SW-T1 Ranking Unit >Surface wate
Exposure Scenario = SW-E2
Usage Location Number = 6
Usage Location Medium = 3
Usage Location Name =

TLIFE is the duration of release for each contaminant expressed in years.
TDIFF is the time difference in years between the current date and the
date when contaminants were first released into the environment.

Constituent Name	TLIFE (years)	TDIFF (years)	TFINAL (years)
CESIUM-1	1.800E+01-3.118E+00		7.001E+03
COBALT-6	1.800E+01-3.118E+00		7.001E+03
PLUTONIUM	1.800E+01-3.118E+00		7.001E+03
STRONTIUM	1.800E+01-3.118E+00		7.001E+03
TRITIUM	1.800E+01-3.118E+00		7.001E+03

#	Constituent	NUM
1	CESIUM-1	2
2	COBALT-6	2
3	PLUTONIUM	2
4	STRONTIUM	2
5	TRITIUM	2

Length of Surface Water Source-Term (AL1) = 3.05E+01 cm
Source-Term Type (ISTYPE) = 3
Source-Term Flux Boundary Conditions (ISOURC) = 2
Liquid Impoundment Index (IPOND) = 2
Source-Term Decay Index (IDECAY) = 2
Direct Discharge Surface Water Index (IDDSW) = 1
Number of Parent Constituents (NUMCON) = 5

Source-Term Configuration (ISCONF) = 1
Number of Media (NMED) = 1
Number of Integration Time Steps (NTIMES) = 40

Medium # 1 Equals Medium Type (MED) # 5
Water concentration units are: ATTO (1.000E-18) Ci OR g

Constituent	CAS ID	Half-Life (Years)	Initial Conc.	Surface Equilibrium Coeff.	Solubility Limit	Constituent Inventory
-------------	--------	----------------------	---------------	----------------------------------	---------------------	--------------------------

			(ml/g)	(g/ml)	(g OR Ci)
CESIUM-1	CS137	3.01E+01	-9.99E+01	-9.99E+01	1.00E+23
COBALT-6	CO60	5.28E+00	-9.99E+01	-9.99E+01	1.00E+23
PLUTONIUM	PU239	2.41E+04	-9.99E+01	-9.99E+01	1.00E+23
URANIUM-	U235	7.04E+08			
STRONTIUM	SR90	2.88E+01	-9.99E+01	-9.99E+01	1.00E+23
YTTRIUM-	Y90	7.39E-03			
TRITIUM	H3	1.23E+01	-9.99E+01	-9.99E+01	1.00E+23

Constituent Flux (g/yr or Ci/yr) and Time (Years) at the Release Unit

Constituent #	Flux	Time	Constituent #	Flux	Time
1 1	5.56E-04	0.000E+00	1 2	5.56E-04	1.800E+01
2 1	3.67E-03	0.000E+00	2 2	3.67E-03	1.800E+01
3 1	5.11E-07	0.000E+00	3 2	5.11E-07	1.800E+01
4 1	5.56E-05	0.000E+00	4 2	5.56E-05	1.800E+01
5 1	1.44E-02	0.000E+00	5 2	1.44E-02	1.800E+01

New Constituent Flux (g/yr or Ci/yr) and Time (Years) at the Release Unit

Constituent #	Flux	Time	Constituent #	Flux	Time
1 1	5.56E-04	0.000E+00	1 2	5.56E-04	1.800E+01
2 1	3.67E-03	0.000E+00	2 2	3.67E-03	1.800E+01
3 1	5.11E-07	0.000E+00	3 2	5.11E-07	1.800E+01
4 1	5.56E-05	0.000E+00	4 2	5.56E-05	1.800E+01
5 1	1.44E-02	0.000E+00	5 2	1.44E-02	1.800E+01

The New Duration of Time that Constituents are Released from the Release Unit

#	Constituent	New TLIFE (Years)
1	CESIUM-1	1.800E+01
2	COBALT-6	1.800E+01
3	PLUTONIUM	1.800E+01
4	STRONTIUM	1.800E+01
5	TRITIUM	1.800E+01

Modeling Medium # = 1
Medium Type (MED) = 5
Source Configuration = 1
Source Term Discharge Type = 3

SURFACE WATER ENVIRONMENT

Number of River Receptor Locations (NUMREC) = 8
Flow Velocity (U1) = 1.66E+09 cm/year
Depth of Flow (H1) = 4.88E+02 cm
Width of River (B1) = 3.96E+04 cm
Downstream Discharge at First Receptor (QNEW) = 3.22E+16 cm**3/year
Distance Downstream from Center of Source (X3) = 1.00E+04 cm

Constituent	CAS ID	Half-Life (Years)	Initial Conc.	Surface Equilibrium Coeff. (ml/g)	Solubility limit (g/ml)	Constituent Inventory (g OR Ci)
CESIUM-1	CS137	3.01E+01	-9.99E+01	-9.99E+01	1.00E+23	1.00E-02
COBALT-6	CO60	5.28E+00	-9.99E+01	-9.99E+01	1.00E+23	6.60E-02
PLUTONIUM	PU239	2.41E+04	-9.99E+01	-9.99E+01	1.00E+23	9.20E-06
STRONTIUM	SR90	2.88E+01	-9.99E+01	-9.99E+01	1.00E+23	1.00E-03
TRITIUM	H3	1.23E+01	-9.99E+01	-9.99E+01	1.00E+23	2.60E-01

Uniform Mixing Distance = 3.82E+02 cm

Present Concentration for CESIUM-1 IS 1.727E-20(g/ml or Ci/ml)
Present Concentration for COBALT-6 IS 1.140E-19(g/ml or Ci/ml)
Present Concentration for PLUTONIUM IS 1.589E-23(g/ml or Ci/ml)
Present Concentration for URANIUM- IS 2.065E-35(g/ml or Ci/ml)
Present Concentration for STRONTIUM IS 1.727E-21(g/ml or Ci/ml)

Present Concentration for YTTRIUM- IS 3.277E-29(g/ml or Ci/ml)
Present Concentration for TRITIUM IS 4.491E-19(g/ml or Ci/ml)

Maximum Constituent Concentrations:

CESIUM-1:	1.727E-20 (g/ml or Ci/ml) at	3.1 Years (1997)
COBALT-6:	1.140E-19 (g/ml or Ci/ml) at	3.1 Years (1997)
PLUTONIUM:	1.589E-23 (g/ml or Ci/ml) at	3.1 Years (1997)
URANIUM:	2.065E-35 (g/ml or Ci/ml) at	3.1 Years (1997)
STRONTIUM:	1.727E-21 (g/ml or Ci/ml) at	3.1 Years (1997)
YTTRIUM:	3.277E-29 (g/ml or Ci/ml) at	3.1 Years (1997)
TRITIUM :	4.491E-19 (g/ml or Ci/ml) at	3.1 Years (1997)

Modeling Scenario Number 2

Name of Facility = DOE Hanford
Name of Waste Unit = SNF-EIS 100K Area
Transport Scenario = SW-T1 Ranking Unit >Surface water
Exposure Scenario = SW-E3 SW-E4 SW-E5
Usage Location Number = 1
Usage Location Medium = 3
Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm³/day

Maximum Constituent Concentrations:

CESIUM-1:	1.727E-20 (g/ml or Ci/ml) at	3.1 years (1997)
COBALT-6:	1.140E-19 (g/ml or Ci/ml) at	3.1 years (1997)
PLUTONIUM:	1.589E-23 (g/ml or Ci/ml) at	3.1 years (1997)
URANIUM:	2.065E-35 (g/ml or Ci/ml) at	3.1 years (1997)
STRONTIUM:	1.727E-21 (g/ml or Ci/ml) at	3.1 years (1997)
YTTRIUM:	3.277E-29 (g/ml or Ci/ml) at	3.1 years (1994)
TRITIUM :	4.491E-19 (g/ml or Ci/ml) at	3.1 years (1994)

Modeling Scenario Number 3

Name of Facility = DOE Hanford
Name of Waste Unit = SNF-EIS 100K Area
Transport Scenario = SW-T1 Ranking Unit >Surface water
Exposure Scenario = SW-E3 SW-E4 SW-E5
Usage Location Number = 7
Usage Location Medium = 3
Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm³/day

Maximum Constituent Concentrations:

CESIUM-1:	1.727E-20 (g/ml or Ci/ml) at	3.1 years (1997)
COBALT-6:	1.140E-19 (g/ml or Ci/ml) at	3.1 years (1997)
PLUTONIUM:	1.589E-23 (g/ml or Ci/ml) at	3.1 years (1997)
URANIUM:	2.065E-35 (g/ml or Ci/ml) at	3.1 years (1997)
STRONTIUM:	1.727E-21 (g/ml or Ci/ml) at	3.1 years (1997)
YTTRIUM:	3.277E-29 (g/ml or Ci/ml) at	3.1 years (1994)
TRITIUM :	4.491E-19 (g/ml or Ci/ml) at	3.1 years (1994)

 Modeling Scenario Number 4

Name of Facility = DOE Hanford
 Name of Waste Unit = SNF-EIS 100K Area
 Transport Scenario = SW-T1 Ranking Unit >Surface wate
 Exposure Scenario = SW-E1 SW-E6
 Usage Location Number = 4
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

CESIUM-1:	1.727E-20 (g/ml or Ci/ml) at	3.1 years (1997)
COBALT-6:	1.140E-19 (g/ml or Ci/ml) at	3.1 years (1997)
PLUTONIUM:	1.589E-23 (g/ml or Ci/ml) at	3.1 years (1997)
URANIUM-:	2.065E-35 (g/ml or Ci/ml) at	3.1 years (1997)
STRONTIUM:	1.727E-21 (g/ml or Ci/ml) at	3.1 years (1997)
YTTRIUM-:	3.277E-29 (g/ml or Ci/ml) at	3.1 years (1994)
TRITIUM :	4.491E-19 (g/ml or Ci/ml) at	3.1 years (1994)

 Modeling Scenario Number 5

Name of Facility = DOE Hanford
 Name of Waste Unit = SNF-EIS 100K Area
 Transport Scenario = SW-T1 Ranking Unit >Surface wate
 Exposure Scenario = SW-E1 SW-E6
 Usage Location Number = 5
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

CESIUM-1:	1.727E-20 (g/ml or Ci/ml) at	3.1 years (1997)
COBALT-6:	1.140E-19 (g/ml or Ci/ml) at	3.1 years (1997)
PLUTONIUM:	1.589E-23 (g/ml or Ci/ml) at	3.1 years (1997)
URANIUM-:	2.065E-35 (g/ml or Ci/ml) at	3.1 years (1997)
STRONTIUM:	1.727E-21 (g/ml or Ci/ml) at	3.1 years (1997)
YTTRIUM-:	3.277E-29 (g/ml or Ci/ml) at	3.1 years (1994)
TRITIUM :	4.491E-19 (g/ml or Ci/ml) at	3.1 years (1994)

 Modeling Scenario Number 6

Name of Facility = DOE Hanford
 Name of Waste Unit = SNF-EIS 100K Area
 Transport Scenario = SW-T1 Ranking Unit >Surface wate
 Exposure Scenario = SW-E1 SW-E7 SW-E8
 Usage Location Number = 3
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

CESIUM-1:	1.727E-20 (g/ml or Ci/ml) at	3.1 years (1997)
COBALT-6:	1.140E-19 (g/ml or Ci/ml) at	3.1 years (1997)

PLUTONIUM: 1.589E-23 (g/ml or Ci/ml) at 3.1 years (1997)
 URANIUM-: 2.065E-35 (g/ml or Ci/ml) at 3.1 years (1997)
 STRONTIUM: 1.727E-21 (g/ml or Ci/ml) at 3.1 years (1997)
 YTTRIUM-: 3.277E-29 (g/ml or Ci/ml) at 3.1 years (1994)
 TRITIUM : 4.491E-19 (g/ml or Ci/ml) at 3.1 years (1994)

Modeling Scenario Number 7

Name of Facility = DOE Hanford
 Name of Waste Unit = SNF-EIS 100K Area
 Transport Scenario = SW-T1 Ranking Unit >Surface water
 Exposure Scenario = SW-E1 SW-E6 SW-E7 SW-E8
 Usage Location Number = 2
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

CESIUM-1: 1.727E-20 (g/ml or Ci/ml) at 3.1 years (1997)
 COBALT-6: 1.140E-19 (g/ml or Ci/ml) at 3.1 years (1997)
 PLUTONIUM: 1.589E-23 (g/ml or Ci/ml) at 3.1 years (1997)
 URANIUM-: 2.065E-35 (g/ml or Ci/ml) at 3.1 years (1997)
 STRONTIUM: 1.727E-21 (g/ml or Ci/ml) at 3.1 years (1997)
 YTTRIUM-: 3.277E-29 (g/ml or Ci/ml) at 3.1 years (1994)
 TRITIUM : 4.491E-19 (g/ml or Ci/ml) at 3.1 years (1994)

Modeling Scenario Number 8

Name of Facility = DOE Hanford
 Name of Waste Unit = SNF-EIS 100K Area
 Transport Scenario = SW-T1 Ranking Unit >Surface water
 Exposure Scenario = SW-E3 SW-E4 SW-E5
 Usage Location Number = 8
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

CESIUM-1: 1.727E-20 (g/ml or Ci/ml) at 3.1 years (1997)
 COBALT-6: 1.140E-19 (g/ml or Ci/ml) at 3.1 years (1997)
 PLUTONIUM: 1.589E-23 (g/ml or Ci/ml) at 3.1 years (1997)
 URANIUM-: 2.065E-35 (g/ml or Ci/ml) at 3.1 years (1997)
 STRONTIUM: 1.727E-21 (g/ml or Ci/ml) at 3.1 years (1997)
 YTTRIUM-: 3.277E-29 (g/ml or Ci/ml) at 3.1 years (1994)
 TRITIUM : 4.491E-19 (g/ml or Ci/ml) at 3.1 years (1994)

Multimedia Environmental Pollutant Assessment System (MEPAS)

MEPAS Hazard Potential Output (VERSION 041292)
 Pacific Northwest Laboratory
 Richland, WA 99352
 Developed for the U.S. Department of Energy

Run Date and Time: 4/25/1994 14:29:37
 (This run used 630. effects per million man-rem)

Run Title: SNF-EIS 100K Area
Ranking Unit 1 : LOWFLOW

Number of Constituents is: 7
Time Discounted HPis are computed using 70 year time periods (Time Index = 0)

Num	Constituent Names	CASID
1	CESIUM-137+0	CS137
2	COBALT-60	CO60
3	PLUTONIUM-239	PU239
4	URANIUM-235	U235
5	STRONTIUM-90	SR90
6	YTTRIUM-90	Y90
7	TRITIUM (as tritiated water, HTO)	H3

Summary of Data from MEPAS Constituent Database
CONSTITUENT DATA LIBRARY FOR MEPAS - UPDATED March 25, 1993 DLS/PEIS

This Database Contains Entries for 400 Constituents

Constituent Parameter	Parameter Units	Constituent 1	Constituent 2	Constituent 3	Constituent 4
ID / CAS #:	(None)	CS137	CO60	PU239	U235
Toxicity Type:	(None)	1	1	1	1
Mol. Weight:	g/mole	1.370E+02	6.000E+01	2.390E+02	2.350E+02
Vapor Pressure:	mm-Hg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Henry's Law Con:	atm*m3/mole	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water Sol:	mg/L	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Carbon Mat Part:	ml/g	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Oct Wat Part:	(None)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1/2-life in AIR:	days	1.100E+04	1.930E+03	8.810E+06	2.570E+11
1/2-life in GW:	days	1.100E+04	1.930E+03	8.810E+06	2.570E+11
1/2-life in SW:	days	1.100E+04	1.930E+03	8.810E+06	2.570E+11
1/2-life in SOIL:	days	1.100E+04	1.930E+03	8.810E+06	2.570E+11
Ing Dose Fact:	1/Kg or rem/pCi	5.000E-08	2.690E-08	3.540E-06	2.700E-07
Inh Dose Fact:	1/Kg or rem/pCi	3.200E-08	2.190E-07	4.290E-04	1.200E-04
Air Imm Fact:	rem*m3/pCi*h	3.400E-10	1.680E-09	5.640E-14	8.900E-11
Soil Exp Fact:	rem*m2/pCi*h	6.800E-12	3.130E-11	4.890E-15	2.000E-12
Water Imm Fact:	rem*L/pCi*h	6.900E-10	3.640E-09	1.280E-13	3.000E-10
Fish Bioaccum:	(None)	2.000E+03	3.300E+02	2.500E+02	5.000E+01
Shell Bioaccum:	(None)	1.000E+02	2.000E+02	1.000E+02	6.000E+01
Veg Bioaccum:	(None)	1.230E-02	1.000E-02	5.000E-05	3.500E-03
Meat Trans Fact:	day/Kg	2.000E-02	2.000E-02	5.000E-07	2.000E-04
Milk Trans Fact:	day/L	7.000E-03	2.000E-03	1.000E-07	6.000E-04
Water Pur Fact:	(None)	9.000E-01	2.000E-01	7.000E-01	7.000E-01
Dep Velocity:	m/sec	1.000E-03	1.000E-03	1.000E-03	1.000E-03
Atmos Dis Class:	(None)	1	1	1	1
Inh Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ing Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Ref Dose:	mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ing Ref Dose:	mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Tox Uncert	HPI units	5	5	5	5
Ing Tox Uncert	HPI units	5	5	5	5
Phys Prop Uncert	HPI units	3	3	3	3
Tran Fact Uncert	HPI units	3	3	3	3

Toxicity Type 1: Radionuclide carcinogenic inhalation and ingestion
Toxicity Type 2: Chemical carcinogenic inhalation and ingestion
Toxicity Type 3: Chemical carcinogenic inhalation, non-carcinogenic ingestion
Toxicity Type 4: Chemical non-carcinogenic inhalation, carcinogenic ingestion
Toxicity Type 5: Chemical non-carcinogenic inhalation and ingestion

KEY for Constituent Table
Constituent 1 = CESIUM-137+0

Constituent 2 = COBALT-60
 Constituent 3 = PLUTONIUM-239
 Constituent 4 = URANIUM-235

Summary of Data from MEPAS Constituent Database (Cont)
 CONSTITUENT DATA LIBRARY FOR MEPAS - UPDATED March 25, 1993 DLS/PEIS
 This Database Contains Entries for 400 Constituents

Constituent Parameter	Parameter Units	Constituent 5	Constituent 6	Constituent 7
ID / CAS #:	(None)	SR90	Y90	H3
Toxicity Type:	(None)	1	1	1
Mol. Weight:	g/mole	9.000E+01	9.000E+01	2.000E+01
Vapor Pressure:	mm-Hg	0.000E+00	0.000E+00	2.380E+01
Henry's Law Con:	atm*m3/mole	0.000E+00	0.000E+00	6.000E-07
Water Sol:	mg/L	0.000E+00	0.000E+00	0.000E+00
Carbon Mat Part:	ml/g	0.000E+00	0.000E+00	0.000E+00
Oct Wat Part:	(None)	0.000E+00	0.000E+00	0.000E+00
1/2-life in AIR:	days	1.050E+04	2.700E+00	4.490E+03
1/2-life in GW:	days	1.050E+04	2.700E+00	4.490E+03
1/2-life in SW:	days	1.050E+04	2.700E+00	2.680E+01
1/2-life in SOIL:	days	1.050E+04	2.700E+00	6.240E+01
Ing Dose Fact:	1/Kg or rem/pCi	1.400E-07	1.080E-08	6.300E-11
Inh Dose Fact:	1/Kg or rem/pCi	1.300E-06	8.440E-09	6.300E-11
Air Imm Fact:	rem*m3/pCi*h	1.300E-12	2.530E-12	0.000E+00
Soil Exp Fact:	rem*m2/pCi*h	6.700E-14	7.090E-14	0.000E+00
Water Imm Fact:	rem*L/pCi*h	1.300E-12	4.830E-12	0.000E+00
Fish Bioaccum:	(None)	5.000E+01	2.500E+01	1.000E+00
Shell Bioaccum:	(None)	1.000E+02	1.000E+03	1.000E+00
Veg Bioaccum:	(None)	2.030E-01	1.500E-03	0.000E+00
Meat Trans Fact:	day/Kg	3.000E-04	3.000E-04	0.000E+00
Milk Trans Fact:	day/L	1.500E-03	2.000E-05	0.000E+00
Water Pur Fact:	(None)	2.000E-01	2.000E-01	1.000E+00
Dep Velocity:	m/sec	1.000E-03	1.000E-03	0.000E+00
Atmos Dis Class:	(None)	1	1	4
Inh Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00
Ing Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00
Inh Ref Dose:	mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00
Ing Ref Dose:	mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00
Inh Tox Uncert	HPI units	5	5	5
Ing Tox Uncert	HPI units	5	5	5
Phys Prop Uncert	HPI units	3	3	3
Tran Fact Uncert	HPI units	3	3	3

 Toxicity Type 1: Radionuclide carcinogenic inhalation and ingestion
 Toxicity Type 2: Chemical carcinogenic inhalation and ingestion
 Toxicity Type 3: Chemical carcinogenic inhalation, non-carcinogenic ingestion
 Toxicity Type 4: Chemical non-carcinogenic inhalation, carcinogenic ingestion
 Toxicity Type 5: Chemical non-carcinogenic inhalation and ingestion

KEY for Constituent Table
 Constituent 5 = STRONTIUM-90
 Constituent 6 = YTTRIUM-90
 Constituent 7 = TRITIUM

USAGE LOCATION DATA FOR SURFACE WATER PATHWAY

Location Parameter	Units	Location 1	Location 2	Location 3	Location 4	Location 5
Drink Index:	(None)	0	0	0	2	2
Drink Pop:	People	0.000E+00	0.000E+00	0.000E+00	4.216E+04	2.034E+04
Rec Index:	(None)	0	0	0	0	0
Rec Pop:	People	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Aquatic Index:	(None)	1	0	0	0	0
FinFish Prod:	Kg/yr	1.500E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Shell Prod:	Kg/yr	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Irr Index:	(None)	0	1	1	0	0
Leaf Veg Prod:	Kg/yr	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Veg Product:	Kg/yr	0.000E+00	1.400E+08	5.800E+05	0.000E+00	0.000E+00
Meat Product:	Kg/yr	0.000E+00	1.200E+06	8.400E+03	0.000E+00	0.000E+00

Milk Product: L/yr	0.000E+00	2.100E+06	2.800E+04	0.000E+00	0.000E+00
SW Trans Time:days	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Irr. Rate: L/mo	0.000E+00	1.280E+02	1.280E+02	0.000E+00	0.000E+00
Harvest Time: days	6.000E+01	6.000E+01	3.000E+01	3.000E+01	0.000E+00
Transit Time: days	0.000E+00	0.000E+00	0.000E+00	5.000E-01	5.000E-01
Water Treated:yes/no	No	No	No	Yes	Yes
H2O Ing Rate: L/day	2.000E+00	2.000E+00	2.000E+00	2.000E+00	2.000E+00
Fish Time Delay:days	1.000E+01	1.000E+01	1.000E+01	1.000E+01	1.000E+01
Inv time delay: days	1.000E+01	1.000E+01	1.000E+01	1.000E+01	1.000E+01

=====

Drinking Index ----> 0 = No Drinking or Bathing, 1 = Bathing Only, and
2 = Drinking and Bathing

Recreation Index --> 1 = Swimming Only, 2 = Boating Only,
3 = Shoreline Activities Only, and 4 = All of the Above

Aquatic Index -----> 0 = No Aquatic food, 1 = Aquatic Food

Irrigation Index --> -1 = Animals Drinking Only, 0 = No Farm Production,
1 = Crops and Animals [Feed and Water], and
2 = Crops and Animals Feed Only

=====

KEY for Usage Location in Table

Usage Location 1 = Aquatic Foods

Usage Location 2 = Benton Co.

Usage Location 3 = Franklin Co.

Usage Location 4 = Kennewick

Usage Location 5 = Pasco

USAGE LOCATION DATA FOR SURFACE WATER PATHWAY

Location Parameter	Units	Location 6	Location 7	Location 8
Drink Index: (None)		2	2	0
Drink Pop: People		1.000E+00	3.232E+04	0.000E+00
Rec Index: (None)		4	4	0
Rec Pop: People		1.000E+00	3.330E+05	0.000E+00
Aquatic Index:(None)		0	0	0
FinFish Prod: Kg/yr		0.000E+00	0.000E+00	0.000E+00
Shell Prod: Kg/yr		0.000E+00	0.000E+00	0.000E+00
Irr Index: (None)		0	0	1
Leaf Veg Prod:Kg/yr		0.000E+00	0.000E+00	1.600E+05
Veg Product: Kg/yr		0.000E+00	0.000E+00	8.300E+06
Meat Product: Kg/yr		0.000E+00	0.000E+00	1.800E+05
Milk Product: L/yr		0.000E+00	0.000E+00	2.800E+05
SW Trans Time:days		0.000E+00	0.000E+00	0.000E+00
Irr. Rate: L/mo		0.000E+00	0.000E+00	1.280E+02
Harvest Time: days		0.000E+00	0.000E+00	0.000E+00
Transit Time: days		5.000E-01	5.000E-01	0.000E+00
Water Treated:yes/no		Yes	Yes	No
H2O Ing Rate: L/day		2.000E+00	2.000E+00	2.000E+00
Fish Time Delay:days		1.000E+01	1.000E+01	1.000E+01
Inv time delay: days		1.000E+01	1.000E+01	1.000E+01

=====

Drinking Index ----> 0 = No Drinking or Bathing, 1 = Bathing Only, and
2 = Drinking and Bathing

Recreation Index --> 1 = Swimming Only, 2 = Boating Only,
3 = Shoreline Activities Only, and 4 = All of the Above

Aquatic Index -----> 0 = No Aquatic food, 1 = Aquatic Food

Irrigation Index --> -1 = Animals Drinking Only, 0 = No Farm Production,
1 = Crops and Animals [Feed and Water], and
2 = Crops and Animals Feed Only

=====

KEY for Usage Location in Table

Usage Location 6 = Restricted

Usage Location 7 = Richland

Usage Location 8 = Walla Walla Co.

Population Health Effects By Pollutant Table

Pollutant	Health Effects, Unweighted	Weighted
# Type	Inhalation Ingestion Total	Inhalation Ingestion Total
1 1	0.00E+00 3.86E-06 3.86E-06	0.00E+00 3.86E-06 3.86E-06
2 1	0.00E+00 1.38E-05 1.38E-05	0.00E+00 1.38E-05 1.38E-05
3 1	0.00E+00 1.26E-07 1.26E-07	0.00E+00 1.26E-07 1.26E-07

4	1	0.00E+00	1.40E-20	1.40E-20	0.00E+00	1.40E-20	1.40E-20
5	1	0.00E+00	3.45E-06	3.45E-06	0.00E+00	3.45E-06	3.45E-06
6	1	0.00E+00	4.90E-17	4.90E-17	0.00E+00	4.90E-17	4.90E-17
7	1	0.00E+00	6.35E-08	6.35E-08	0.00E+00	6.35E-08	6.35E-08

Population Health Effects Summary Table
Summary Results

	Unweighted	Weighted
Radiation dose (person-rem):	3.38E-02	3.38E-02
Chemical cancer incidence:	0.00E+00	0.00E+00
Radiation cancer incidence:	5.76E-05	5.76E-05
Total cancer incidence:	5.76E-05	5.76E-05
Radiation cancer fatalities:	1.68E-05	1.68E-05
Radiation cancer hereditary:	4.48E-06	4.48E-06

HPI Values by Usage Location for the SURFACE WATER Transport Pathway

Usage Location	Constituent				
	1	2	3	4	5
Aquatic Foods	-5.51	-7.84	-26.40	-163.43	-27.06
Benton Co.	3.39	8.26	-10.58	-140.05	5.04
Franklin Co.	-19.61	-15.22	-34.40	-163.77	-18.74
Kennewick	-5.83	-6.86	-18.78	-148.82	-17.89
Pasco	-8.99	-10.02	-21.95	-151.99	-21.05
Restricted	-50.92	-46.41	-65.02	-194.93	-64.09
Richland	-.82	7.88	-19.86	-148.72	-18.58
Walla Walla Co.	-7.84	-3.15	-22.08	-151.58	-7.04
Total for Constituent	5.86	11.41	-8.98	-138.55	5.37

Usage Location	Constituent	
	6	7
Aquatic Foods	-129.56	-53.37
Benton Co.	-136.99	-14.05
Franklin Co.	-155.81	-37.70
Kennewick	-106.79	-20.22
Pasco	-109.96	-23.38
Restricted	-153.01	-66.46
Richland	-107.64	-21.32
Walla Walla Co.	-121.91	-26.10
Total for Constituent	-103.10	-11.97

--- Constituent Names ---

Constituent 1 = CESIUM-137+D	2 = COBALT-60
Constituent 3 = PLUTONIUM-239	4 = URANIUM-235
Constituent 5 = STRONTIUM-90	6 = YTTRIUM-90
7 = TRITIUM	

```

*****
*           Summary of Hazard Potential Index (HPI) Values For Run           *
*****
*           Constituent Name           HPI           *
*           *                           *           *
*           CESIUM-137+D           5.86           *
*           COBALT-60           11.41           *
*           PLUTONIUM-239           -8.98           *
*           URANIUM-235           -138.55          *
*           STRONTIUM-90           5.37           *
*           YTTRIUM-90           -103.10          *
*           TRITIUM           -11.97           *
*****

```

Maximum Individual Results by Pollutant

#	Type	Unweighted Results			Time Weighted Results		
		Total	Inhalation	Ingestion	Total	Inhalation	Ingestion
1	1	7.22E-11	0.00E+00	7.22E-11	7.22E-11	0.00E+00	7.22E-11
2	1	9.21E-11	0.00E+00	9.21E-11	9.21E-11	0.00E+00	9.21E-11
3	1	9.83E-13	0.00E+00	9.83E-13	9.83E-13	0.00E+00	9.83E-13

4	1	7.71E-26	0.00E+00	7.71E-26	7.71E-26	0.00E+00	7.71E-26
5	1	7.14E-12	0.00E+00	7.14E-12	7.14E-12	0.00E+00	7.14E-12
6	1	6.39E-22	0.00E+00	6.39E-22	6.39E-22	0.00E+00	6.39E-22
7	1	3.47E-13	0.00E+00	3.47E-13	3.47E-13	0.00E+00	3.47E-13

Final Result Parameter	Total
------------------------	-------

Radiation Results, Time Weighted

MIR Fatal Cancer	1.36E-10
MIR Cancer Incidence	4.66E-10
MIR Hereditary Effects	3.63E-11
MEI radiation dose (rem)	2.74E-07

Radiation Results, Unweighted

MIR Fatal Cancer	1.36E-10
MIR Cancer Incidence	4.66E-10
MIR Hereditary Effects	3.63E-11
MEI radiation dose (rem)	2.74E-07

Chemical Cancer Effects, Time Weighted

MIR Cancer Incidence	0.00E+00
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Chemical Cancer Effects, Unweighted

MIR Cancer Incidence	0.00E+00
----------------------	----------

Chemical Non-Cancer Effects, Time Weighted

MI Hazard Index	0.00E+00
-----------------	----------

Chemical Non-Cancer Effects, Unweighted

MI Hazard Index	0.00E+00
-----------------	----------

Total cancer effects, radiation + chemicals, Time Weighted

MIR fatal cancers	1.36E-10
MIR Cancer Incidence	4.66E-10
MIR Hereditary Effects	3.63E-11

Total cancer effects, radiation + chemicals, Unweighted

MIR fatal cancers	1.36E-10
MIR Cancer Incidence	4.66E-10
MIR Hereditary Effects	3.63E-11

Maximum Individual Risk Values/RfD Ratios

Exposure Route	[CESIUM-137+D]				[COBALT-60]			
	Time Weighted		Non-Time Weighted		Time Weighted		Non-Time Weighted	
	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INGESTION/DERMAL								
Drinking Water	6.20E-12	1	6.20E-12	1	4.89E-12	1	4.89E-12	1
Finfish	4.45E-11	1	4.45E-11	1	2.60E-11	1	2.60E-11	1
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	3.00E-12	1	3.00E-12	1	1.05E-11	1	1.05E-11	1
Other Vegetables	2.64E-12	1	2.64E-12	1	8.59E-12	1	8.59E-12	1
Meat	4.05E-12	1	4.05E-12	1	1.41E-11	1	1.41E-11	1
Milk	9.94E-12	1	9.94E-12	1	1.00E-11	1	1.00E-11	1
Swimming	1.01E-14	1	1.01E-14	1	8.47E-14	1	8.47E-14	1
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
	Risk	Time	Risk	Time	Risk	Time	Risk	Time

	Value	Per.	Value	Per.	Value	Per.	Value	Per.
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
	Risk	Time	Risk	Time	Risk	Time	Risk	Time
	Value	Per.	Value	Per.	Value	Per.	Value	Per.
EXTERNAL RADIATION								
Boating	7.80E-16	1	7.80E-16	1	2.72E-14	1	2.72E-14	1
Shoreline	1.87E-12	1	1.87E-12	1	1.79E-11	1	1.79E-11	1
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)									
[PLUTONIUM-239]					[URANIUM-235]				
Exposure Route	Time Weighted	Non-Time Weighted			Time Weighted	Non-Time Weighted			
	Risk	Time	Risk	Time	Risk	Time	Risk	Time	
	Value	Per.	Value	Per.	Value	Per.	Value	Per.	
INGESTION/DERMAL									
Drinking Water	3.14E-13	1	3.14E-13	1	3.11E-26	1	3.11E-26	1	
Finfish	3.63E-13	1	3.63E-13	1	7.19E-27	1	7.19E-27	1	
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0	
Leafy Vegetables	1.87E-13	1	1.87E-13	1	1.88E-26	1	1.88E-26	1	
Other Vegetables	1.19E-13	1	1.19E-13	1	1.33E-26	1	1.33E-26	1	
Meat	6.15E-18	1	6.15E-18	1	2.49E-28	1	2.49E-28	1	
Milk	9.17E-18	1	9.17E-18	1	5.47E-27	1	5.47E-27	1	
Swimming	5.56E-16	1	5.56E-16	1	5.59E-29	1	5.59E-29	1	
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0	
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0	
	Risk	Time	Risk	Time	Risk	Time	Risk	Time	
	Value	Per.	Value	Per.	Value	Per.	Value	Per.	
INHALATION									
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0	
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0	
	Risk	Time	Risk	Time	Risk	Time	Risk	Time	
	Value	Per.	Value	Per.	Value	Per.	Value	Per.	
EXTERNAL RADIATION									
Boating	1.33E-22	1	1.33E-22	1	4.06E-31	1	4.06E-31	1	
Shoreline	1.80E-18	1	1.80E-18	1	9.58E-28	1	9.58E-28	1	
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0	

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)									
[STRONTIUM-90]					[YTTTRIUM-90]				
Exposure Route	Time Weighted	Non-Time Weighted			Time Weighted	Non-Time Weighted			
	Risk	Time	Risk	Time	Risk	Time	Risk	Time	
	Value	Per.	Value	Per.	Value	Per.	Value	Per.	
INGESTION/DERMAL									
Drinking Water	3.86E-13	1	3.86E-13	1	4.97E-22	1	4.97E-22	1	
Finfish	3.12E-13	1	3.12E-13	1	1.75E-23	1	1.75E-23	1	
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0	
Leafy Vegetables	1.41E-12	1	1.41E-12	1	1.20E-22	1	1.20E-22	1	
Other Vegetables	4.31E-12	1	4.31E-12	1	2.61E-29	1	2.61E-29	1	

Meat	3.53E-14	1	3.53E-14	1	5.41E-26	1	5.41E-26	1
Milk	6.82E-13	1	6.82E-13	1	1.01E-24	1	1.01E-24	1
Swimming	2.39E-15	1	2.39E-15	1	3.52E-24	1	3.52E-24	1
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
EXTERNAL RADIATION								
Boating	1.47E-19	1	1.47E-19	1	1.04E-26	1	1.04E-26	1
Shoreline	1.81E-15	1	1.81E-15	1	1.64E-26	1	1.64E-26	1
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[TRITIUM]		1	
	Time Weighted	Non-Time Weighted		
INGESTION/DERMAL				
Drinking Water	2.26E-13	1	2.26E-13	1
Finfish	7.29E-16	1	7.29E-16	1
Shellfish	0.00E+00	0	0.00E+00	0
Leafy Vegetables	8.28E-15	1	8.28E-15	1
Other Vegetables	5.21E-14	1	5.21E-14	1
Meat	2.63E-14	1	2.63E-14	1
Milk	3.33E-14	1	3.33E-14	1
Swimming	2.80E-16	1	2.80E-16	1
Soil Ingestion	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0
INHALATION				
Inhalation	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0
EXTERNAL RADIATION				
Boating	0.00E+00	0	0.00E+00	0
Shoreline	0.00E+00	0	0.00E+00	0
Ground	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

File Title Summary For Run

Run Title: SNF-EIS 100K Area --- LOWFLOW .HIN

Run Date and Time: 4/25/1994 14:29:40

Constituent Database: UPDATED March 25, 1993 DLS/PEIS

Water Data File: DOE Ha --- LOWFLOW .WAT

APPENDIX C

WET STORAGE OF NUCLEAR FUELS NEW POOL STORAGE FACILITY ACCIDENT SCENARIO

*****4/17/1993 VERSION I1ldarc*****

RADCON -- WATERBORNE TRANSPORT COMPONENT for the Multimedia
Environmental Pollutant Assessment System (NEPAS):
Models movement of radionuclides and other chemicals
in groundwater, surface water, and overland pathways.

Battelle, Pacific Northwest Laboratory (PNL)
P.O. Box 999, Richland, WA 99352

Developed for the U.S. Department of Energy

Input file for this run is NPSF04 .WIN

Modeling Scenario Number 1

Name of Facility = DOE Hanford
Name of Waste Unit = SNF-EIS 200 East Area
Transport Scenario = SS-T3 Surface soil >Groundwater
Exposure Scenario = SW-E2
Usage Location Number = 6
Usage Location Medium = 3
Usage Location Name =

TLIFE is the duration of release for each contaminant expressed in years.
TDIFF is the time difference in years between the current date and the
date when contaminants were first released into the environment.

Constituent Name	TLIFE (years)	TDIFF (years)	TFINAL (years)
CESIUM-1	9.000E-04	0.000E+00	7.001E+03
CESIUM-1	9.000E-04	0.000E+00	7.001E+03
COBALT-6	9.000E-04	0.000E+00	7.001E+03
PLUTONIUM	9.000E-04	0.000E+00	7.001E+03
PLUTONIUM	9.000E-04	0.000E+00	7.001E+03
STRONTIUM	9.000E-04	0.000E+00	7.001E+03
TRITIUM	9.000E-04	0.000E+00	7.001E+03

#	Constituent	NUM
1	CESIUM-1	2
2	CESIUM-1	2
3	COBALT-6	2
4	PLUTONIUM	2
5	PLUTONIUM	2
6	STRONTIUM	2
7	TRITIUM	2

Known Infiltration Rate to Unsaturated Zone (VLEACH) = 2.63E+01 cm/day

Source-Term Type (ISTYPE) = 1
Source-Term Flux Boundary Conditions (ISOURC) = 2
Liquid Impoundment Index (IPOND) = 2
Source-Term Decay Index (IDECAY) = 1
Direct Discharge Surface Water Index (IDDSW) = 0
Number of Parent Constituents (NUMCON) = 7

Source-Term Configuration (ISCONF) = 4
Number of Media (NMED) = 5
Number of Integration Time Steps (NTIMES) = 40

Medium # 1 Equals Medium Type (MED) # 1
Medium # 2 Equals Medium Type (MED) # 1
Medium # 3 Equals Medium Type (MED) # 1

Medium # 4 Equals Medium Type (MED) # 4
 Medium # 5 Equals Medium Type (MED) # 5

Length of Release Unit (AL1 OR CLEN) = 1.61E+04 cm
 Width of release Unit (B1) = 1.61E+04 cm

Water concentration units are: ATTO (1.000E-18) Ci OR g

Constituent	CAS ID	Half-Life (Years)	Initial Conc.	Surface Equilibrium Coeff. (ml/g)	Solubility limit (g/ml)	Constituent Inventory (g OR Ci)
CESIUM-1	CS134	2.06E+00	-9.99E+01	-9.99E+01	1.00E+23	3.06E-03
CESIUM-1	CS137	3.01E+01	-9.99E+01	-9.99E+01	1.00E+23	2.17E-01
COBALT-6	CO60	5.28E+00	-9.99E+01	-9.99E+01	1.00E+23	1.28E-03
PLUTONIUM	PU238	8.79E+01	-9.99E+01	-9.99E+01	1.00E+23	5.82E-06
URANIUM	U234	2.45E+05				
THORIUM	TH230	7.69E+04				
PLUTONIUM	PU239	2.41E+04	-9.99E+01	-9.99E+01	1.00E+23	3.06E-05
URANIUM	U235	7.04E+08				
STRONTIUM	SR90	2.88E+01	-9.99E+01	-9.99E+01	1.00E+23	1.09E+00
YTTRIUM	Y90	7.39E-03				
TRITIUM	H3	1.23E+01	-9.99E+01	-9.99E+01	1.00E+23	4.73E-01

Constituent Flux (g/yr or Ci/yr) and Time (Years) at the Release Unit

Constituent #	Flux	Time	Constituent #	Flux	Time
1 1	3.40E+00	0.000E+00	1 2	3.40E+00	9.000E-04
2 1	2.41E+02	0.000E+00	2 2	2.41E+02	9.000E-04
3 1	1.42E+00	0.000E+00	3 2	1.42E+00	9.000E-04
4 1	6.46E-03	0.000E+00	4 2	6.46E-03	9.000E-04
5 1	3.40E-02	0.000E+00	5 2	3.40E-02	9.000E-04
6 1	1.21E+03	0.000E+00	6 2	1.21E+03	9.000E-04
7 1	5.26E+02	0.000E+00	7 2	5.26E+02	9.000E-04

New Constituent Flux (g/yr or Ci/yr) and Time (Years) at the Release Unit

Constituent #	Flux	Time	Constituent #	Flux	Time
1 1	3.40E+00	0.000E+00	1 2	3.40E+00	9.000E-04
2 1	2.41E+02	0.000E+00	2 2	2.41E+02	9.000E-04
3 1	1.42E+00	0.000E+00	3 2	1.42E+00	9.000E-04
4 1	6.46E-03	0.000E+00	4 2	6.46E-03	8.999E-04
5 1	3.40E-02	0.000E+00	5 2	3.40E-02	9.000E-04
6 1	1.21E+03	0.000E+00	6 2	1.21E+03	9.000E-04
7 1	5.26E+02	0.000E+00	7 2	5.26E+02	9.000E-04

The New Duration of Time that Constituents are Released from the Release Unit

#	Constituent	New TLIFE (Years)
1	CESIUM-1	9.000E-04
2	CESIUM-1	9.000E-04
3	COBALT-6	9.000E-04
4	PLUTONIUM	8.999E-04
5	PLUTONIUM	9.000E-04
6	STRONTIUM	9.000E-04
7	TRITIUM	9.000E-04

Modeling Medium # 1
 Medium Type (MED) = 1
 Source Configuration = 4
 Source Term Discharge Type = 1
 PARTIALLY SATURATED ZONE

Thickness of Unsaturated Layer (H1) = 1.01E+03 cm
 X-Direction Dispersivity (A1) = 1.01E+01 cm
 Bulk Density (R2) = 1.80E+00 g/cm**3
 Total Porosity (AN4) = 3.60E-01 (fraction)
 Field Capacity (AN5) = 1.90E-01 (fraction)
 Permeability (X2) = 1.32E+02 cm/day
 Leach Rate (VLEACH) = 2.63E+01 cm/day
 Soil-Type Coefficient (A2) = 4.05E+00

Moisture Content (AN5) = 31.13 %
 Infiltration Rate (U) = 8.46E+01 cm/day

NO	PARENT	HALFLIFE YEARS	KD CC/GM	RETARDATION FACTOR
1	CESIUM-1	2.06200E+00	1.00000E+01	5.88273E+01
2	CESIUM-1	3.01200E+01	1.00000E+01	5.88273E+01
3	COBALT-6	5.28400E+00	0.00000E+00	1.00000E+00
4	PLUTONIUM	8.78900E+01	1.00000E+01	5.88273E+01
5	PLUTONIUM	2.41200E+04	1.00000E+01	5.88273E+01
6	STRONTIUM	2.87500E+01	7.00000E+00	4.14791E+01
7	TRITIUM	1.22900E+01	0.00000E+00	1.00000E+00

Constituent	CAS ID	Half-Life (Years)	Initial Conc.	Surface Equilibrium Coeff. (ml/g)	Solubility limit (g/ml)	Constituent Inventory (g OR Ci)
CESIUM-1	CS134	2.06E+00	-9.99E+01	-9.99E+01	1.00E+23	3.06E-03
CESIUM-1	CS137	3.01E+01	-9.99E+01	-9.99E+01	1.00E+23	2.17E-01
COBALT-6	CO60	5.28E+00	-9.99E+01	-9.99E+01	1.00E+23	1.28E-03
PLUTONIUM	PU238	8.79E+01	-9.99E+01	-9.99E+01	1.00E+23	5.82E-06
PLUTONIUM	PU239	2.41E+04	-9.99E+01	-9.99E+01	1.00E+23	3.06E-05
STRONTIUM	SR90	2.88E+01	-9.99E+01	-9.99E+01	1.00E+23	1.09E+00
TRITIUM	H3	1.23E+01	-9.99E+01	-9.99E+01	1.00E+23	4.73E-01

Computed Initial at the Release Unit (DMAX) = 1.36E-12

Computed Initial at the Release Unit (DMAX) = 9.68E-11

Computed Initial at the Release Unit (DMAX) = 5.72E-13

Computed Initial at the Release Unit (DMAX) = 2.60E-15

Computed Initial at the Release Unit (DMAX) = 1.36E-14

Computed Initial at the Release Unit (DMAX) = 4.84E-10

Computed Initial at the Release Unit (DMAX) = 2.11E-10

Modeling Medium # = 2
 Medium Type (MED) = 1
 Source Configuration = 4
 Source Term Discharge Type = 1
 PARTIALLY SATURATED ZONE

Thickness of Unsaturated Layer (H1) = 5.00E+03 cm
 X-Direction Dispersivity (A1) = 5.00E+01 cm
 Bulk Density (R2) = 1.60E+00 g/cm**3
 Total Porosity (AN4) = 4.20E-01 (fraction)
 Field Capacity (AN5) = 8.50E-02 (fraction)
 Permeability (X2) = 4.33E+02 cm/day
 Leach Rate (VLEACH) = 7.21E-02 cm/day
 Soil-Type Coefficient (A2) = 4.05E+00

Moisture Content (AN5) = 32.64 %
 Infiltration Rate (U) = 8.07E+01 cm/day

NO	PARENT	DECAY RATE 1/YEARS	KD CC/GM	RETARDATION FACTOR
1	CESIUM-1	3.36153E-01	1.00000E+01	5.00236E+01
2	CESIUM-1	2.30129E-02	1.00000E+01	5.00236E+01
3	COBALT-6	1.31178E-01	0.00000E+00	1.00000E+00
4	PLUTONIUM	7.88653E-03	1.00000E+01	5.00236E+01
5	PLUTONIUM	2.87374E-05	1.00000E+01	5.00236E+01
6	STRONTIUM	2.41095E-02	7.00000E+00	3.53165E+01
7	TRITIUM	5.63993E-02	0.00000E+00	1.00000E+00

Modeling Medium # = 3
 Medium Type (MED) = 1
 Source Configuration = 4
 Source Term Discharge Type = 1
 PARTIALLY SATURATED ZONE

Thickness of Unsaturated Layer (H1) = 1.89E+03 cm
 X-Direction Dispersivity (A1) = 1.89E+01 cm
 Bulk Density (R2) = 1.80E+00 g/cm**3
 Total Porosity (AN4) = 3.60E-01 (fraction)
 Field Capacity (AN5) = 1.90E-01 (fraction)
 Permeability (X2) = 1.32E+02 cm/day
 Leach Rate (VLEACH) = 7.21E-02 cm/day
 Soil-Type Coefficient (A2) = 4.05E+00

Moisture Content (AN5) = 31.13 %
 Infiltration Rate (U) = 8.46E+01 cm/day

NO	PARENT	DECAY RATE 1/YEARS	KD CC/GM	RETARDATION FACTOR
1	CESIUM-1	3.36153E-01	1.00000E+01	5.88273E+01
2	CESIUM-1	2.30129E-02	1.00000E+01	5.88273E+01
3	COBALT-6	1.31178E-01	0.00000E+00	1.00000E+00
4	PLUTONIUM	7.88653E-03	1.00000E+01	5.88273E+01
5	PLUTONIUM	2.87374E-05	1.00000E+01	5.88273E+01
6	STRONTIUM	2.41095E-02	7.00000E+00	4.14791E+01
7	TRITIUM	5.63993E-02	0.00000E+00	1.00000E+00

Modeling Medium # = 4
 Medium Type (MED) = 4
 Source Configuration = 4
 Source Term Discharge Type = 1
 SATURATED ZONE AT A RIVER

NO	PARENT	DECAY RATE 1/YEARS	KD CC/GM	RETARDATION FACTOR
1	CESIUM-1	3.36153E-01	1.00000E+01	9.15172E+01
2	CESIUM-1	2.30129E-02	1.00000E+01	9.15172E+01
3	COBALT-6	1.31178E-01	0.00000E+00	1.00000E+00
4	PLUTONIUM	7.88653E-03	1.00000E+01	9.15172E+01
5	PLUTONIUM	2.87374E-05	1.00000E+01	9.15172E+01
6	STRONTIUM	2.41095E-02	7.00000E+00	6.43621E+01
7	TRITIUM	5.63993E-02	0.00000E+00	1.00000E+00

Groundwater Velocity (U) = 1.07E+03 cm/day

Aquifer Thickness (H1) = 1.04E+03 cm
 X-Direction Dispersivity (A1) = 2.41E+05 cm
 Y-Direction Dispersivity (A2) = 4.82E+04 cm
 Z-Direction Dispersivity (A3) = 2.80E+02 cm
 Bulk Density (R2) = 2.10E+00 g/cm**3
 Total Porosity (AN4) = 2.60E-01 (fraction)
 Effective Porosity (AN5) = 2.32E-01 (fraction)
 Length of Burial Area (AL1) = 1.61E+04 cm
 Width of Burial Area (B1) = 1.61E+04 cm
 Depth of Release Unit Below Water Table (HW) = 0.00E+00 cm
 Distance Downgradient from Center of Source (X2) = 2.41E+06 cm
 Lateral Hydraulic Conductivity (HC) = 0.00E+00 cm/day

Modeling Medium # = 5
 Medium Type (MED) = 5
 Source Configuration = 4
 Source Term Discharge Type = 1
 SURFACE WATER ENVIRONMENT

Number of River Receptor Locations (NUMREC) = 8
 Flow Velocity (U1) = 1.66E+09 cm/year
 Depth of Flow (H1) = 4.88E+02 cm
 Width of River (B1) = 3.96E+04 cm
 Downstream Discharge at First Receptor (QNEW) = 3.22E+16 cm**3/year
 Distance Downstream from Center of Source (X3) = 1.00E+04 cm

Uniform Mixing Distance = 1.38E+03 cm

Present Concentration for CESIUM-1 IS 0.000E+00(g/ml or Ci/ml)
 Concentrations for CESIUM-1 at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 0.000E+00 (g/ml or Ci/ml) at 28.7 years (2021)

Concentrations for COBALT-6 at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 3.436E-25 (g/ml or Ci/ml) at 1.2 years (1994)

Concentrations for PLUTONIUM at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 0.000E+00 (g/ml or Ci/ml) at 49.2 years (2042)

Concentrations for URANIUM- at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 0.000E+00 (g/ml or Ci/ml) at 49.2 years (2042)

Concentrations for THORIUM- at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 0.000E+00 (g/ml or Ci/ml) at 49.2 years (2042)

Concentrations for PLUTONIUM at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 7.910E-29 (g/ml or Ci/ml) at 96.8 years (2089)

Concentrations for URANIUM- at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 7.553E-36 (g/ml or Ci/ml) at 96.8 years (2089)

Present Concentration for STRONTIUM IS 0.000E+00(g/ml or Ci/ml)
 Present Concentration for YTTRIUM- IS 0.000E+00(g/ml or Ci/ml)
 Concentrations for TRITIUM at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 1.533E-22 (g/ml or Ci/ml) at 1.3 years (1994)

Maximum Constituent Concentrations:

CESIUM-1: 0.000E+00 (g/ml or Ci/ml) at .0 Years (1993)
CESIUM-1: 1.722E-23 (g/ml or Ci/ml) at 229.7 Years (2222)
COBALT-6: 1.561E-21 (g/ml or Ci/ml) at 5.0 Years (1997)
PLUTONIUM: 2.246E-26 (g/ml or Ci/ml) at 295.5 Years (2288)
URANIUM-: 1.508E-28 (g/ml or Ci/ml) at 492.4 Years (2485)
THORIUM-: 5.719E-31 (g/ml or Ci/ml) at 590.9 Years (2583)
PLUTONIUM: 2.227E-24 (g/ml or Ci/ml) at 483.9 Years (2476)
URANIUM-: 1.156E-30 (g/ml or Ci/ml) at 580.7 Years (2573)
STRONTIUM: 3.613E-22 (g/ml or Ci/ml) at 167.9 Years (2160)
YTTRIUM-: 3.614E-22 (g/ml or Ci/ml) at 167.9 Years (2160)
TRITIUM : 8.184E-19 (g/ml or Ci/ml) at 5.0 Years (1998)

Modeling Scenario Number 2

Name of Facility = DOE Hanford
Name of Waste Unit = SNF-EIS 200 East Area
Transport Scenario = SS-T3 Surface soil >Groundwater
Exposure Scenario = SW-E3 SW-E4 SW-E5
Usage Location Number = 1
Usage Location Medium = 3
Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

CESIUM-1: 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
CESIUM-1: 3.312E-23 (g/ml or Ci/ml) at 229.7 years (2222)
COBALT-6: 3.001E-21 (g/ml or Ci/ml) at 5.0 years (1997)
PLUTONIUM: 4.319E-26 (g/ml or Ci/ml) at 295.5 years (2288)
URANIUM-: 2.899E-28 (g/ml or Ci/ml) at 492.4 years (2485)
THORIUM-: 1.100E-30 (g/ml or Ci/ml) at 590.9 years (2583)
PLUTONIUM: 4.283E-24 (g/ml or Ci/ml) at 483.9 years (2476)
URANIUM-: 2.222E-30 (g/ml or Ci/ml) at 580.7 years (2573)
STRONTIUM: 6.947E-22 (g/ml or Ci/ml) at 167.9 years (2160)
YTTRIUM-: 6.948E-22 (g/ml or Ci/ml) at 167.9 years (2160)
TRITIUM : 1.574E-18 (g/ml or Ci/ml) at 5.0 years (1998)

Modeling Scenario Number 3

Name of Facility = DOE Hanford
Name of Waste Unit = SNF-EIS 200 East Area
Transport Scenario = SS-T3 Surface soil >Groundwater
Exposure Scenario = SW-E3 SW-E4 SW-E5
Usage Location Number = 7
Usage Location Medium = 3
Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

CESIUM-1:	0.000E+00 (g/ml or Ci/ml)	at	.0 years (1993)
CESIUM-1:	3.312E-23 (g/ml or Ci/ml)	at	229.7 years (2222)
COBALT-6:	3.001E-21 (g/ml or Ci/ml)	at	5.0 years (1997)
PLUTONIUM:	4.319E-26 (g/ml or Ci/ml)	at	295.5 years (2288)
URANIUM-:	2.899E-28 (g/ml or Ci/ml)	at	492.4 years (2485)
THORIUM-:	1.100E-30 (g/ml or Ci/ml)	at	590.9 years (2583)
PLUTONIUM:	4.283E-24 (g/ml or Ci/ml)	at	483.9 years (2476)
URANIUM-:	2.222E-30 (g/ml or Ci/ml)	at	580.7 years (2573)
STRONTIUM:	6.947E-22 (g/ml or Ci/ml)	at	167.9 years (2160)
YTTRIUM-:	6.948E-22 (g/ml or Ci/ml)	at	167.9 years (2160)
TRITIUM :	1.574E-18 (g/ml or Ci/ml)	at	5.0 years (1998)

 Modeling Scenario Number 4

Name of Facility = DOE Hanford
 Name of Waste Unit = SNF-EIS 200 East Area
 Transport Scenario = SS-T3 Surface soil >Groundwater
 Exposure Scenario = SW-E1 SW-E6
 Usage Location Number = 4
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

CESIUM-1:	0.000E+00 (g/ml or Ci/ml)	at	.0 years (1993)
CESIUM-1:	3.312E-23 (g/ml or Ci/ml)	at	229.7 years (2222)
COBALT-6:	3.001E-21 (g/ml or Ci/ml)	at	5.0 years (1997)
PLUTONIUM:	4.319E-26 (g/ml or Ci/ml)	at	295.5 years (2288)
URANIUM-:	2.899E-28 (g/ml or Ci/ml)	at	492.4 years (2485)
THORIUM-:	1.100E-30 (g/ml or Ci/ml)	at	590.9 years (2583)
PLUTONIUM:	4.283E-24 (g/ml or Ci/ml)	at	483.9 years (2476)
URANIUM-:	2.222E-30 (g/ml or Ci/ml)	at	580.7 years (2573)
STRONTIUM:	6.947E-22 (g/ml or Ci/ml)	at	167.9 years (2160)
YTTRIUM-:	6.948E-22 (g/ml or Ci/ml)	at	167.9 years (2160)
TRITIUM :	1.574E-18 (g/ml or Ci/ml)	at	5.0 years (1998)

 Modeling Scenario Number 5

Name of Facility = DOE Hanford
 Name of Waste Unit = SNF-EIS 200 East Area
 Transport Scenario = SS-T3 Surface soil >Groundwater
 Exposure Scenario = SW-E1 SW-E6
 Usage Location Number = 5
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

CESIUM-1:	0.000E+00 (g/ml or Ci/ml)	at	.0 years (1993)
CESIUM-1:	3.312E-23 (g/ml or Ci/ml)	at	229.7 years (2222)
COBALT-6:	3.001E-21 (g/ml or Ci/ml)	at	5.0 years (1997)
PLUTONIUM:	4.319E-26 (g/ml or Ci/ml)	at	295.5 years (2288)
URANIUM-:	2.899E-28 (g/ml or Ci/ml)	at	492.4 years (2485)
THORIUM-:	1.100E-30 (g/ml or Ci/ml)	at	590.9 years (2583)

PLUTONIUM: 4.283E-24 (g/ml or Ci/ml) at 483.9 years (2476)
 URANIUM-: 2.222E-30 (g/ml or Ci/ml) at 580.7 years (2573)
 STRONTIUM: 6.947E-22 (g/ml or Ci/ml) at 167.9 years (2160)
 YTTRIUM-: 6.948E-22 (g/ml or Ci/ml) at 167.9 years (2160)
 TRITIUM : 1.574E-18 (g/ml or Ci/ml) at 5.0 years (1998)

Modeling Scenario Number 6

Name of Facility = DOE Hanford
 Name of Waste Unit = SNF-EIS 200 East Area
 Transport Scenario = SS-T3 Surface soil >Groundwater
 Exposure Scenario = SW-E1 SW-E6 SW-E7 SW-E8
 Usage Location Number = 3
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

CESIUM-1: 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 CESIUM-1: 3.312E-23 (g/ml or Ci/ml) at 229.7 years (2222)
 COBALT-6: 3.001E-21 (g/ml or Ci/ml) at 5.0 years (1997)
 PLUTONIUM: 4.319E-26 (g/ml or Ci/ml) at 295.5 years (2288)
 URANIUM-: 2.899E-28 (g/ml or Ci/ml) at 492.4 years (2485)
 THORIUM-: 1.100E-30 (g/ml or Ci/ml) at 590.9 years (2583)
 PLUTONIUM: 4.283E-24 (g/ml or Ci/ml) at 483.9 years (2476)
 URANIUM-: 2.222E-30 (g/ml or Ci/ml) at 580.7 years (2573)
 STRONTIUM: 6.947E-22 (g/ml or Ci/ml) at 167.9 years (2160)
 YTTRIUM-: 6.948E-22 (g/ml or Ci/ml) at 167.9 years (2160)
 TRITIUM : 1.574E-18 (g/ml or Ci/ml) at 5.0 years (1998)

Modeling Scenario Number 7

Name of Facility = DOE Hanford
 Name of Waste Unit = SNF-EIS 200 East Area
 Transport Scenario = SS-T3 Surface soil >Groundwater
 Exposure Scenario = SW-E1 SW-E6 SW-E7 SW-E8
 Usage Location Number = 2
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

CESIUM-1: 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 CESIUM-1: 3.312E-23 (g/ml or Ci/ml) at 229.7 years (2222)
 COBALT-6: 3.001E-21 (g/ml or Ci/ml) at 5.0 years (1997)
 PLUTONIUM: 4.319E-26 (g/ml or Ci/ml) at 295.5 years (2288)
 URANIUM-: 2.899E-28 (g/ml or Ci/ml) at 492.4 years (2485)
 THORIUM-: 1.100E-30 (g/ml or Ci/ml) at 590.9 years (2583)
 PLUTONIUM: 4.283E-24 (g/ml or Ci/ml) at 483.9 years (2476)
 URANIUM-: 2.222E-30 (g/ml or Ci/ml) at 580.7 years (2573)
 STRONTIUM: 6.947E-22 (g/ml or Ci/ml) at 167.9 years (2160)
 YTTRIUM-: 6.948E-22 (g/ml or Ci/ml) at 167.9 years (2160)
 TRITIUM : 1.574E-18 (g/ml or Ci/ml) at 5.0 years (1998)

 Modeling Scenario Number 8

Name of Facility = DOE Hanford
 Name of Waste Unit = SNF-EIS 200 East Area
 Transport Scenario = SS-T3 Surface soil >Groundwater
 Exposure Scenario = SW-E3 SW-E4 SW-E5
 Usage Location Number = 8
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

 Maximum Constituent Concentrations:

CESIUM-1:	0.000E+00 (g/ml or Ci/ml) at	.0 years (1993)
CESIUM-1:	3.312E-23 (g/ml or Ci/ml) at	229.7 years (2222)
COBALT-6:	3.001E-21 (g/ml or Ci/ml) at	5.0 years (1997)
PLUTONIUM:	4.319E-26 (g/ml or Ci/ml) at	295.5 years (2288)
URANIUM-:	2.899E-28 (g/ml or Ci/ml) at	492.4 years (2485)
THORIUM-:	1.100E-30 (g/ml or Ci/ml) at	590.9 years (2583)
PLUTONIUM:	4.283E-24 (g/ml or Ci/ml) at	483.9 years (2476)
URANIUM-:	2.222E-30 (g/ml or Ci/ml) at	580.7 years (2573)
STRONTIUM:	6.947E-22 (g/ml or Ci/ml) at	167.9 years (2160)
YTTRIUM-:	6.948E-22 (g/ml or Ci/ml) at	167.9 years (2160)
TRITIUM :	1.574E-18 (g/ml or Ci/ml) at	5.0 years (1998)

Multimedia Environmental Pollutant Assessment System (MEPAS)

MEPAS Hazard Potential Output (VERSION 041292)
 Pacific Northwest Laboratory
 Richland, WA 99352
 Developed for the U.S. Department of Energy

Run Date and Time: 11/22/1993 12:16:19
 (This run used 630. effects per million man-rem)
 Run Title: SNF-EIS 200 East Area
 Ranking Unit 1 : NPSF04

Number of Constituents is: 11
 Time Discounted HPis are computed using 70 year time periods (Time Index = 0)

Num	Constituent Names	CASID
1	CESIUM-134	CS134
2	CESIUM-137+D	CS137
3	COBALT-60	CO60
4	PLUTONIUM-238	PU238
5	URANIUM-234	U234
6	THORIUM-230	TH230
7	PLUTONIUM-239	PU239
8	URANIUM-235	U235
9	STRONTIUM-90	SR90
10	YTTRIUM-90	Y90
11	TRITIUM (as tritiated water, HTO)	H3

Summary of Data from MEPAS Constituent Database
 CONSTITUENT DATA LIBRARY FOR MEPAS - UPDATED March 25, 1993 DLS/PEIS
 This Database Contains Entries for 400 Constituents

Constituent Parameter	Parameter Units	Constituent 1	Constituent 2	Constituent 3	Constituent 4
ID / CAS #:	(None)	CS134	CS137	CO60	PU238
Toxicity Type:	(None)	1	1	1	1
Mol. Weight:	g/mole	1.340E+02	1.370E+02	6.000E+01	2.380E+02
Vapor Pressure:	mm-Hg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Henry's Law Con:	atm*m3/mole	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water Sol:	mg/L	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Carbon Mat Part:	ml/g	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Oct Wat Part:	(None)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1/2-life in AIR:	days	7.530E+02	1.100E+04	1.930E+03	3.210E+04
1/2-life in GW:	days	7.530E+02	1.100E+04	1.930E+03	3.210E+04
1/2-life in SW:	days	7.530E+02	1.100E+04	1.930E+03	3.210E+04
1/2-life in SOIL:	days	7.530E+02	1.100E+04	1.930E+03	3.210E+04
Ing Dose Fact:	1/Kg or rem/pCi	7.330E-08	5.000E-08	2.690E-08	3.200E-06
Inh Dose Fact:	1/Kg or rem/pCi	4.630E-08	3.200E-08	2.190E-07	3.920E-04
Air Imm Fact:	rem*m3/pCi*h	1.010E-09	3.400E-10	1.680E-09	6.490E-14
Soil Exp Fact:	rem*m2/pCi*h	2.020E-11	6.800E-12	3.130E-11	1.110E-14
Water Imm Fact:	rem*L/pCi*h	2.190E-09	6.900E-10	3.640E-09	1.510E-13
Fish Bioaccum:	(None)	2.000E+03	2.000E+03	3.300E+02	2.500E+02
Shell Bioaccum:	(None)	1.000E+02	1.000E+02	2.000E+02	1.000E+02
Veg Bioaccum:	(None)	1.230E-02	1.230E-02	1.000E-02	5.000E-05
Meat Trans Fact:	day/Kg	2.000E-02	2.000E-02	2.000E-02	5.000E-07
Milk Trans Fact:	day/L	7.000E-03	7.000E-03	2.000E-03	1.000E-07
Water Pur Fact:	(None)	9.000E-01	9.000E-01	2.000E-01	7.000E-01

Dep Velocity:	m/sec	1.000E-03	1.000E-03	1.000E-03	1.000E-03
Atmos Dis Class:	(None)	1	1	1	1
Inh Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Summary of Data from MEPAS Constituent Database (Cont)

Constituent Parameter	Parameter Units	Constituent 1	Constituent 2	Constituent 3	Constituent 4
Inh Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Ref Dose:	mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Ref Dose:	mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Tox Uncert	HPI units	5	5	5	5
Inh Tox Uncert	HPI units	5	5	5	5
Phys Prop Uncert	HPI units	3	3	3	3
Tran Fact Uncert	HPI units	3	3	3	3

Toxicity Type 1: Radionuclide carcinogenic inhalation and ingestion
 Toxicity Type 2: Chemical carcinogenic inhalation and ingestion
 Toxicity Type 3: Chemical carcinogenic inhalation, non-carcinogenic ingestion
 Toxicity Type 4: Chemical non-carcinogenic inhalation, carcinogenic ingestion
 Toxicity Type 5: Chemical non-carcinogenic inhalation and ingestion

KEY for Constituent Table

Constituent 1 = CESIUM-134
 Constituent 2 = CESIUM-137+D
 Constituent 3 = COBALT-60
 Constituent 4 = PLUTONIUM-238

Summary of Data from MEPAS Constituent Database (Cont)
 CONSTITUENT DATA LIBRARY FOR MEPAS - UPDATED March 25, 1993 DLS/PEIS
 This Database Contains Entries for 400 Constituents

Constituent Parameter	Parameter Units	Constituent 5	Constituent 6	Constituent 7	Constituent 8
ID / CAS #:	(None)	U234	TH230	PU239	U235
Toxicity Type:	(None)	1	1	1	1
Mol. Weight:	g/mole	2.340E+02	2.300E+02	2.390E+02	2.350E+02
Vapor Pressure:	mm-Hg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Henry's Law Con:	atm*m3/mole	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water Sol:	mg/L	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Carbon Mat Part:	ml/g	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Oct Wat Part:	(None)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1/2-life in AIR:	days	8.930E+07	2.810E+07	8.810E+06	2.570E+11
1/2-life in GW:	days	8.930E+07	2.810E+07	8.810E+06	2.570E+11
1/2-life in SW:	days	8.930E+07	2.810E+07	8.810E+06	2.570E+11
1/2-life in SOIL:	days	8.930E+07	2.810E+07	8.810E+06	2.570E+11
Ing Dose Fact:	1/Kg or rem/pCi	2.830E-07	5.480E-07	3.540E-06	2.700E-07
Inh Dose Fact:	1/Kg or rem/pCi	1.320E-04	3.260E-04	4.290E-04	1.200E-04
Air Imm Fact:	rem*m3/pCi*h	1.020E-13	2.330E-13	5.640E-14	8.900E-11
Soil Exp Fact:	rem*m2/pCi*h	9.960E-15	9.990E-15	4.890E-15	2.000E-12
Water Imm Fact:	rem*L/pCi*h	2.330E-13	5.240E-13	1.280E-13	3.000E-10
Fish Bioaccum:	(None)	5.000E+01	1.000E+02	2.500E+02	5.000E+01
Shell Bioaccum:	(None)	6.000E+01	5.000E+02	1.000E+02	6.000E+01
Veg Bioaccum:	(None)	3.500E-03	3.000E-05	5.000E-05	3.500E-03
Meat Trans Fact:	day/Kg	2.000E-04	6.000E-06	5.000E-07	2.000E-04
Milk Trans Fact:	day/L	6.000E-04	5.000E-06	1.000E-07	6.000E-04
Water Pur Fact:	(None)	7.000E-01	7.000E-01	7.000E-01	7.000E-01
Dep Velocity:	m/sec	1.000E-03	1.000E-03	1.000E-03	1.000E-03
Atmos Dis Class:	(None)	1	1	1	1
Inh Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Ref Dose:	mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Ref Dose:	mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Tox Uncert	HPI units	5	5	5	5
Inh Tox Uncert	HPI units	5	5	5	5
Phys Prop Uncert	HPI units	3	3	3	3

Tran Fact Uncert HPI units

3

3

3

3

Toxicity Type 1: Radionuclide carcinogenic inhalation and ingestion
 Toxicity Type 2: Chemical carcinogenic inhalation and ingestion
 Toxicity Type 3: Chemical carcinogenic inhalation, non-carcinogenic ingestion
 Toxicity Type 4: Chemical non-carcinogenic inhalation, carcinogenic ingestion
 Toxicity Type 5: Chemical non-carcinogenic inhalation and ingestion

KEY for Constituent Table

Constituent 5 = URANIUM-234

Constituent 6 = THORIUM-230

Constituent 7 = PLUTONIUM-239

Constituent 8 = URANIUM-235

Summary of Data from MEPAS Constituent Database (Cont)
 CONSTITUENT DATA LIBRARY FOR MEPAS - UPDATED March 25, 1993 DLS/PEIS
 This Database Contains Entries for 400 Constituents

Constituent Parameter	Parameter Units	Constituent 9	Constituent 10	Constituent 11
ID / CAS #:	(None)	SR90	Y90	H3
Toxicity Type:	(None)	1	1	1
Mol. Weight:	g/mole	9.000E+01	9.000E+01	2.000E+01
Vapor Pressure:	mm-Hg	0.000E+00	0.000E+00	2.380E+01
Henry's Law Con:	atm*m3/mole	0.000E+00	0.000E+00	6.000E-07
Water Sol:	mg/L	0.000E+00	0.000E+00	0.000E+00
Carbon Mat Part:	ml/g	0.000E+00	0.000E+00	0.000E+00
Oct Wat Part:	(None)	0.000E+00	0.000E+00	0.000E+00
1/2-life in AIR:	days	1.050E+04	2.700E+00	4.490E+03
1/2-life in GW:	days	1.050E+04	2.700E+00	4.490E+03
1/2-life in SW:	days	1.050E+04	2.700E+00	2.680E+01
1/2-life in SOIL:	days	1.050E+04	2.700E+00	6.240E+01
Ing Dose Fact:	1/Kg or rem/pCi	1.400E-07	1.080E-08	6.300E-11
Inh Dose Fact:	1/Kg or rem/pCi	1.300E-06	8.440E-09	6.300E-11
Air Imm Fact:	rem*m3/pCi*h	1.300E-12	2.530E-12	0.000E+00
Soil Exp Fact:	rem*m2/pCi*h	6.700E-14	7.090E-14	0.000E+00
Water Imm Fact:	rem*L/pCi*h	1.300E-12	4.830E-12	0.000E+00
Fish Bioaccum:	(None)	5.000E+01	2.500E+01	1.000E+00
Shell Bioaccum:	(None)	1.000E+02	1.000E+03	1.000E+00
Veg Bioaccum:	(None)	2.030E-01	1.500E-03	0.000E+00
Meat Trans Fact:	day/Kg	3.000E-04	3.000E-04	0.000E+00
Milk Trans Fact:	day/L	1.500E-03	2.000E-05	0.000E+00
Water Pur Fact:	(None)	2.000E-01	2.000E-01	1.000E+00
Dep Velocity:	m/sec	1.000E-03	1.000E-03	0.000E+00
Atmos Dis Class:	(None)	1	1	4
Inh Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00
Ing Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00
Inh Ref Dose:	mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00
Ing Ref Dose:	mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00
Inh Tox Uncert	HPI units	5	5	5
Ing Tox Uncert	HPI units	5	5	5
Phys Prop Uncert	HPI units	3	3	3
Tran Fact Uncert	HPI units	3	3	3

Toxicity Type 1: Radionuclide carcinogenic inhalation and ingestion
 Toxicity Type 2: Chemical carcinogenic inhalation and ingestion
 Toxicity Type 3: Chemical carcinogenic inhalation, non-carcinogenic ingestion
 Toxicity Type 4: Chemical non-carcinogenic inhalation, carcinogenic ingestion
 Toxicity Type 5: Chemical non-carcinogenic inhalation and ingestion

KEY for Constituent Table

Constituent 9 = STRONTIUM-90

Constituent 10 = YTTRIUM-90

Constituent 11 = TRITIUM

USAGE LOCATION DATA FOR SURFACE WATER PATHWAY

Location Parameter	Units	Location 1	Location 2	Location 3	Location 4	Location 5
Drink Index: (None)		0	0	0	2	2
Drink Pop: People		0.000E+00	0.000E+00	0.000E+00	4.216E+04	2.034E+04
Rec Index: (None)		0	0	0	0	0
Rec Pop: People		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Aquatic Index:(None)		1	0	0	0	0
FinFish Prod: Kg/yr		1.500E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Shell Prod: Kg/yr		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Irr Index: (None)		0	1	1	0	0
Leaf Veg Prod:Kg/yr		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Veg Product: Kg/yr		0.000E+00	1.400E+08	5.800E+05	0.000E+00	0.000E+00
Meat Product: Kg/yr		0.000E+00	1.200E+06	8.400E+02	0.000E+00	0.000E+00
Milk Product: L/yr		0.000E+00	2.100E+06	2.800E+04	0.000E+00	0.000E+00
SW Trans Time:days		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Irr. Rate: L/mo		0.000E+00	1.280E+02	1.280E+02	0.000E+00	0.000E+00
Harvest Time: days		6.000E+01	6.000E+01	3.000E+01	3.000E+01	0.000E+00
Transit Time: days		0.000E+00	0.000E+00	0.000E+00	5.000E-01	5.000E-01
Water Treated:yes/no		No	No	No	Yes	Yes
H2O Ing Rate: L/day		2.000E+00	2.000E+00	2.000E+00	2.000E+00	2.000E+00
Fish Time Delay:days		1.000E+01	1.000E+01	1.000E+01	1.000E+01	1.000E+01
Inv time delay: days		1.000E+01	1.000E+01	1.000E+01	1.000E+01	1.000E+01
=====						
Drinking Index ---->	0 = No Drinking or Bathing, 1 = Bathing Only, and 2 = Drinking and Bathing					
Recreation Index -->	1 = Swimming Only, 2 = Boating Only, 3 = Shoreline Activities Only, and 4 = All of the Above					
Aquatic Index ----->	0 = No Aquatic food, 1 = Aquatic Food					
Irrigation Index -->	-1 = Animals Drinking Only, 0 = No Farm Production, 1 = Crops and Animals [Feed and Water], and 2 = Crops and Animals Feed Only					

=====

KEY for Usage Location in Table

Usage Location 1 = Aquatic Foods

Usage Location 2 = Benton Co.

Usage Location 3 = Franklin Co.

Usage Location 4 = Kennewick

Usage Location 5 = Pasco

USAGE LOCATION DATA FOR SURFACE WATER PATHWAY

Location Parameter	Units	Location 6	Location 7	Location 8
Drink Index: (None)		2	2	0
Drink Pop: People		1.000E+00	3.232E+04	0.000E+00
Rec Index: (None)		4	4	0
Rec Pop: People		1.000E+00	3.330E+05	0.000E+00
Aquatic Index:(None)		0	0	0
FinFish Prod: Kg/yr		0.000E+00	0.000E+00	0.000E+00
Shell Prod: Kg/yr		0.000E+00	0.000E+00	0.000E+00
Irr Index: (None)		0	0	1
Leaf Veg Prod:Kg/yr		0.000E+00	0.000E+00	1.600E+05
Veg Product: Kg/yr		0.000E+00	0.000E+00	8.300E+06
Meat Product: Kg/yr		0.000E+00	0.000E+00	1.800E+05
Milk Product: L/yr		0.000E+00	0.000E+00	2.800E+05
SW Trans Time:days		0.000E+00	0.000E+00	0.000E+00
Irr. Rate: L/mo		0.000E+00	0.000E+00	1.280E+02
Harvest Time: days		0.000E+00	0.000E+00	0.000E+00
Transit Time: days		5.000E-01	5.000E-01	0.000E+00
Water Treated:yes/no		Yes	Yes	No
H2O Ing Rate: L/day		2.000E+00	2.000E+00	2.000E+00
Fish Time Delay:days		1.000E+01	1.000E+01	1.000E+01
Inv time delay: days		1.000E+01	1.000E+01	1.000E+01
=====				
Drinking Index ---->	0 = No Drinking or Bathing, 1 = Bathing Only, and			

2 = Drinking and Bathing
 Recreation Index --> 1 = Swimming Only, 2 = Boating Only,
 3 = Shoreline Activities Only, and 4 = All of the Above
 Aquatic Index ----- 0 = No Aquatic food, 1 = Aquatic Food
 Irrigation Index --> -1 = Animals Drinking Only, 0 = No Farm Production,
 1 = Crops and Animals [Feed and Water], and
 2 = Crops and Animals Feed Only

=====
 KEY for Usage Location in Table
 Usage Location 6 = Restricted
 Usage Location 7 = Richland
 Usage Location 8 = Walla Walla Co.

Population Health Effects By Pollutant Table

#	Type	Health Effects, Unweighted			Weighted		
		Inhalation	Ingestion	Total	Inhalation	Ingestion	Total
1	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1	0.00E+00	6.32E-08	6.32E-08	0.00E+00	9.42E-09	9.42E-09
3	1	0.00E+00	1.04E-07	1.04E-07	0.00E+00	1.04E-07	1.04E-07
4	1	0.00E+00	4.77E-09	4.77E-09	0.00E+00	3.12E-10	3.12E-10
5	1	0.00E+00	6.35E-12	6.35E-12	0.00E+00	1.06E-13	1.06E-13
6	1	0.00E+00	5.23E-14	5.23E-14	0.00E+00	4.14E-16	4.14E-16
7	1	0.00E+00	1.08E-06	1.08E-06	0.00E+00	2.04E-08	2.04E-08
8	1	0.00E+00	5.81E-14	5.81E-14	0.00E+00	5.88E-16	5.88E-16
9	1	0.00E+00	9.85E-06	9.85E-06	0.00E+00	2.30E-06	2.30E-06
10	1	0.00E+00	7.39E-09	7.39E-09	0.00E+00	1.73E-09	1.73E-09
11	1	0.00E+00	7.03E-08	7.03E-08	0.00E+00	7.03E-08	7.03E-08

Population Health Effects Summary Table Summary Results

	Unweighted	Weighted
Radiation dose (person-rem):	1.77E-02	3.98E-03
Chemical cancer incidence:	0.00E+00	0.00E+00
Radiation cancer incidence:	3.02E-05	6.77E-06
Total cancer incidence:	3.02E-05	6.77E-06
Radiation cancer fatalities:	8.83E-06	1.98E-06
Radiation cancer hereditary:	2.35E-06	5.26E-07

HPI Values by Usage Location for the SURFACE WATER Transport Pathway

Usage Location	Constituent				
	1	2	3	4	5
Aquatic Foods	-250.00	-31.63	-29.07	-52.47	-94.53
Benton Co.	-250.00	-22.73	-12.96	-36.65	-71.15
Franklin Co.	-250.00	-45.86	-36.61	-60.48	-94.88
Kennewick	-250.00	-31.95	-28.08	-44.85	-79.93
Pasco	-250.00	-35.12	-31.25	-48.02	-83.09
Restricted	-250.00	-79.89	-70.47	-93.93	-129.00
Richland	-250.00	-26.95	-13.34	-45.93	-81.00
Walla Walla Co.	-250.00	-33.97	-24.38	-48.16	-82.68
Total for Constituent	-250.00	-20.26	-9.82	-35.06	-69.75

Usage Location	Constituent				
	6	7	8	9	10
Aquatic Foods	-115.18	-34.31	-117.18	-28.81	-54.10
Benton Co.	-95.38	-18.49	-93.80	3.29	-61.52
Franklin Co.	-119.20	-42.32	-117.53	-20.50	-80.42
Kennewick	-103.58	-26.70	-102.58	-19.64	-31.33
Pasco	-106.75	-29.86	-105.74	-22.81	-34.49
Restricted	-152.66	-75.78	-151.53	-68.69	-80.38

Richland	-104.65	-27.77	-102.47	-20.34	-32.17
Walla Walla Co.	-106.88	-30.00	-105.34	-8.79	-46.45
Total for Constituent	-93.83	-16.90	-92.31	3.62	-27.63

HPI Values by Usage Location for the SURFACE WATER Transport Pathway (Cont)

Usage Location	Constituent 11
Aquatic Foods	-52.92
Benton Co.	-13.60
Franklin Co.	-37.31
Kennewick	-19.77
Pasco	-22.94
Restricted	-68.85
Richland	-20.87
Walla Walla Co.	-25.65
Total for Constituent	-11.53

--- Constituent Names ---
11 = TRITIUM

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*****
*          Summary of Hazard Potential Index (HPI) Values For Run          *
*****
*          Constituent Name          HPI          *
*          *          *          *          *          *          *
*          CESIUM-134          -250.00          *
*          CESIUM-137+0          -20.26          *
*          COBALT-60          -9.82          *
*          PLUTONIUM-238          -35.06          *
*          URANIUM-234          -69.75          *
*          THORIUM-230          -93.83          *
*          PLUTONIUM-239          -16.90          *
*          URANIUM-235          -92.31          *
*          STRONTIUM-90          3.62          *
*          YTTRIUM-90          -27.63          *
*          TRITIUM          -11.53          *
*****

```

Maximum Individual Results by Pollutant

#	Type	Unweighted Results			Time Weighted Results		
		Total	Inhalation	Ingestion	Total	Inhalation	Ingestion
1	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1	4.95E-13	0.00E+00	4.95E-13	9.20E-14	0.00E+00	9.20E-14
3	1	6.94E-13	0.00E+00	6.94E-13	6.94E-13	0.00E+00	6.94E-13
4	1	9.24E-15	0.00E+00	9.24E-15	9.16E-16	0.00E+00	9.16E-16
5	1	4.30E-18	0.00E+00	4.30E-18	1.60E-19	0.00E+00	1.60E-19
6	1	3.19E-20	0.00E+00	3.19E-20	6.15E-22	0.00E+00	6.15E-22
7	1	1.00E-12	0.00E+00	1.00E-12	4.02E-14	0.00E+00	4.02E-14
8	1	3.20E-20	0.00E+00	3.20E-20	7.70E-22	0.00E+00	7.70E-22
9	1	1.09E-11	0.00E+00	1.09E-11	2.71E-12	0.00E+00	2.71E-12
10	1	5.15E-14	0.00E+00	5.15E-14	1.28E-14	0.00E+00	1.28E-14
11	1	3.84E-13	0.00E+00	3.84E-13	3.84E-13	0.00E+00	3.84E-13

Final Result Parameter	Total
------------------------	-------

Radiation Results, Time Weighted

MIR Fatal Cancer	3.11E-12
MIR Cancer Incidence	1.06E-11
MIR Hereditary Effects	8.26E-13

MEI radiation dose (rem) 6.24E-09

Radiation Results, Unweighted

MIR Fatal Cancer 1.07E-11
 MIR Cancer Incidence 3.66E-11
 MIR Hereditary Effects 2.85E-12
 MEI radiation dose (rem) 2.15E-08

Chemical Cancer Effects, Time Weighted

MIR Cancer Incidence 0.00E+00

Chemical Cancer Effects, Unweighted

MIR Cancer Incidence 0.00E+00

Chemical Non-Cancer Effects, Time Weighted

MI Hazard Index 0.00E+00

Chemical Non-Cancer Effects, Unweighted

MI Hazard Index 0.00E+00

Total cancer effects, radiation + chemicals, Time Weighted

MIR fatal cancers 3.11E-12
 MIR Cancer Incidence 1.06E-11
 MIR Hereditary Effects 8.26E-13

Total cancer effects, radiation + chemicals, Unweighted

MIR fatal cancers 1.07E-11
 MIR Cancer Incidence 3.66E-11
 MIR Hereditary Effects 2.85E-12

Maximum Individual Risk Values/RfD Ratios

Exposure Route	[CESIUM-134]				[CESIUM-137+D]			
	Time Weighted		Non-Time Weighted		Time Weighted		Non-Time Weighted	
	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INGESTION/DERMAL								
Drinking Water	0.00E+00	0	0.00E+00	0	7.89E-15	3	4.25E-14	4
Finfish	0.00E+00	0	0.00E+00	0	5.67E-14	3	3.05E-13	4
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	0.00E+00	0	0.00E+00	0	3.82E-15	3	2.05E-14	4
Other Vegetables	0.00E+00	0	0.00E+00	0	3.36E-15	3	1.81E-14	4
Meat	0.00E+00	0	0.00E+00	0	5.16E-15	3	2.77E-14	4
Milk	0.00E+00	0	0.00E+00	0	1.27E-14	3	6.81E-14	4
Swimming	0.00E+00	0	0.00E+00	0	1.29E-17	3	6.92E-17	4
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
EXTERNAL RADIATION								
Boating	0.00E+00	0	0.00E+00	0	9.93E-19	3	5.34E-18	4
Shoreline	0.00E+00	0	0.00E+00	0	2.38E-15	3	1.28E-14	4
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]
Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[COBALT-60]				[PLUTONIUM-238]			
	Time Weighted	Non-Time Weighted			Time Weighted	Non-Time Weighted		
	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INGESTION/DERMAL								
Drinking Water	3.69E-14	1	3.69E-14	1	2.93E-16	4	2.95E-15	5
Finfish	1.96E-13	1	1.96E-13	1	3.38E-16	4	3.41E-15	5
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	7.92E-14	1	7.92E-14	1	1.74E-16	4	1.76E-15	5
Other Vegetables	6.48E-14	1	6.48E-14	1	1.11E-16	4	1.12E-15	5
Meat	1.06E-13	1	1.06E-13	1	5.73E-21	4	5.78E-20	5
Milk	7.56E-14	1	7.56E-14	1	8.55E-21	4	8.62E-20	5
Swimming	6.38E-16	1	6.38E-16	1	5.18E-19	4	5.23E-18	5
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
EXTERNAL RADIATION								
Boating	2.05E-16	1	2.05E-16	1	1.62E-25	4	1.63E-24	5
Shoreline	1.35E-13	1	1.35E-13	1	3.69E-21	4	3.72E-20	5
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]
Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[URANIUM-234]				[THORIUM-230]			
	Time Weighted	Non-Time Weighted			Time Weighted	Non-Time Weighted		
	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.

	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.

INGESTION/DERMAL								
Drinking Water	6.55E-20	5	1.76E-18	7	2.52E-22	5	1.31E-20	9
Finfish	1.51E-20	5	4.06E-19	7	1.17E-22	5	6.04E-21	9
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	3.95E-20	5	1.06E-18	7	1.50E-22	5	7.79E-21	9
Other Vegetables	2.79E-20	5	7.50E-19	7	9.54E-23	5	4.94E-21	9
Meat	5.24E-22	5	1.41E-20	7	5.93E-26	5	3.07E-24	9
Milk	1.15E-20	5	3.09E-19	7	3.68E-25	5	1.91E-23	9
Swimming	1.16E-22	5	3.11E-21	7	4.47E-25	5	2.32E-23	9
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.

INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.

EXTERNAL RADIATION								
Boating	6.32E-28	5	1.70E-26	7	2.83E-30	5	1.47E-28	9
Shoreline	9.58E-24	5	2.57E-22	7	1.91E-26	5	9.91E-25	9
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, Rfd VALUES are used [dose/Rfd]

Maximum Individual Risk Values/Rfd Ratios (Cont)

	[PLUTONIUM-239]				[URANIUM-235]				
Exposure Route	Time Weighted		Non-Time Weighted		Time Weighted		Non-Time Weighted		
	-----				-----				
	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	

INGESTION/DERMAL									
Drinking Water	1.29E-14	4	3.19E-13	7	3.11E-22	5	1.29E-20	9	
Finfish	1.48E-14	4	3.69E-13	7	7.18E-23	5	2.98E-21	9	
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0	
Leafy Vegetables	7.66E-15	4	1.90E-13	7	1.87E-22	5	7.79E-21	9	
Other Vegetables	4.86E-15	4	1.21E-13	7	1.33E-22	5	5.51E-21	9	
Meat	2.52E-19	4	6.25E-18	7	2.48E-24	5	1.03E-22	9	
Milk	3.75E-19	4	9.33E-18	7	5.46E-23	5	2.27E-21	9	
Swimming	2.28E-17	4	5.65E-16	7	5.58E-25	5	2.32E-23	9	
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0	
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0	

	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	

INHALATION									
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0	
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0	

	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	

	Value	Per.	Value	Per.	Value	Per.	Value	Per.
EXTERNAL RADIATION								
Boating	5.45E-24	4	1.35E-22	7	4.05E-27	5	1.68E-25	9
Shoreline	7.38E-20	4	1.83E-18	7	9.57E-24	5	3.97E-22	9
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[STRONTIUM-90]				[YTRIUM-90]			
	Time Weighted		Non-Time Weighted		Time Weighted		Non-Time Weighted	
	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INGESTION/DERMAL								
Drinking Water	1.46E-13	3	5.90E-13	3	9.93E-15	3	4.01E-14	3
Finfish	1.18E-13	3	4.77E-13	3	3.50E-16	3	1.41E-15	3
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	5.33E-13	3	2.15E-12	3	2.40E-15	3	9.69E-15	3
Other Vegetables	1.64E-12	3	6.60E-12	3	5.21E-22	3	2.10E-21	3
Meat	1.34E-14	3	5.41E-14	3	1.08E-18	3	4.37E-18	3
Milk	2.59E-13	3	1.04E-12	3	2.01E-17	3	8.13E-17	3
Swimming	9.07E-16	3	3.66E-15	3	7.04E-17	3	2.84E-16	3
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
EXTERNAL RADIATION								
Boating	5.58E-20	3	2.25E-19	3	2.07E-19	3	8.36E-19	3
Shoreline	6.88E-16	3	2.78E-15	3	3.29E-19	3	1.33E-18	3
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[TRITIUM]	
	Time Weighted	Non-Time Weighted

	Risk Value	Time Per.	Risk Value	Time Per.
INGESTION/DERMAL				
Drinking Water	2.50E-13	1	2.50E-13	1
Finfish	8.08E-16	1	8.08E-16	1
Shellfish	0.00E+00	0	0.00E+00	0
Leafy Vegetables	9.18E-15	1	9.18E-15	1
Other Vegetables	5.77E-14	1	5.77E-14	1
Meat	2.91E-14	1	2.91E-14	1
Milk	3.70E-14	1	3.70E-14	1
Swimming	3.10E-16	1	3.10E-16	1
Soil Ingestion	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0

	Risk Value	Time Per.	Risk Value	Time Per.
INHALATION				
Inhalation	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0

	Risk Value	Time Per.	Risk Value	Time Per.
EXTERNAL RADIATION				
Boating	0.00E+00	0	0.00E+00	0
Shoreline	0.00E+00	0	0.00E+00	0
Ground	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

File Title Summary For Run

Run Title: SNF-EIS 200 East Are --- NPSF04 .HIN

Run Date and Time: 11/22/1993 12:16:22

Constituent Database: UPDATED March 25, 1993 DLS/PEIS

Water Data File: DOE Ha --- NPSF04 .WAT

APPENDIX D

WET STORAGE/FUEL TRANSFER FACILITY SCENARIO

*****4/17/1993 VERSION IIIdarc*****

RADCON -- WATERBORNE TRANSPORT COMPONENT for the Multimedia
Environmental Pollutant Assessment System (MEPAS):
Models movement of radionuclides and other chemicals
in groundwater, surface water, and overland pathways.

Battelle, Pacific Northwest Laboratory (PNL)
P.O. Box 999, Richland, WA 99352

Developed for the U.S. Department of Energy

Input file for this run is WTSF200 .WIN

Modeling Scenario Number 1

Name of Facility = DOE Hanford
Name of Waste Unit = PEIS 100N Area GW->SW Scenario
Transport Scenario = SS-T3 Surface soil >Groundwater
Exposure Scenario = SW-E2
Usage Location Number = 6
Usage Location Medium = 3
Usage Location Name =

TLIFE is the duration of release for each contaminant expressed in years.
TDIFF is the time difference in years between the current date and the
date when contaminants were first released into the environment.

Constituent Name	TLIFE (years)	TDIFF (years)	TFINAL (years)
CESIUM-1	8.210E-02	0.000E+00	7.001E+03
COBALT-6	8.210E-02	0.000E+00	7.001E+03
STRONTIU	8.210E-02	0.000E+00	7.001E+03
TRITIUM	8.210E-02	0.000E+00	7.001E+03
ANTIMONY	8.210E-02	0.000E+00	7.001E+03
COBALT-5	8.210E-02	0.000E+00	7.001E+03

#	Constituent	NUM
1	CESIUM-1	2
2	COBALT-6	2
3	STRONTIU	2
4	TRITIUM	2
5	ANTIMONY	2
6	COBALT-5	2

Known Infiltration Rate to Unsaturated Zone (VLEACH) = 2.04E+01 cm/day
Source-Term Type (ISTYPE) = 1
Source-Term Flux Boundary Conditions (ISOURC) = 2
Liquid Impoundment Index (IPOND) = 2
Source-Term Decay Index (IDECAY) = 1
Direct Discharge Surface Water Index (IDDSW) = 0
Number of Parent Constituents (NUMCON) = 6

Source-Term Configuration (ISCONF) = 4
Number of Media (NMED) = 5
Number of Integration Time Steps (NTIMES) = 40

Medium # 1 Equals Medium Type (MED) # 1
 Medium # 2 Equals Medium Type (MED) # 1
 Medium # 3 Equals Medium Type (MED) # 1
 Medium # 4 Equals Medium Type (MED) # 4
 Medium # 5 Equals Medium Type (MED) # 5

Length of Release Unit (AL1 OR CLEN) = 3.05E+01 cm
 Width of release Unit (B1) = 3.05E+01 cm

Water concentration units are: ATTO (1.000E-18) Ci OR g

Constituent	CAS ID	Half-Life (Years)	Initial Conc.	Surface Equilibrium Coeff. (ml/g)	Solubility limit (g/ml)	Constituent Inventory (g OR Ci)
CESIUM-1	CS137	3.01E+01	-9.99E+01	-9.99E+01	1.00E+23	3.95E-07
COBALT-6	CO60	5.28E+00	-9.99E+01	-9.99E+01	1.00E+23	1.43E-05
STRONTIU	SR90	2.88E+01	-9.99E+01	-9.99E+01	1.00E+23	1.19E-06
YTTRIUM-	Y90	7.39E-03				
TRITIUM	H3	1.23E+01	-9.99E+01	-9.99E+01	1.00E+23	4.24E-05
ANTIMONY	SB125	2.77E+00	-9.99E+01	-9.99E+01	1.00E+23	2.14E-05
COBALT-5	CO57	7.39E-01	-9.99E+01	-9.99E+01	1.00E+23	6.79E-07

Constituent Flux (g/yr or Ci/yr) and Time (Years) at the Release Unit

Constituent #	Flux	Time	Constituent #	Flux	Time
1 1	4.81E-06	0.000E+00	1 2	4.81E-06	8.210E-02
2 1	1.74E-04	0.000E+00	2 2	1.74E-04	8.210E-02
3 1	1.45E-05	0.000E+00	3 2	1.45E-05	8.210E-02
4 1	5.17E-04	0.000E+00	4 2	5.17E-04	8.210E-02
5 1	5.17E-06	0.000E+00	5 2	5.17E-06	8.210E-02
6 1	8.27E-06	0.000E+00	6 2	8.27E-06	8.210E-02

New Constituent Flux (g/yr or Ci/yr) and Time (Years) at the Release Unit

Constituent #	Flux	Time	Constituent #	Flux	Time
1 1	4.81E-06	0.000E+00	1 2	4.81E-06	8.210E-02
2 1	1.74E-04	0.000E+00	2 2	1.74E-04	8.210E-02
3 1	1.45E-05	0.000E+00	3 2	1.45E-05	8.210E-02
4 1	5.17E-04	0.000E+00	4 2	5.17E-04	8.209E-02
5 1	5.17E-06	0.000E+00	5 2	5.17E-06	8.210E-02
6 1	8.27E-06	0.000E+00	6 2	8.27E-06	8.210E-02

The New Duration of Time that Constituents are Released from the Release Unit

#	Constituent	New TLIFE (Years)
1	CESIUM-1	8.210E-02
2	COBALT-6	8.210E-02
3	STRONTIU	8.210E-02
4	TRITIUM	8.209E-02
5	ANTIMONY	8.210E-02
6	COBALT-5	8.210E-02

Modeling Medium # 1
 Medium Type (MED) = 1
 Source Configuration = 4
 Source Term Discharge Type = 1
 PARTIALLY SATURATED ZONE

Thickness of Unsaturated Layer (H1) = 1.01E+03 cm
 X-Direction Dispersivity (A1) = 1.01E+01 cm
 Bulk Density (R2) = 1.80E+00 g/cm**3
 Total Porosity (AN4) = 3.60E-01 (fraction)
 Field Capacity (AN5) = 1.90E-01 (fraction)
 Permeability (X2) = 1.32E+02 cm/day
 Leach Rate (VLEACH) = 2.04E+01 cm/day
 Soil-Type Coefficient (A2) = 4.05E+00

Moisture Content (AN5) = 30.42 %
 Infiltration Rate (U) = 6.70E+01 cm/day

NO	PARENT	HALFLIFE YEARS	KD CC/GM	RETARDATION FACTOR
1	CESIUM-1	3.01200E+01	1.00000E+01	6.01799E+01
2	COBALT-6	5.28400E+00	0.00000E+00	1.00000E+00
3	STRONTIU	2.87500E+01	7.00000E+00	4.24259E+01
4	TRITIUM	1.22900E+01	0.00000E+00	1.00000E+00
5	ANTIMONY	2.76500E+00	2.00000E+00	1.28360E+01
6	COBALT-5	7.39200E-01	0.00000E+00	1.00000E+00

Constituent	CAS ID	Half-Life (Years)	Initial Conc.	Surface Equilibrium Coeff. (ml/g)	Solubility limit (g/ml)	Constituent Inventory (g OR Ci)
CESIUM-1	CS137	3.01E+01	-9.99E+01	-9.99E+01	1.00E+23	3.95E-07
COBALT-6	CO60	5.28E+00	-9.99E+01	-9.99E+01	1.00E+23	1.43E-05
STRONTIU	SR90	2.88E+01	-9.99E+01	-9.99E+01	1.00E+23	1.19E-06
TRITIUM	H3	1.23E+01	-9.99E+01	-9.99E+01	1.00E+23	4.24E-05
ANTIMONY	SB125	2.77E+00	-9.99E+01	-9.99E+01	1.00E+23	2.14E-05
COBALT-5	CO57	7.39E-01	-9.99E+01	-9.99E+01	1.00E+23	6.79E-07

Computed Initial at the Release Unit (DMAX) = 6.96E-13

Computed Initial at the Release Unit (DMAX) = 2.51E-11

Computed Initial at the Release Unit (DMAX) = 2.09E-12

Computed Initial at the Release Unit (DMAX) = 7.48E-11

Computed Initial at the Release Unit (DMAX) = 7.48E-13

Computed Initial at the Release Unit (DMAX) = 1.20E-12

Modeling Medium # = 2
 Medium Type (MED) = 1
 Source Configuration = 4
 Source Term Discharge Type = 1
 PARTIALLY SATURATED ZONE

Thickness of Unsaturated Layer (H1) = 5.00E+03 cm
 X-Direction Dispersivity (A1) = 5.00E+01 cm
 Bulk Density (R2) = 1.60E+00 g/cm**3
 Total Porosity (AN4) = 4.20E-01 (fraction)
 Field Capacity (AN5) = 8.50E-02 (fraction)
 Permeability (X2) = 4.33E+02 cm/day
 Leach Rate (VLEACH) = 5.58E-02 cm/day

Soil-Type Coefficient (A2) = 4.05E+00

Moisture Content (AN5) = 31.89 %
Infiltration Rate (U) = 6.39E+01 cm/day

NO	PARENT	DECAY RATE 1/YEARS	KD CC/GM	RETARDATION FACTOR
1	CESIUM-1	2.30129E-02	1.00000E+01	5.11703E+01
2	COBALT-6	1.31178E-01	0.00000E+00	1.00000E+00
3	STRONTIU	2.41095E-02	7.00000E+00	3.61192E+01
4	TRITIUM	5.63993E-02	0.00000E+00	1.00000E+00
5	ANTIMONY	2.50686E-01	2.00000E+00	1.10341E+01
6	COBALT-5	9.37699E-01	0.00000E+00	1.00000E+00

Modeling Medium # = 3
Medium Type (MED) = 1
Source Configuration = 4
Source Term Discharge Type = 1
PARTIALLY SATURATED ZONE

Thickness of Unsaturated Layer (H1) = 1.89E+03 cm
X-Direction Dispersivity (A1) = 1.89E+01 cm
Bulk Density (R2) = 1.80E+00 g/cm**3
Total Porosity (AN4) = 3.60E-01 (fraction)
Field Capacity (AN5) = 1.90E-01 (fraction)
Permeability (X2) = 1.32E+02 cm/day
Leach Rate (VLEACH) = 5.58E-02 cm/day
Soil-Type Coefficient (A2) = 4.05E+00

Moisture Content (AN5) = 30.42 %
Infiltration Rate (U) = 6.70E+01 cm/day

NO	PARENT	DECAY RATE 1/YEARS	KD CC/GM	RETARDATION FACTOR
1	CESIUM-1	2.30129E-02	1.00000E+01	6.01799E+01
2	COBALT-6	1.31178E-01	0.00000E+00	1.00000E+00
3	STRONTIU	2.41095E-02	7.00000E+00	4.24259E+01
4	TRITIUM	5.63993E-02	0.00000E+00	1.00000E+00
5	ANTIMONY	2.50686E-01	2.00000E+00	1.28360E+01
6	COBALT-5	9.37699E-01	0.00000E+00	1.00000E+00

Modeling Medium # = 4
Medium Type (MED) = 4
Source Configuration = 4
Source Term Discharge Type = 1
SATURATED ZONE AT A RIVER

NO	PARENT	DECAY RATE 1/YEARS	KD CC/GM	RETARDATION FACTOR
1	CESIUM-1	2.30129E-02	1.00000E+01	9.15172E+01

2	COBALT-6	1.31178E-01	0.00000E+00	1.00000E+00
3	STRONTIU	2.41095E-02	7.00000E+00	6.43621E+01
4	TRITIUM	5.63993E-02	0.00000E+00	1.00000E+00
5	ANTIMONY	2.50686E-01	2.00000E+00	1.91034E+01
6	COBALT-5	9.37699E-01	0.00000E+00	1.00000E+00

Groundwater Velocity (U)	=	1.07E+03 cm/day
Aquifer Thickness (H1)	=	1.04E+03 cm
X-Direction Dispersivity (A1)	=	2.41E+05 cm
Y-Direction Dispersivity (A2)	=	4.82E+04 cm
Z-Direction Dispersivity (A3)	=	2.80E+02 cm
Bulk Density (R2)	=	2.10E+00 g/cm**3
Total Porosity (AN4)	=	2.60E-01 (fraction)
Effective Porosity (AN5)	=	2.32E-01 (fraction)
Length of Burial Area (AL1)	=	3.05E+01 cm
Width of Burial Area (B1)	=	3.05E+01 cm
Depth of Release Unit Below Water Table (HW)	=	0.00E+00 cm
Distance Downgradient from Center of Source (X2)	=	2.41E+06 cm
Lateral Hydraulic Conductivity (HC)	=	0.00E+00 cm/day

Modeling Medium # 5
Medium Type (MED) = 5
Source Configuration = 4
Source Term Discharge Type = 1
SURFACE WATER ENVIRONMENT

Number of River Receptor Locations (NUMREC)	=	8
Flow Velocity (U1)	=	1.66E+09 cm/year
Depth of Flow (H1)	=	4.88E+02 cm
Width of River (B1)	=	3.96E+04 cm
Downstream Discharge at First Receptor (QNEW)	=	3.22E+16 cm**3/year
Distance Downstream from Center of Source (X3)	=	1.00E+04 cm

Uniform Mixing Distance = 1.36E+03 cm

Present Concentration for CESIUM-1 IS 0.000E+00(g/ml or Ci/ml)
Concentrations for COBALT-6 at run time (1994 , 0.0 years) is between:
0.000E+00 (g/ml or Ci/ml) at .0 years (1994)
1.058E-27 (g/ml or Ci/ml) at 1.2 years (1995)

Concentrations for STRONTIU at run time (1994 , 0.0 years) is between:
0.000E+00 (g/ml or Ci/ml) at .0 years (1994)
0.000E+00 (g/ml or Ci/ml) at 23.8 years (2017)

Concentrations for YTTRIUM- at run time (1994 , 0.0 years) is between:
0.000E+00 (g/ml or Ci/ml) at .0 years (1994)
0.000E+00 (g/ml or Ci/ml) at 23.8 years (2017)

Concentrations for TRITIUM at run time (1994 , 0.0 years) is between:
0.000E+00 (g/ml or Ci/ml) at .0 years (1994)
3.976E-27 (g/ml or Ci/ml) at 1.3 years (1995)

Concentrations for ANTIMONY at run time (1994 , 0.0 years) is between:
0.000E+00 (g/ml or Ci/ml) at .0 years (1994)
0.000E+00 (g/ml or Ci/ml) at 3.8 years (1997)

Concentrations for COBALT-5 at run time (1994 , 0.0 years) is between:

0.000E+00 (g/ml or Ci/ml) at .0 years (1994)
0.000E+00 (g/ml or Ci/ml) at .8 years (1994)

Maximum Constituent Concentrations:

CESIUM-1: 1.108E-29 (g/ml or Ci/ml) at 230.6 Years (2224)
COBALT-6: 1.863E-23 (g/ml or Ci/ml) at 5.0 Years (1998)
STRONTIU: 1.951E-28 (g/ml or Ci/ml) at 166.8 Years (2160)
YTTRIUM-: 1.952E-28 (g/ml or Ci/ml) at 166.8 Years (2160)
TRITIUM : 8.082E-23 (g/ml or Ci/ml) at 5.0 Years (1999)
ANTIMONY: 1.910E-31 (g/ml or Ci/ml) at 34.2 Years (2028)
COBALT-5: 3.692E-26 (g/ml or Ci/ml) at 3.3 Years (1997)

Modeling Scenario Number 2

Name of Facility = DOE Hanford
Name of Waste Unit = PEIS 100N Area GW->SW Scenario
Transport Scenario = SS-T3 Surface soil >Groundwater
Exposure Scenario = SW-E3 SW-E4 SW-E5
Usage Location Number = 1
Usage Location Medium = 3
Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

CESIUM-1: 2.127E-29 (g/ml or Ci/ml) at 230.6 years (2224)
COBALT-6: 3.578E-23 (g/ml or Ci/ml) at 5.0 years (1998)
STRONTIU: 3.747E-28 (g/ml or Ci/ml) at 166.8 years (2160)
YTTRIUM-: 3.748E-28 (g/ml or Ci/ml) at 166.8 years (2160)
TRITIUM : 1.552E-22 (g/ml or Ci/ml) at 5.0 years (1999)
ANTIMONY: 3.668E-31 (g/ml or Ci/ml) at 34.2 years (2028)
COBALT-5: 7.089E-26 (g/ml or Ci/ml) at 3.3 years (1997)

Modeling Scenario Number 3

Name of Facility = DOE Hanford
Name of Waste Unit = PEIS 100N Area GW->SW Scenario
Transport Scenario = SS-T3 Surface soil >Groundwater
Exposure Scenario = SW-E3 SW-E4 SW-E5
Usage Location Number = 7
Usage Location Medium = 3
Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

CESIUM-1: 2.127E-29 (g/ml or Ci/ml) at 230.6 years (2224)
 COBALT-6: 3.578E-23 (g/ml or Ci/ml) at 5.0 years (1998)
 STRONTIU: 3.747E-28 (g/ml or Ci/ml) at 166.8 years (2160)
 YTTRIUM-: 3.748E-28 (g/ml or Ci/ml) at 166.8 years (2160)
 TRITIUM : 1.552E-22 (g/ml or Ci/ml) at 5.0 years (1999)
 ANTIMONY: 3.668E-31 (g/ml or Ci/ml) at 34.2 years (2028)
 COBALT-5: 7.089E-26 (g/ml or Ci/ml) at 3.3 years (1997)

 Modeling Scenario Number 4

Name of Facility = DOE Hanford
 Name of Waste Unit = PEIS 100N Area GW->SW Scenario
 Transport Scenario = SS-T3 Surface soil >Groundwater
 Exposure Scenario = SW-E1 SW-E6
 Usage Location Number = 4
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

 Maximum Constituent Concentrations:

CESIUM-1: 2.127E-29 (g/ml or Ci/ml) at 230.6 years (2224)
 COBALT-6: 3.578E-23 (g/ml or Ci/ml) at 5.0 years (1998)
 STRONTIU: 3.747E-28 (g/ml or Ci/ml) at 166.8 years (2160)
 YTTRIUM-: 3.748E-28 (g/ml or Ci/ml) at 166.8 years (2160)
 TRITIUM : 1.552E-22 (g/ml or Ci/ml) at 5.0 years (1999)
 ANTIMONY: 3.668E-31 (g/ml or Ci/ml) at 34.2 years (2028)
 COBALT-5: 7.089E-26 (g/ml or Ci/ml) at 3.3 years (1997)

 Modeling Scenario Number 5

Name of Facility = DOE Hanford
 Name of Waste Unit = PEIS 100N Area GW->SW Scenario
 Transport Scenario = SS-T3 Surface soil >Groundwater
 Exposure Scenario = SW-E1 SW-E6
 Usage Location Number = 5
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

 Maximum Constituent Concentrations:

CESIUM-1: 2.127E-29 (g/ml or Ci/ml) at 230.6 years (2224)
 COBALT-6: 3.578E-23 (g/ml or Ci/ml) at 5.0 years (1998)
 STRONTIU: 3.747E-28 (g/ml or Ci/ml) at 166.8 years (2160)
 YTTRIUM-: 3.748E-28 (g/ml or Ci/ml) at 166.8 years (2160)
 TRITIUM : 1.552E-22 (g/ml or Ci/ml) at 5.0 years (1999)
 ANTIMONY: 3.668E-31 (g/ml or Ci/ml) at 34.2 years (2028)
 COBALT-5: 7.089E-26 (g/ml or Ci/ml) at 3.3 years (1997)

Modeling Scenario Number 6

Name of Facility = DOE Hanford
 Name of Waste Unit = PEIS 100N Area GW->SW Scenario
 Transport Scenario = SS-T3 Surface soil >Groundwater
 Exposure Scenario = SW-E1 SW-E7 SW-E8
 Usage Location Number = 3
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

CESIUM-1: 2.127E-29 (g/ml or Ci/ml) at 230.6 years (2224)
 COBALT-6: 3.578E-23 (g/ml or Ci/ml) at 5.0 years (1998)
 STRONTIU: 3.747E-28 (g/ml or Ci/ml) at 166.8 years (2160)
 YTTRIUM-: 3.748E-28 (g/ml or Ci/ml) at 166.8 years (2160)
 TRITIUM : 1.552E-22 (g/ml or Ci/ml) at 5.0 years (1999)
 ANTIMONY: 3.668E-31 (g/ml or Ci/ml) at 34.2 years (2028)
 COBALT-5: 7.089E-26 (g/ml or Ci/ml) at 3.3 years (1997)

Modeling Scenario Number 7

Name of Facility = DOE Hanford
 Name of Waste Unit = PEIS 100N Area GW->SW Scenario
 Transport Scenario = SS-T3 Surface soil >Groundwater
 Exposure Scenario = SW-E1 SW-E6 SW-E7 SW-E8
 Usage Location Number = 2
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

CESIUM-1: 2.127E-29 (g/ml or Ci/ml) at 230.6 years (2224)
 COBALT-6: 3.578E-23 (g/ml or Ci/ml) at 5.0 years (1998)
 STRONTIU: 3.747E-28 (g/ml or Ci/ml) at 166.8 years (2160)
 YTTRIUM-: 3.748E-28 (g/ml or Ci/ml) at 166.8 years (2160)
 TRITIUM : 1.552E-22 (g/ml or Ci/ml) at 5.0 years (1999)
 ANTIMONY: 3.668E-31 (g/ml or Ci/ml) at 34.2 years (2028)
 COBALT-5: 7.089E-26 (g/ml or Ci/ml) at 3.3 years (1997)

Modeling Scenario Number 8

Name of Facility = DOE Hanford
 Name of Waste Unit = PEIS 100N Area GW->SW Scenario
 Transport Scenario = SS-T3 Surface soil >Groundwater
 Exposure Scenario = SW-E3 SW-E4 SW-E5
 Usage Location Number = 8
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

CESIUM-1: 2.127E-29 (g/ml or Ci/ml) at 230.6 years (2224)
COBALT-6: 3.578E-23 (g/ml or Ci/ml) at 5.0 years (1998)
STRONTIUM-90: 3.747E-28 (g/ml or Ci/ml) at 166.8 years (2160)
YTTRIUM-90: 3.748E-28 (g/ml or Ci/ml) at 166.8 years (2160)
TRITIUM : 1.552E-22 (g/ml or Ci/ml) at 5.0 years (1999)
ANTIMONY-125: 3.668E-31 (g/ml or Ci/ml) at 34.2 years (2028)
COBALT-57: 7.089E-26 (g/ml or Ci/ml) at 3.3 years (1997)

Multimedia Environmental Pollutant Assessment System (MEPAS)

MEPAS Hazard Potential Output (VERSION 041292)

Pacific Northwest Laboratory

Richland, WA 99352

Developed for the U.S. Department of Energy

Run Date and Time: 4/ 6/1994 7:24:20

(This run used 630. effects per million man-rem)

Run Title: PEIS 100N Area GW->SW Scenario

Ranking Unit 1 : WTSF200

Number of Constituents is: 7

Time Discounted HPis are computed using 70 year time periods (Time Index = 0)

Num Constituent Names ----- CASID -----

1	CESIUM-137+D	CS137
2	COBALT-60	C060
3	STRONTIUM-90	SR90
4	YTTRIUM-90	Y90
5	TRITIUM (as tritiated water, HTO)	H3
6	ANTIMONY-125	SB125
7	COBALT-57	C057

Summary of Data from MEPAS Constituent Database

CONSTITUENT DATA LIBRARY FOR MEPAS - UPDATED March 25, 1993 DLS/PEIS

This Database Contains Entries for 400 Constituents

Constituent Parameter	Parameter Units	Constituent 1	Constituent 2	Constituent 3	Constituent 4
ID / CAS #:	(None)	CS137	C060	SR90	Y90
Toxicity Type:	(None)	1	1	1	1
Mol. Weight:	g/mole	1.370E+02	6.000E+01	9.000E+01	9.000E+01
Vapor Pressure:	mm-Hg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Henry's Law Con:	atm*m3/mole	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water Sol:	mg/L	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Carbon Mat Part:	ml/g	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Oct Wat Part:	(None)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1/2-life in AIR:	days	1.100E+04	1.930E+03	1.050E+04	2.700E+00
1/2-life in GW:	days	1.100E+04	1.930E+03	1.050E+04	2.700E+00
1/2-life in SW:	days	1.100E+04	1.930E+03	1.050E+04	2.700E+00

1/2-life in SOIL: days	1.100E+04	1.930E+03	1.050E+04	2.700E+00
Ing Dose Fact: 1/Kg or rem/pCi	5.000E-08	2.690E-08	1.400E-07	1.080E-08
Inh Dose Fact: 1/Kg or rem/pCi	3.200E-08	2.190E-07	1.300E-06	8.440E-09
Air Imm Fact: rem*m3/pCi*h	3.400E-10	1.680E-09	1.300E-12	2.530E-12
Soil Exp Fact: rem*m2/pCi*h	6.800E-12	3.130E-11	6.700E-14	7.090E-14
Water Imm Fact: rem*L/pCi*h	6.900E-10	3.640E-09	1.300E-12	4.830E-12
Fish Bioaccum: (None)	2.000E+03	3.300E+02	5.000E+01	2.500E+01
Shell Bioaccum: (None)	1.000E+02	2.000E+02	1.000E+02	1.000E+03
Veg Bioaccum: (None)	1.230E-02	1.000E-02	2.030E-01	1.500E-03
Meat Trans Fact: day/Kg	2.000E-02	2.000E-02	3.000E-04	3.000E-04
Milk Trans Fact: day/L	7.000E-03	2.000E-03	1.500E-03	2.000E-05
Water Pur Fact: (None)	9.000E-01	2.000E-01	2.000E-01	2.000E-01
Dep Velocity: m/sec	1.000E-03	1.000E-03	1.000E-03	1.000E-03
Atmos Dis Class: (None)	1	1	1	1
Inh Cancer Pot: (Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ing Cancer Pot: (Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Ref Dose: mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ing Ref Dose: mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Tox Uncert HPI units	5	5	5	5
Ing Tox Uncert HPI units	5	5	5	5
Phys Prop Uncert HPI units	3	3	3	3
Tran Fact Uncert HPI units	3	3	3	3

Toxicity Type 1: Radionuclide carcinogenic inhalation and ingestion
Toxicity Type 2: Chemical carcinogenic inhalation and ingestion
Toxicity Type 3: Chemical carcinogenic inhalation, non-carcinogenic ingestion
Toxicity Type 4: Chemical non-carcinogenic inhalation, carcinogenic ingestion
Toxicity Type 5: Chemical non-carcinogenic inhalation and ingestion

KEY for Constituent Table

Constituent 1 = CESIUM-137+D
Constituent 2 = COBALT-60
Constituent 3 = STRONTIUM-90
Constituent 4 = YTTRIUM-90

Summary of Data from MEPAS Constituent Database (Cont)
CONSTITUENT DATA LIBRARY FOR MEPAS - UPDATED March 25, 1993 DLS/PEIS
This Database Contains Entries for 400 Constituents

Constituent	Parameter	Constituent	Constituent	Constituent
Parameter	Units	5	6	7
ID / CAS #:	(None)	H3	SB125	C057
Toxicity Type:	(None)	1	1	1
Mol. Weight:	g/mole	2.000E+01	1.250E+02	5.700E+01
Vapor Pressure:	mm-Hg	2.380E+01	0.000E+00	0.000E+00
Henry's Law Con:	atm*m3/mole	6.000E-07	0.000E+00	0.000E+00
Water Sol:	mg/L	0.000E+00	0.000E+00	0.000E+00
Carbon Mat Part:	ml/g	0.000E+00	0.000E+00	0.000E+00
Oct Wat Part:	(None)	0.000E+00	0.000E+00	0.000E+00
1/2-life in AIR: days	days	4.490E+03	1.010E+03	2.700E+02
1/2-life in GW: days	days	4.490E+03	1.010E+03	2.700E+02
1/2-life in SW: days	days	2.680E+01	1.010E+03	2.700E+02
1/2-life in SOIL: days	days	6.240E+01	1.010E+03	2.700E+02
Ing Dose Fact: 1/Kg or rem/pCi	1/Kg or rem/pCi	6.300E-11	2.810E-09	1.180E-09
Inh Dose Fact: 1/Kg or rem/pCi	1/Kg or rem/pCi	6.300E-11	1.220E-08	9.070E-09
Air Imm Fact: rem*m3/pCi*h	rem*m3/pCi*h	0.000E+00	2.680E-10	7.480E-11
Soil Exp Fact: rem*m2/pCi*h	rem*m2/pCi*h	0.000E+00	5.660E-12	1.540E-12
Water Imm Fact: rem*L/pCi*h	rem*L/pCi*h	0.000E+00	5.840E-10	1.670E-10
Fish Bioaccum: (None)	(None)	1.000E+00	2.000E+02	3.300E+02
Shell Bioaccum: (None)	(None)	1.000E+00	1.000E+03	2.000E+02
Veg Bioaccum: (None)	(None)	0.000E+00	1.400E-04	1.000E-02
Meat Trans Fact: day/Kg	day/Kg	0.000E+00	1.000E-03	2.000E-02
Milk Trans Fact: day/L	day/L	0.000E+00	1.000E-04	2.000E-03
Water Pur Fact: (None)	(None)	1.000E+00	7.000E-01	2.000E-01

Dep Velocity:	m/sec	0.000E+00	1.000E-03	1.000E-03
Atmos Dis Class:	(None)	4	1	1
Inh Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00
Ing Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00
Inh Ref Dose:	mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00
Ing Ref Dose:	mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00
Inh Tox Uncert	HPI units	5	5	5
Ing Tox Uncert	HPI units	5	5	5
Phys Prop Uncert	HPI units	3	3	3
Tran Fact Uncert	HPI units	3	3	3

Toxicity Type 1: Radionuclide carcinogenic inhalation and ingestion
 Toxicity Type 2: Chemical carcinogenic inhalation and ingestion
 Toxicity Type 3: Chemical carcinogenic inhalation, non-carcinogenic ingestion
 Toxicity Type 4: Chemical non-carcinogenic inhalation, carcinogenic ingestion
 Toxicity Type 5: Chemical non-carcinogenic inhalation and ingestion

KEY for Constituent Table

Constituent 5 = TRITIUM

Constituent 6 = ANTIMONY-125

Constituent 7 = COBALT-57

USAGE LOCATION DATA FOR SURFACE WATER PATHWAY

Location Parameter	Units	Location 1	Location 2	Location 3	Location 4	Location 5
Drink Index:	(None)	0	0	0	2	2
Drink Pop:	People	0.000E+00	0.000E+00	0.000E+00	4.216E+04	2.034E+04
Rec Index:	(None)	0	0	0	0	0
Rec Pop:	People	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Aquatic Index:	(None)	1	0	0	0	0
FinFish Prod:	Kg/yr	1.500E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Shell Prod:	Kg/yr	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Irr Index:	(None)	0	1	1	0	0
Leaf Veg Prod:	Kg/yr	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Veg Product:	Kg/yr	0.000E+00	1.400E+08	5.800E+05	0.000E+00	0.000E+00
Meat Product:	Kg/yr	0.000E+00	1.200E+06	8.400E+03	0.000E+00	0.000E+00
Milk Product:	L/yr	0.000E+00	2.100E+06	2.800E+04	0.000E+00	0.000E+00
SW Trans Time:	days	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Irr. Rate:	L/mo	0.000E+00	1.280E+02	1.280E+02	0.000E+00	0.000E+00
Harvest Time:	days	6.000E+01	6.000E+01	3.000E+01	3.000E+01	0.000E+00
Transit Time:	days	0.000E+00	0.000E+00	0.000E+00	5.000E-01	5.000E-01
Water Treated:	yes/no	No	No	No	Yes	Yes
H2O Ing Rate:	L/day	2.000E+00	2.000E+00	2.000E+00	2.000E+00	2.000E+00
Fish Time Delay:	days	1.000E+01	1.000E+01	1.000E+01	1.000E+01	1.000E+01
Inv time delay:	days	1.000E+01	1.000E+01	1.000E+01	1.000E+01	1.000E+01

Drinking Index ----> 0 = No Drinking or Bathing, 1 = Bathing Only, and
 2 = Drinking and Bathing

Recreation Index --> 1 = Swimming Only, 2 = Boating Only,
 3 = Shoreline Activities Only, and 4 = All of the Above

Aquatic Index -----> 0 = No Aquatic food, 1 = Aquatic Food

Irrigation Index --> -1 = Animals Drinking Only, 0 = No Farm Production,
 1 = Crops and Animals [Feed and Water], and
 2 = Crops and Animals Feed Only

KEY for Usage Location in Table

Usage Location 1 = Aquatic Foods

Usage Location 2 = Benton Co.

Usage Location 3 = Franklin Co.

Usage Location 4 = Kennewick

Usage Location 5 = Pasco

USAGE LOCATION DATA FOR SURFACE WATER PATHWAY

Location Parameter	Units	Location 6	Location 7	Location 8
Drink Index: (None)		2	2	0
Drink Pop: People		1.000E+00	3.232E+04	0.000E+00
Rec Index: (None)		4	4	0
Rec Pop: People		1.000E+00	3.330E+05	0.000E+00
Aquatic Index: (None)		0	0	0
FinFish Prod: Kg/yr		0.000E+00	0.000E+00	0.000E+00
Shell Prod: Kg/yr		0.000E+00	0.000E+00	0.000E+00
Irr Index: (None)		0	0	1
Leaf Veg Prod: Kg/yr		0.000E+00	0.000E+00	1.600E+05
Veg Product: Kg/yr		0.000E+00	0.000E+00	8.300E+06
Meat Product: Kg/yr		0.000E+00	0.000E+00	1.800E+05
Milk Product: L/yr		0.000E+00	0.000E+00	2.800E+05
SW Trans Time: days		0.000E+00	0.000E+00	0.000E+00
Irr. Rate: L/mo		0.000E+00	0.000E+00	1.280E+02
Harvest Time: days		0.000E+00	0.000E+00	0.000E+00
Transit Time: days		5.000E-01	5.000E-01	0.000E+00
Water Treated: yes/no		Yes	Yes	No
H2O Ing Rate: L/day		2.000E+00	2.000E+00	2.000E+00
Fish Time Delay: days		1.000E+01	1.000E+01	1.000E+01
Inv time delay: days		1.000E+01	1.000E+01	1.000E+01

Drinking Index ----> 0 = No Drinking or Bathing, 1 = Bathing Only, and
2 = Drinking and Bathing
Recreation Index --> 1 = Swimming Only, 2 = Boating Only,
3 = Shoreline Activities Only, and 4 = All of the Above
Aquatic Index -----> 0 = No Aquatic food, 1 = Aquatic Food
Irrigation Index --> -1 = Animals Drinking Only, 0 = No Farm Production,
1 = Crops and Animals [Feed and Water], and
2 = Crops and Animals Feed Only

KEY for Usage Location in Table
Usage Location 6 = Restricted
Usage Location 7 = Richland
Usage Location 8 = Walla Walla Co.

Population Health Effects By Pollutant Table

Pollutant # Type	Health Effects, Unweighted			Weighted		
	Inhalation	Ingestion	Total	Inhalation	Ingestion	Total
1 1	0.00E+00	4.03E-14	4.03E-14	0.00E+00	5.77E-15	5.77E-15
2 1	0.00E+00	1.24E-09	1.24E-09	0.00E+00	1.24E-09	1.24E-09
3 1	0.00E+00	5.37E-12	5.37E-12	0.00E+00	1.21E-12	1.21E-12
4 1	0.00E+00	4.03E-15	4.03E-15	0.00E+00	9.10E-16	9.10E-16
5 1	0.00E+00	6.96E-12	6.96E-12	0.00E+00	6.96E-12	6.96E-12
6 1	0.00E+00	4.12E-18	4.12E-18	0.00E+00	4.12E-18	4.12E-18
7 1	0.00E+00	3.03E-14	3.03E-14	0.00E+00	3.03E-14	3.03E-14

Population Health Effects Summary Table Summary Results

	Unweighted	Weighted
Radiation dose (person-rem):	1.98E-06	1.98E-06
Chemical cancer incidence:	0.00E+00	0.00E+00
Radiation cancer incidence:	3.37E-09	3.36E-09
Total cancer incidence:	3.37E-09	3.36E-09
Radiation cancer fatalities:	9.86E-10	9.83E-10
Radiation cancer hereditary:	2.62E-10	2.61E-10
HPI Values by Usage Location for the SURFACE WATER Transport Pathway		

Usage Location	Constituent				
	1	2	3	4	5
Aquatic Foods	-93.76	-48.33	-91.59	-116.88	-92.97
Benton Co.	-84.86	-32.22	-59.49	-124.31	-53.65
Franklin Co.	-107.86	-55.71	-83.28	-143.13	-77.30
Kennewick	-94.08	-47.34	-82.43	-94.11	-59.82
Pasco	-97.25	-50.51	-85.59	-97.27	-62.98
Restricted	-142.01	-89.73	-131.46	-143.16	-108.90
Richland	-89.08	-32.60	-83.12	-94.95	-60.92
Walla Walla Co.	-96.10	-43.64	-71.57	-109.23	-65.70
Total for Constituent	-82.39	-29.08	-59.17	-90.41	-51.58

Usage Location	Constituent	
	6	7
Aquatic Foods	-134.72	-91.95
Benton Co.	-118.09	-76.54
Franklin Co.	-141.89	-99.97
Kennewick	-126.10	-90.87
Pasco	-129.27	-94.04
Restricted	-172.25	-137.90
Richland	-116.87	-83.44
Walla Walla Co.	-129.56	-87.84
Total for Constituent	-113.85	-75.18

--- Constituent Names ---

Constituent 1 = CESIUM-137+D

Constituent 3 = STRONTIUM-90

Constituent 5 = TRITIUM

7 = COBALT-57

2 = COBALT-60

4 = YTTRIUM-90

6 = ANTIMONY-125

```

*****
*           Summary of Hazard Potential Index (HPI) Values For Run           *
*****
*           Constituent Name           HPI           *
*           *           *           *           *
*           CESIUM-137+D           -82.39           *
*           COBALT-60           -29.08           *
*           STRONTIUM-90           -59.17           *
*           YTTRIUM-90           -90.41           *
*           TRITIUM           -51.58           *
*           ANTIMONY-125           -113.85          *
*           COBALT-57           -75.18           *
*****

```

Maximum Individual Results by Pollutant

#	Type	Unweighted Results			Time Weighted Results		
		Total	Inhalation	Ingestion	Total	Inhalation	Ingestion
1	1	3.21E-19	0.00E+00	3.21E-19	5.44E-20	0.00E+00	5.44E-20
2	1	8.23E-15	0.00E+00	8.23E-15	8.23E-15	0.00E+00	8.23E-15
3	1	5.96E-18	0.00E+00	5.96E-18	1.49E-18	0.00E+00	1.49E-18
4	1	2.81E-20	0.00E+00	2.81E-20	7.03E-21	0.00E+00	7.03E-21
5	1	3.80E-17	0.00E+00	3.80E-17	3.80E-17	0.00E+00	3.80E-17
6	1	2.27E-23	0.00E+00	2.27E-23	2.27E-23	0.00E+00	2.27E-23
7	1	2.91E-19	0.00E+00	2.91E-19	2.91E-19	0.00E+00	2.91E-19

Final Result Parameter Total

Radiation Results, Time Weighted

MIR Fatal Cancer	6.53E-15
MIR Cancer Incidence	2.23E-14
MIR Hereditary Effects	1.74E-15
MEI radiation dose (rem)	1.31E-11

Radiation Results, Unweighted

MIR Fatal Cancer	6.54E-15
MIR Cancer Incidence	2.23E-14
MIR Hereditary Effects	1.74E-15
MEI radiation dose (rem)	1.31E-11

Chemical Cancer Effects, Time Weighted

MIR Cancer Incidence	0.00E+00
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Chemical Cancer Effects, Unweighted

MIR Cancer Incidence	0.00E+00
----------------------	----------

Chemical Non-Cancer Effects, Time Weighted

MI Hazard Index	0.00E+00
-----------------	----------

Chemical Non-Cancer Effects, Unweighted

MI Hazard Index	0.00E+00
-----------------	----------

Total cancer effects, radiation + chemicals, Time Weighted

MIR fatal cancers	6.53E-15
MIR Cancer Incidence	2.23E-14
MIR Hereditary Effects	1.74E-15

Total cancer effects, radiation + chemicals, Unweighted

MIR fatal cancers	6.54E-15
MIR Cancer Incidence	2.23E-14
MIR Hereditary Effects	1.74E-15

Maximum Individual Risk Values/RfD Ratios

Exposure Route	[CESIUM-137+D]				[COBALT-60]			
	Time		Non-Time		Time		Non-Time	
	Weighted		Weighted		Weighted		Weighted	
	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INGESTION/DERMAL								
Drinking Water	4.67E-21	3	2.75E-20	4	4.37E-16	1	4.37E-16	1
Finfish	3.35E-20	3	1.98E-19	4	2.33E-15	1	2.33E-15	1
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	2.26E-21	3	1.33E-20	4	9.39E-16	1	9.39E-16	1
Other Vegetables	1.99E-21	3	1.17E-20	4	7.68E-16	1	7.68E-16	1
Meat	3.05E-21	3	1.80E-20	4	1.26E-15	1	1.26E-15	1
Milk	7.49E-21	3	4.41E-20	4	8.96E-16	1	8.96E-16	1
Swimming	7.61E-24	3	4.49E-23	4	7.57E-18	1	7.57E-18	1
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

	Risk		Risk		Risk		Risk	
	Value	Time Per.	Value	Time Per.	Value	Time Per.	Value	Time Per.
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
EXTERNAL RADIATION								
Boating	5.88E-25	3	3.47E-24	4	2.43E-18	1	2.43E-18	1
Shoreline	1.41E-21	3	8.31E-21	4	1.60E-15	1	1.60E-15	1
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

 For radionuclides and carcinogenic chemicals, RISK VALUES are used
 For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]
 Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[STRONTIUM-90]				[YTTRIUM-90]			
	Time		Non-Time		Time		Non-Time	
	Weighted		Weighted		Weighted		Weighted	
	Risk		Risk		Risk		Risk	
	Value	Time Per.	Value	Time Per.	Value	Time Per.	Value	Time Per.
INGESTION/DERMAL								
Drinking Water	8.05E-20	3	3.22E-19	3	5.47E-21	3	2.19E-20	3
Finfish	6.51E-20	3	2.60E-19	3	1.93E-22	3	7.71E-22	3
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	2.93E-19	3	1.17E-18	3	1.32E-21	3	5.29E-21	3
Other Vegetables	9.01E-19	3	3.60E-18	3	2.87E-28	3	1.15E-27	3
Meat	7.37E-21	3	2.95E-20	3	5.96E-25	3	2.38E-24	3
Milk	1.42E-19	3	5.69E-19	3	1.11E-23	3	4.43E-23	3
Swimming	4.99E-22	3	2.00E-21	3	3.87E-23	3	1.55E-22	3
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
EXTERNAL RADIATION								
Boating	3.07E-26	3	1.23E-25	3	1.14E-25	3	4.56E-25	3
Shoreline	3.79E-22	3	1.51E-21	3	1.81E-25	3	7.23E-25	3
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

 For radionuclides and carcinogenic chemicals, RISK VALUES are used
 For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]
 Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[TRITIUM]				[ANTIMONY-125]			
	Time Weighted		Non-Time Weighted		Time Weighted		Non-Time Weighted	
	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INGESTION/DERMAL								
Drinking Water	2.47E-17	1	2.47E-17	1	5.82E-24	1	5.82E-24	1
Finfish	7.99E-20	1	7.99E-20	1	5.34E-24	1	5.34E-24	1
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	9.08E-19	1	9.08E-19	1	3.43E-24	1	3.43E-24	1
Other Vegetables	5.71E-18	1	5.71E-18	1	2.10E-24	1	2.10E-24	1
Meat	2.88E-18	1	2.88E-18	1	2.24E-25	1	2.24E-25	1
Milk	3.66E-18	1	3.66E-18	1	1.68E-25	1	1.68E-25	1
Swimming	3.07E-20	1	3.07E-20	1	3.87E-26	1	3.87E-26	1
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
EXTERNAL RADIATION								
Boating	0.00E+00	0	0.00E+00	0	1.42E-26	1	1.42E-26	1
Shoreline	0.00E+00	0	0.00E+00	0	5.56E-24	1	5.56E-24	1
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]
Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[COBALT-57]			
	Time Weighted		Non-Time Weighted	
	Risk Value	Time Per.	Risk Value	Time Per.
INGESTION/DERMAL				
Drinking Water	1.94E-20	1	1.94E-20	1
Finfish	1.01E-19	1	1.01E-19	1
Shellfish	0.00E+00	0	0.00E+00	0
Leafy Vegetables	3.99E-20	1	3.99E-20	1
Other Vegetables	2.82E-20	1	2.82E-20	1
Meat	5.23E-20	1	5.23E-20	1
Milk	3.85E-20	1	3.85E-20	1
Swimming	3.46E-22	1	3.46E-22	1

Soil Ingestion	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0

	Risk Value	Time Per.	Risk Value	Time Per.
INHALATION				
Inhalation	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0

	Risk Value	Time Per.	Risk Value	Time Per.
EXTERNAL RADIATION				
Boating	1.13E-22	1	1.13E-22	1
Shoreline	1.12E-20	1	1.12E-20	1
Ground	0.00E+00	0	0.00E+00	0

 For radionuclides and carcinogenic chemicals, RISK VALUES are used
 For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]
 File Title Summary For Run

Run Title: PEIS 100N Area GW-->S --- WTSF200 .HIN

Run Date and Time: 4/ 6/1994 7:24:25

Constituent Database: UPDATED March 25, 1993 DLS/PEIS

Water Data File: DOE Ha --- WTSF200 .WAT

APPENDIX E

PROCESS AND PACKAGE OF ALL FUEL: SHEAR, LEACH, AND SOLVENT
EXTRACTION FACILITY NEW FUEL DRYING AND PASSIVATION FACILITY

*****4/17/1993 VERSION IIIdarc*****

RADCON -- WATERBORNE TRANSPORT COMPONENT for the Multimedia
Environmental Pollutant Assessment System (MEPAS):
Models movement of radionuclides and other chemicals
in groundwater, surface water, and overland pathways.

Battelle, Pacific Northwest Laboratory (PNL)
P.O. Box 999, Richland, WA 99352

Developed for the U.S. Department of Energy

Input file for this run is TEDF08A .WIN

Modeling Scenario Number 1

Name of Facility = DOE Hanford
Name of Waste Unit = SNF-EIS 200 East Area
Transport Scenario = SS-T3 Surface soil >Groundwater
Exposure Scenario = SW-E2
Usage Location Number = 6
Usage Location Medium = 3
Usage Location Name =

TLIFE is the duration of release for each contaminant expressed in years.
TDIFF is the time difference in years between the current date and the
date when contaminants were first released into the environment.

Constituent Name	TLIFE (years)	TDIFF (years)	TFINAL (years)
AMERICIU	4.000E+00	0.000E+00	7.001E+03
CARBON-1	4.000E+00	0.000E+00	7.001E+03
CESIUM-1	4.000E+00	0.000E+00	7.001E+03
PLUTONIUM	4.000E+00	0.000E+00	7.001E+03
PLUTONIUM	4.000E+00	0.000E+00	7.001E+03
TRITIUM	4.000E+00	0.000E+00	7.001E+03
URANIUM-	4.000E+00	0.000E+00	7.001E+03
AMMONIA	4.000E+00	0.000E+00	7.001E+03
NITRATE	4.000E+00	0.000E+00	7.001E+03
SULFATE	4.000E+00	0.000E+00	7.001E+03
URANIUM-	4.000E+00	0.000E+00	7.001E+03
SILICATE	4.000E+00	0.000E+00	7.001E+03

#	Constituent	NUM
1	AMERICIU	2
2	CARBON-1	2
3	CESIUM-1	2
4	PLUTONIUM	2
5	PLUTONIUM	2
6	TRITIUM	2
7	URANIUM-	2
8	AMMONIA	2
9	NITRATE	2
10	SULFATE	2
11	URANIUM-	2
12	SILICATE	2

Known Infiltration Rate to Unsaturated Zone (VLEACH) = 1.32E+02 cm/day
Source-Term Type (ISTYPE) = 1

Source-Term Flux Boundary Conditions (ISOURC) = 2
 Liquid Impoundment Index (IPOND) = 1
 Source-Term Decay Index (IDECAY) = 2
 Direct Discharge Surface Water Index (IDDSW) = 0
 Number of Parent Constituents (NUMCON) = 12

Source-Term Configuration (ISCONF) = 4
 Number of Media (NMED) = 5
 Number of Integration Time Steps (NTIMES) = 40

Medium # 1 Equals Medium Type (MED) # 1
 Medium # 2 Equals Medium Type (MED) # 1
 Medium # 3 Equals Medium Type (MED) # 1
 Medium # 4 Equals Medium Type (MED) # 4
 Medium # 5 Equals Medium Type (MED) # 5

Length of Release Unit (AL1 OR CLEN) = 1.61E+04 cm
 Width of release Unit (B1) = 1.61E+04 cm

Water concentration units are: ATTO (1.000E-18) Ci OR g

Constituent	CAS ID	Half-Life (Years)	Initial Conc.	Surface Equilibrium Coeff. (ml/g)	Solubility limit (g/ml)	Constituent Inventory (g OR Ci)
AMERICIU	AM241	4.33E+02	-9.99E+01	-9.99E+01	1.00E+23	5.14E-03
NEPTUNIUM	NP237	2.14E+06				
PROTACTI	PA233	7.39E-02				
URANIUM-	U233	1.59E+05				
CARBON-1	C14	5.72E+03	-9.99E+01	-9.99E+01	1.00E+23	9.97E+01
CESIUM-1	CS137	3.01E+01	-9.99E+01	-9.99E+01	1.00E+23	9.97E+00
PLUTONIUM	PU238	8.79E+01	-9.99E+01	-9.99E+01	1.00E+23	7.98E-02
URANIUM-	U234	2.45E+05				
THORIUM-	TH230	7.69E+04				
PLUTONIUM	PU239	2.41E+04	-9.99E+01	-9.99E+01	1.00E+23	5.98E-02
URANIUM-	U235	7.04E+08				
TRITIUM	H3	1.23E+01	-9.99E+01	-9.99E+01	1.00E+23	1.14E+01
URANIUM-	U234	2.45E+05	-9.99E+01	-9.99E+01	1.00E+23	1.99E+00
THORIUM-	TH230	7.69E+04				
AMMONIA	7664417	1.00E+20	-9.99E+01	-9.99E+01	1.00E+00	6.48E+07
NITRATE	14797558	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	2.57E+07
SULFATE	12808798	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	1.25E+10
URANIUM-	U238	4.46E+09	-9.99E+01	-9.99E+01	1.00E+23	1.99E+00
SILICATE	6834920	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	1.28E+08

Constituent Flux (g/yr or Ci/yr) and Time (Years) at the Release Unit

Constituent #	Flux	Time	Constituent #	Flux	Time
1 1	1.28E-03	0.000E+00	1 2	1.28E-03	4.000E+00
2 1	2.49E+01	0.000E+00	2 2	2.49E+01	4.000E+00
3 1	2.49E+00	0.000E+00	3 2	2.49E+00	4.000E+00
4 1	1.99E-02	0.000E+00	4 2	1.99E-02	4.000E+00
5 1	1.50E-02	0.000E+00	5 2	1.50E-02	4.000E+00
6 1	2.85E+00	0.000E+00	6 2	2.85E+00	4.000E+00
7 1	4.99E-01	0.000E+00	7 2	4.99E-01	4.000E+00
8 1	1.62E+07	0.000E+00	8 2	1.62E+07	4.000E+00
9 1	6.43E+06	0.000E+00	9 2	6.43E+06	4.000E+00
10 1	3.12E+09	0.000E+00	10 2	3.12E+09	4.000E+00
11 1	4.99E-01	0.000E+00	11 2	4.99E-01	4.000E+00
12 1	3.20E+07	0.000E+00	12 2	3.20E+07	4.000E+00

New Constituent Flux (g/yr or Ci/yr) and Time (Years) at the Release Unit

Constituent #	Flux	Time	Constituent #	Flux	Time
1 1	1.28E-03	0.000E+00	1 2	1.28E-03	4.000E+00
2 1	2.49E+01	0.000E+00	2 2	2.49E+01	4.000E+00
3 1	2.49E+00	0.000E+00	3 2	2.49E+00	4.000E+00
4 1	1.99E-02	0.000E+00	4 2	1.99E-02	4.000E+00
5 1	1.50E-02	0.000E+00	5 2	1.50E-02	4.000E+00
6 1	2.85E+00	0.000E+00	6 2	2.85E+00	4.000E+00
7 1	4.99E-01	0.000E+00	7 2	4.99E-01	3.999E+00
8 1	1.62E+07	0.000E+00	8 2	1.62E+07	4.000E+00
9 1	6.43E+06	0.000E+00	9 2	6.43E+06	4.000E+00
10 1	3.12E+09	0.000E+00	10 2	3.12E+09	3.999E+00
11 1	4.99E-01	0.000E+00	11 2	4.99E-01	3.999E+00
12 1	3.20E+07	0.000E+00	12 2	3.20E+07	3.999E+00

The New Duration of Time that Constituents are Released from the Release Unit

#	Constituent	New TLIFE (Years)
1	AMERICIU	4.000E+00
2	CARBON-1	4.000E+00
3	CESIUM-1	4.000E+00
4	PLUTONIUM	4.000E+00
5	PLUTONIUM	4.000E+00
6	TRITIUM	4.000E+00
7	URANIUM-	3.999E+00
8	AMMONIA	4.000E+00
9	NITRATE	4.000E+00
10	SULFATE	3.999E+00
11	URANIUM-	3.999E+00
12	SILICATE	3.999E+00

Modeling Medium # 1
Medium Type (MED) = 1
Source Configuration = 4
Source Term Discharge Type = 1
PARTIALLY SATURATED ZONE

Thickness of Unsaturated Layer (H1) = 1.01E+03 cm
X-Direction Dispersivity (A1) = 1.01E+01 cm
Bulk Density (R2) = 1.80E+00 g/cm**3
Total Porosity (AN4) = 3.60E-01 (fraction)
Field Capacity (AN5) = 1.90E-01 (fraction)
Permeability (X2) = 1.32E+02 cm/day
Leach Rate (VLEACH) = 1.32E+02 cm/day
Soil-Type Coefficient (A2) = 4.05E+00

Moisture Content (AN5) = 36.00 %
Infiltration Rate (U) = 3.68E+02 cm/day

NO	PARENT	HALFLIFE YEARS	KD CC/GM	RETARDATION FACTOR
1	AMERICIU	4.32600E+02	1.00000E+01	5.10000E+01
2	CARBON-1	5.72200E+03	0.00000E+00	1.00000E+00
3	CESIUM-1	3.01200E+01	1.00000E+01	5.10000E+01
4	PLUTONIUM	8.78900E+01	1.00000E+01	5.10000E+01
5	PLUTONIUM	2.41200E+04	1.00000E+01	5.10000E+01
6	TRITIUM	1.22900E+01	0.00000E+00	1.00000E+00
7	URANIUM-	2.44500E+05	0.00000E+00	1.00000E+00

8	AMMONIA	1.00000E+20	0.00000E+00	1.00000E+00
9	NITRATE	1.00000E+20	0.00000E+00	1.00000E+00
10	SULFATE	1.00000E+20	0.00000E+00	1.00000E+00
11	URANIUM-	4.46300E+09	0.00000E+00	1.00000E+00
12	SILICATE	1.00000E+20	5.00000E+00	2.60000E+01

Constituent	CAS ID	Half-Life (Years)	Surface			Solubility limit (g/ml)	Constituent Inventory (g OR Ci)
			Initial Conc.	Equilibrium Coeff. (ml/g)			
AMERICIU	AM241	4.33E+02	-9.99E+01	-9.99E+01	1.00E+23	5.14E-03	
CARBON-1	C14	5.72E+03	-9.99E+01	-9.99E+01	1.00E+23	9.97E+01	
CESIUM-1	CS137	3.01E+01	-9.99E+01	-9.99E+01	1.00E+23	9.97E+00	
PLUTONIUM	PU238	8.79E+01	-9.99E+01	-9.99E+01	1.00E+23	7.98E-02	
PLUTONIUM	PU239	2.41E+04	-9.99E+01	-9.99E+01	1.00E+23	5.98E-02	
TRITIUM	H3	1.23E+01	-9.99E+01	-9.99E+01	1.00E+23	1.14E+01	
URANIUM-	U234	2.45E+05	-9.99E+01	-9.99E+01	1.00E+23	1.99E+00	
AMMONIA	7664417	1.00E+20	-9.99E+01	-9.99E+01	1.00E+00	6.48E+07	
NITRATE	14797558	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	2.57E+07	
SULFATE	12808798	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	1.25E+10	
URANIUM-	U238	4.46E+09	-9.99E+01	-9.99E+01	1.00E+23	1.99E+00	
SILICATE	6834920	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	1.28E+08	

Computed Initial at the Release Unit (DMAX) = 1.03E-16

Computed Initial at the Release Unit (DMAX) = 2.00E-12

Computed Initial at the Release Unit (DMAX) = 2.00E-13

Computed Initial at the Release Unit (DMAX) = 1.60E-15

Computed Initial at the Release Unit (DMAX) = 1.20E-15

Computed Initial at the Release Unit (DMAX) = 2.29E-13

Computed Initial at the Release Unit (DMAX) = 4.00E-14

Computed Initial at the Release Unit (DMAX) = 1.30E-06

Computed Initial at the Release Unit (DMAX) = 5.16E-07

Computed Initial at the Release Unit (DMAX) = 2.50E-04

Computed Initial at the Release Unit (DMAX) = 4.00E-14

Computed Initial at the Release Unit (DMAX) = 2.57E-06

Modeling Medium # 2
Medium Type (MED) = 1
Source Configuration = 4
Source Term Discharge Type = 1
PARTIALLY SATURATED ZONE

Thickness of Unsaturated Layer (H1) = 5.00E+03 cm
X-Direction Dispersivity (A1) = 5.00E+01 cm
Bulk Density (R2) = 1.60E+00 g/cm**3
Total Porosity (AN4) = 4.20E-01 (fraction)
Field Capacity (AN5) = 8.50E-02 (fraction)
Permeability (X2) = 4.33E+02 cm/day
Leach Rate (VLEACH) = 3.62E-01 cm/day
Soil-Type Coefficient (A2) = 4.05E+00

Moisture Content (AN5) = 37.75 %
 Infiltration Rate (U) = 3.50E+02 cm/day

NO	PARENT	DECAY RATE 1/YEARS	KD CC/GM	RETARDATION FACTOR
1	AMERICIU	1.60228E-03	1.00000E+01	4.33880E+01
2	CARBON-1	1.21137E-04	0.00000E+00	1.00000E+00
3	CESIUM-1	2.30129E-02	1.00000E+01	4.33880E+01
4	PLUTONIUM	7.88653E-03	1.00000E+01	4.33880E+01
5	PLUTONIUM	2.87374E-05	1.00000E+01	4.33880E+01
6	TRITIUM	5.63993E-02	0.00000E+00	1.00000E+00
7	URANIUM-	2.83496E-06	0.00000E+00	1.00000E+00
8	AMMONIA	6.93147E-21	0.00000E+00	1.00000E+00
9	NITRATE	6.93147E-21	0.00000E+00	1.00000E+00
10	SULFATE	6.93147E-21	0.00000E+00	1.00000E+00
11	URANIUM-	1.55310E-10	0.00000E+00	1.00000E+00
12	SILICATE	6.93147E-21	5.00000E+00	2.21940E+01

Modeling Medium # 3
 Medium Type (MED) = 1
 Source Configuration = 4
 Source Term Discharge Type = 1
 PARTIALLY SATURATED ZONE

Thickness of Unsaturated Layer (H1) = 1.89E+03 cm
 X-Direction Dispersivity (A1) = 1.89E+01 cm
 Bulk Density (R2) = 1.80E+00 g/cm**3
 Total Porosity (AN4) = 3.60E-01 (fraction)
 Field Capacity (AN5) = 1.90E-01 (fraction)
 Permeability (X2) = 1.32E+02 cm/day
 Leach Rate (VLEACH) = 3.62E-01 cm/day
 Soil-Type Coefficient (A2) = 4.05E+00

Moisture Content (AN5) = 36.00 %
 Infiltration Rate (U) = 3.68E+02 cm/day

NO	PARENT	DECAY RATE 1/YEARS	KD CC/GM	RETARDATION FACTOR
1	AMERICIU	1.60228E-03	1.00000E+01	5.10000E+01
2	CARBON-1	1.21137E-04	0.00000E+00	1.00000E+00
3	CESIUM-1	2.30129E-02	1.00000E+01	5.10000E+01
4	PLUTONIUM	7.88653E-03	1.00000E+01	5.10000E+01
5	PLUTONIUM	2.87374E-05	1.00000E+01	5.10000E+01
6	TRITIUM	5.63993E-02	0.00000E+00	1.00000E+00
7	URANIUM-	2.83496E-06	0.00000E+00	1.00000E+00
8	AMMONIA	6.93147E-21	0.00000E+00	1.00000E+00
9	NITRATE	6.93147E-21	0.00000E+00	1.00000E+00
10	SULFATE	6.93147E-21	0.00000E+00	1.00000E+00
11	URANIUM-	1.55310E-10	0.00000E+00	1.00000E+00
12	SILICATE	6.93147E-21	5.00000E+00	2.60000E+01

Modeling Medium # 4
 Medium Type (MED) = 4

Source Configuration = 4
 Source Term Discharge Type = 1
 SATURATED ZONE AT A RIVER

NO	PARENT	DECAY RATE 1/YEARS	KD CC/GM	RETARDATION FACTOR
1	AMERICIU	1.60228E-03	1.00000E+01	1.61000E+02
2	CARBON-1	1.21137E-04	0.00000E+00	1.00000E+00
3	CESIUM-1	2.30129E-02	1.00000E+01	1.61000E+02
4	PLUTONIUM	7.88653E-03	1.00000E+01	1.61000E+02
5	PLUTONIUM	2.87374E-05	1.00000E+01	1.61000E+02
6	TRITIUM	5.63993E-02	0.00000E+00	1.00000E+00
7	URANIUM-	2.83496E-06	0.00000E+00	1.00000E+00
8	AMMONIA	6.93147E-21	0.00000E+00	1.00000E+00
9	NITRATE	6.93147E-21	0.00000E+00	1.00000E+00
10	SULFATE	6.93147E-21	0.00000E+00	1.00000E+00
11	URANIUM-	1.55310E-10	0.00000E+00	1.00000E+00
12	SILICATE	6.93147E-21	5.00000E+00	8.10000E+01

Groundwater Velocity (U) = 3.29E+02 cm/day
 Aquifer Thickness (H1) = 9.14E+02 cm
 X-Direction Dispersivity (A1) = 1.29E+05 cm
 Y-Direction Dispersivity (A2) = 2.58E+04 cm
 Z-Direction Dispersivity (A3) = 1.49E+02 cm
 Bulk Density (R2) = 1.60E+00 g/cm**3
 Total Porosity (AN4) = 1.80E-01 (fraction)
 Effective Porosity (AN5) = 1.00E-01 (fraction)
 Length of Burial Area (AL1) = 1.61E+04 cm
 Width of Burial Area (B1) = 1.61E+04 cm
 Depth of Release Unit Below Water Table (HW) = 0.00E+00 cm
 Distance Downgradient from Center of Source (X2) = 1.29E+06 cm
 Lateral Hydraulic Conductivity (HC) = 0.00E+00 cm/day

Modeling Medium # = 5
 Medium Type (MED) = .5
 Source Configuration = 4
 Source Term Discharge Type = 1
 SURFACE WATER ENVIRONMENT

Number of River Receptor Locations (NUMREC) = 8
 Flow Velocity (U1) = 1.66E+09 cm/year
 Depth of Flow (H1) = 4.88E+02 cm
 Width of River (B1) = 3.96E+04 cm
 Downstream Discharge at First Receptor (QNEW) = 3.22E+16 cm**3/year
 Distance Downstream from Center of Source (X3) = 1.00E+04 cm

Uniform Mixing Distance = 1.04E+03 cm

Concentrations for AMERICIU at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 7.166E-31 (g/ml or Ci/ml) at 175.0 years (2168)

Concentrations for NEPTUNIUM at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)

4.686E-35 (g/ml or Ci/ml) at 175.0 years (2168)

Concentrations for PROTACTI at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 4.684E-35 (g/ml or Ci/ml) at 175.0 years (2168)

Concentrations for URANIUM- at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 1.873E-38 (g/ml or Ci/ml) at 175.0 years (2168)

Concentrations for CARBON-1 at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 6.410E-21 (g/ml or Ci/ml) at 2.1 years (1995)

Concentrations for CESIUM-1 at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 0.000E+00 (g/ml or Ci/ml) at 44.0 years (2036)

Concentrations for PLUTONIUM at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 0.000E+00 (g/ml or Ci/ml) at 84.6 years (2077)

Concentrations for URANIUM- at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 0.000E+00 (g/ml or Ci/ml) at 84.6 years (2077)

Concentrations for THORIUM- at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 0.000E+00 (g/ml or Ci/ml) at 84.6 years (2077)

Concentrations for PLUTONIUM at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 1.096E-29 (g/ml or Ci/ml) at 175.0 years (2168)

Concentrations for URANIUM- at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 1.895E-36 (g/ml or Ci/ml) at 175.0 years (2168)

Concentrations for TRITIUM at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 2.673E-23 (g/ml or Ci/ml) at 1.7 years (1994)

Concentrations for URANIUM- at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 1.254E-22 (g/ml or Ci/ml) at 2.1 years (1995)

Concentrations for THORIUM- at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 2.391E-27 (g/ml or Ci/ml) at 2.1 years (1995)

Concentrations for AMMONIA at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 4.003E-15 (g/ml or Ci/ml) at 2.1 years (1995)

Concentrations for NITRATE at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 1.612E-15 (g/ml or Ci/ml) at 2.1 years (1995)

Concentrations for SULFATE at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 7.839E-13 (g/ml or Ci/ml) at 2.1 years (1995)

Concentrations for URANIUM- at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 1.254E-22 (g/ml or Ci/ml) at 2.1 years (1995)

Concentrations for SILICATE at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 5.764E-16 (g/ml or Ci/ml) at 148.2 years (2141)

Maximum Constituent Concentrations:

AMERICIU: 7.423E-24 (g/ml or Ci/ml) at 1050.0 Years (3043)
 NEPTUNI: 8.912E-27 (g/ml or Ci/ml) at 1400.0 Years (3393)
 PROTACTI: 8.911E-27 (g/ml or Ci/ml) at 1400.0 Years (3393)
 URANIUM-: 4.243E-29 (g/ml or Ci/ml) at 1750.0 Years (3743)
 CARBON-1: 1.438E-16 (g/ml or Ci/ml) at 10.6 Years (2003)
 CESIUM-1: 7.820E-26 (g/ml or Ci/ml) at 395.9 Years (2388)
 PLUTONI: 9.116E-25 (g/ml or Ci/ml) at 592.0 Years (2585)
 URANIUM-: 2.776E-25 (g/ml or Ci/ml) at 1437.8 Years (3430)
 THORIUM-: 3.582E-27 (g/ml or Ci/ml) at 1691.5 Years (3684)
 PLUTONI: 5.506E-22 (g/ml or Ci/ml) at 1400.0 Years (3393)
 URANIUM-: 8.447E-28 (g/ml or Ci/ml) at 1750.0 Years (3743)
 TRITIUM : 9.744E-18 (g/ml or Ci/ml) at 10.3 Years (2003)
 URANIUM-: 2.750E-18 (g/ml or Ci/ml) at 10.6 Years (2003)
 THORIUM-: 2.621E-22 (g/ml or Ci/ml) at 10.6 Years (2003)
 AMMONIA : 8.192E-11 (g/ml or Ci/ml) at 10.6 Years (2003)
 NITRATE : 3.547E-11 (g/ml or Ci/ml) at 10.6 Years (2003)
 SULFATE : 1.718E-08 (g/ml or Ci/ml) at 10.6 Years (2003)
 URANIUM-: 2.750E-18 (g/ml or Ci/ml) at 10.6 Years (2003)
 SILICATE: 2.394E-12 (g/ml or Ci/ml) at 741.2 Years (2734)

Modeling Scenario Number 2

Name of Facility = DOE Hanford
 Name of Waste Unit = SNF-EIS 200 East Area
 Transport Scenario = SS-T3 Surface soil >Groundwater
 Exposure Scenario = SW-E3 SW-E4 SW-E5
 Usage Location Number = 1
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

AMERICIU: 1.383E-23 (g/ml or Ci/ml) at 1050.0 years (3043)
 NEPTUNI: 1.661E-26 (g/ml or Ci/ml) at 1400.0 years (3393)
 PROTACTI: 1.661E-26 (g/ml or Ci/ml) at 1400.0 years (3393)
 URANIUM-: 7.909E-29 (g/ml or Ci/ml) at 1750.0 years (3743)
 CARBON-1: 2.679E-16 (g/ml or Ci/ml) at 10.6 years (2003)
 CESIUM-1: 1.457E-25 (g/ml or Ci/ml) at 395.9 years (2388)
 PLUTONI: 1.699E-24 (g/ml or Ci/ml) at 592.0 years (2585)
 URANIUM-: 5.174E-25 (g/ml or Ci/ml) at 1437.8 years (3430)
 THORIUM-: 6.676E-27 (g/ml or Ci/ml) at 1691.5 years (3684)
 PLUTONI: 1.026E-21 (g/ml or Ci/ml) at 1400.0 years (3393)
 URANIUM-: 1.574E-27 (g/ml or Ci/ml) at 1750.0 years (3743)
 TRITIUM : 1.816E-17 (g/ml or Ci/ml) at 10.3 years (2003)
 URANIUM-: 5.125E-18 (g/ml or Ci/ml) at 10.6 years (2003)
 THORIUM-: 4.886E-22 (g/ml or Ci/ml) at 10.6 years (2003)

AMMONIA : 1.527E-10 (g/ml or Ci/ml) at 10.6 years (2003)
 NITRATE : 6.611E-11 (g/ml or Ci/ml) at 10.6 years (2003)
 SULFATE : 3.202E-08 (g/ml or Ci/ml) at 10.6 years (2003)
 URANIUM-: 5.125E-18 (g/ml or Ci/ml) at 10.6 years (2003)
 SILICATE: 4.461E-12 (g/ml or Ci/ml) at 741.2 years (2734)

Modeling Scenario Number 3

Name of Facility = DOE Hanford
 Name of Waste Unit = SNF-EIS 200 East Area
 Transport Scenario = SS-T3 Surface soil >Groundwater
 Exposure Scenario = SW-E3 SW-E4 SW-E5
 Usage Location Number = 7
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

AMERICIU: 1.383E-23 (g/ml or Ci/ml) at 1050.0 years (3043)
 NEPTUNI: 1.661E-26 (g/ml or Ci/ml) at 1400.0 years (3393)
 PROTACT: 1.661E-26 (g/ml or Ci/ml) at 1400.0 years (3393)
 URANIUM-: 7.909E-29 (g/ml or Ci/ml) at 1750.0 years (3743)
 CARBON-1: 2.679E-16 (g/ml or Ci/ml) at 10.6 years (2003)
 CESIUM-1: 1.457E-25 (g/ml or Ci/ml) at 395.9 years (2388)
 PLUTONI: 1.699E-24 (g/ml or Ci/ml) at 592.0 years (2585)
 URANIUM-: 5.174E-25 (g/ml or Ci/ml) at 1437.8 years (3430)
 THORIUM-: 6.676E-27 (g/ml or Ci/ml) at 1691.5 years (3684)
 PLUTONI: 1.026E-21 (g/ml or Ci/ml) at 1400.0 years (3393)
 URANIUM-: 1.574E-27 (g/ml or Ci/ml) at 1750.0 years (3743)
 TRITIUM : 1.816E-17 (g/ml or Ci/ml) at 10.3 years (2003)
 URANIUM-: 5.125E-18 (g/ml or Ci/ml) at 10.6 years (2003)
 THORIUM-: 4.886E-22 (g/ml or Ci/ml) at 10.6 years (2003)
 AMMONIA : 1.527E-10 (g/ml or Ci/ml) at 10.6 years (2003)
 NITRATE : 6.611E-11 (g/ml or Ci/ml) at 10.6 years (2003)
 SULFATE : 3.202E-08 (g/ml or Ci/ml) at 10.6 years (2003)
 URANIUM-: 5.125E-18 (g/ml or Ci/ml) at 10.6 years (2003)
 SILICATE: 4.461E-12 (g/ml or Ci/ml) at 741.2 years (2734)

Modeling Scenario Number 4

Name of Facility = DOE Hanford
 Name of Waste Unit = SNF-EIS 200 East Area
 Transport Scenario = SS-T3 Surface soil >Groundwater
 Exposure Scenario = SW-E1 SW-E6
 Usage Location Number = 4
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

AMERICIU: 1.383E-23 (g/ml or Ci/ml) at 1050.0 years (3043)

NEPTUNIUM: 1.661E-26 (g/ml or Ci/ml) at 1400.0 years (3393)
 PROTACTI: 1.661E-26 (g/ml or Ci/ml) at 1400.0 years (3393)
 URANIUM-: 7.909E-29 (g/ml or Ci/ml) at 1750.0 years (3743)
 CARBON-1: 2.679E-16 (g/ml or Ci/ml) at 10.6 years (2003)
 CESIUM-1: 1.457E-25 (g/ml or Ci/ml) at 395.9 years (2388)
 PLUTONIUM: 1.699E-24 (g/ml or Ci/ml) at 592.0 years (2585)
 URANIUM-: 5.174E-25 (g/ml or Ci/ml) at 1437.8 years (3430)
 THORIUM-: 6.676E-27 (g/ml or Ci/ml) at 1691.5 years (3684)
 PLUTONIUM: 1.026E-21 (g/ml or Ci/ml) at 1400.0 years (3393)
 URANIUM-: 1.574E-27 (g/ml or Ci/ml) at 1750.0 years (3743)
 TRITIUM : 1.816E-17 (g/ml or Ci/ml) at 10.3 years (2003)
 URANIUM-: 5.125E-18 (g/ml or Ci/ml) at 10.6 years (2003)
 THORIUM-: 4.886E-22 (g/ml or Ci/ml) at 10.6 years (2003)
 AMMONIA : 1.527E-10 (g/ml or Ci/ml) at 10.6 years (2003)
 NITRATE : 6.611E-11 (g/ml or Ci/ml) at 10.6 years (2003)
 SULFATE : 3.202E-08 (g/ml or Ci/ml) at 10.6 years (2003)
 URANIUM-: 5.125E-18 (g/ml or Ci/ml) at 10.6 years (2003)
 SILICATE: 4.461E-12 (g/ml or Ci/ml) at 741.2 years (2734)

Modeling Scenario Number 5

Name of Facility = DOE Hanford
 Name of Waste Unit = SNF-EIS 200 East Area
 Transport Scenario = SS-T3 Surface soil >Groundwater
 Exposure Scenario = SW-E1 SW-E6
 Usage Location Number = 5
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

AMERICIUM: 1.383E-23 (g/ml or Ci/ml) at 1050.0 years (3043)
 NEPTUNIUM: 1.661E-26 (g/ml or Ci/ml) at 1400.0 years (3393)
 PROTACTI: 1.661E-26 (g/ml or Ci/ml) at 1400.0 years (3393)
 URANIUM-: 7.909E-29 (g/ml or Ci/ml) at 1750.0 years (3743)
 CARBON-1: 2.679E-16 (g/ml or Ci/ml) at 10.6 years (2003)
 CESIUM-1: 1.457E-25 (g/ml or Ci/ml) at 395.9 years (2388)
 PLUTONIUM: 1.699E-24 (g/ml or Ci/ml) at 592.0 years (2585)
 URANIUM-: 5.174E-25 (g/ml or Ci/ml) at 1437.8 years (3430)
 THORIUM-: 6.676E-27 (g/ml or Ci/ml) at 1691.5 years (3684)
 PLUTONIUM: 1.026E-21 (g/ml or Ci/ml) at 1400.0 years (3393)
 URANIUM-: 1.574E-27 (g/ml or Ci/ml) at 1750.0 years (3743)
 TRITIUM : 1.816E-17 (g/ml or Ci/ml) at 10.3 years (2003)
 URANIUM-: 5.125E-18 (g/ml or Ci/ml) at 10.6 years (2003)
 THORIUM-: 4.886E-22 (g/ml or Ci/ml) at 10.6 years (2003)
 AMMONIA : 1.527E-10 (g/ml or Ci/ml) at 10.6 years (2003)
 NITRATE : 6.611E-11 (g/ml or Ci/ml) at 10.6 years (2003)
 SULFATE : 3.202E-08 (g/ml or Ci/ml) at 10.6 years (2003)
 URANIUM-: 5.125E-18 (g/ml or Ci/ml) at 10.6 years (2003)
 SILICATE: 4.461E-12 (g/ml or Ci/ml) at 741.2 years (2734)

Modeling Scenario Number 6

Name of Facility = DOE Hanford

Name of Waste Unit = SNF-EIS 200 East Area
 Transport Scenario = SS-T3 Surface soil >Groundwater
 Exposure Scenario = SW-E1 SW-E6 SW-E7 SW-E8
 Usage Location Number = 3
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

AMERICIU:	1.383E-23 (g/ml or Ci/ml)	at 1050.0 years (3043)
NEPTUNI:	1.661E-26 (g/ml or Ci/ml)	at 1400.0 years (3393)
PROTACTI:	1.661E-26 (g/ml or Ci/ml)	at 1400.0 years (3393)
URANIUM-:	7.909E-29 (g/ml or Ci/ml)	at 1750.0 years (3743)
CARBON-1:	2.679E-16 (g/ml or Ci/ml)	at 10.6 years (2003)
CESIUM-1:	1.457E-25 (g/ml or Ci/ml)	at 395.9 years (2388)
PLUTONI:	1.699E-24 (g/ml or Ci/ml)	at 592.0 years (2585)
URANIUM-:	5.174E-25 (g/ml or Ci/ml)	at 1437.8 years (3430)
THORIUM-:	6.676E-27 (g/ml or Ci/ml)	at 1691.5 years (3684)
PLUTONI:	1.026E-21 (g/ml or Ci/ml)	at 1400.0 years (3393)
URANIUM-:	1.574E-27 (g/ml or Ci/ml)	at 1750.0 years (3743)
TRITIUM :	1.816E-17 (g/ml or Ci/ml)	at 10.3 years (2003)
URANIUM-:	5.125E-18 (g/ml or Ci/ml)	at 10.6 years (2003)
THORIUM-:	4.886E-22 (g/ml or Ci/ml)	at 10.6 years (2003)
AMMONIA :	1.527E-10 (g/ml or Ci/ml)	at 10.6 years (2003)
NITRATE :	6.611E-11 (g/ml or Ci/ml)	at 10.6 years (2003)
SULFATE :	3.202E-08 (g/ml or Ci/ml)	at 10.6 years (2003)
URANIUM-:	5.125E-18 (g/ml or Ci/ml)	at 10.6 years (2003)
SILICATE:	4.461E-12 (g/ml or Ci/ml)	at 741.2 years (2734)

Modeling Scenario Number 7

Name of Facility = DOE Hanford
 Name of Waste Unit = SNF-EIS 200 East Area
 Transport Scenario = SS-T3 Surface soil >Groundwater
 Exposure Scenario = SW-E1 SW-E6 SW-E7 SW-E8
 Usage Location Number = 2
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

AMERICIU:	1.383E-23 (g/ml or Ci/ml)	at 1050.0 years (3043)
NEPTUNI:	1.661E-26 (g/ml or Ci/ml)	at 1400.0 years (3393)
PROTACTI:	1.661E-26 (g/ml or Ci/ml)	at 1400.0 years (3393)
URANIUM-:	7.909E-29 (g/ml or Ci/ml)	at 1750.0 years (3743)
CARBON-1:	2.679E-16 (g/ml or Ci/ml)	at 10.6 years (2003)
CESIUM-1:	1.457E-25 (g/ml or Ci/ml)	at 395.9 years (2388)
PLUTONI:	1.699E-24 (g/ml or Ci/ml)	at 592.0 years (2585)
URANIUM-:	5.174E-25 (g/ml or Ci/ml)	at 1437.8 years (3430)
THORIUM-:	6.676E-27 (g/ml or Ci/ml)	at 1691.5 years (3684)
PLUTONI:	1.026E-21 (g/ml or Ci/ml)	at 1400.0 years (3393)
URANIUM-:	1.574E-27 (g/ml or Ci/ml)	at 1750.0 years (3743)
TRITIUM :	1.816E-17 (g/ml or Ci/ml)	at 10.3 years (2003)
URANIUM-:	5.125E-18 (g/ml or Ci/ml)	at 10.6 years (2003)
THORIUM-:	4.886E-22 (g/ml or Ci/ml)	at 10.6 years (2003)

AMMONIA : 1.527E-10 (g/ml or Ci/ml) at 10.6 years (2003)
 NITRATE : 6.611E-11 (g/ml or Ci/ml) at 10.6 years (2003)
 SULFATE : 3.202E-08 (g/ml or Ci/ml) at 10.6 years (2003)
 URANIUM-: 5.125E-18 (g/ml or Ci/ml) at 10.6 years (2003)
 SILICATE: 4.461E-12 (g/ml or Ci/ml) at 741.2 years (2734)

Modeling Scenario Number 8

Name of Facility = DOE Hanford
 Name of Waste Unit = SNF-EIS 200 East Area
 Transport Scenario = SS-T3 Surface soil >Groundwater
 Exposure Scenario = SW-E3 SW-E4 SW-E5
 Usage Location Number = 8
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

AMERICIU: 1.383E-23 (g/ml or Ci/ml) at 1050.0 years (3043)
 NEPTUNI: 1.661E-26 (g/ml or Ci/ml) at 1400.0 years (3393)
 PROTACTI: 1.661E-26 (g/ml or Ci/ml) at 1400.0 years (3393)
 URANIUM-: 7.909E-29 (g/ml or Ci/ml) at 1750.0 years (3743)
 CARBON-1: 2.679E-16 (g/ml or Ci/ml) at 10.6 years (2003)
 CESIUM-1: 1.457E-25 (g/ml or Ci/ml) at 395.9 years (2388)
 PLUTONI: 1.699E-24 (g/ml or Ci/ml) at 592.0 years (2585)
 URANIUM-: 5.174E-25 (g/ml or Ci/ml) at 1437.8 years (3430)
 THORIUM-: 6.676E-27 (g/ml or Ci/ml) at 1691.5 years (3684)
 PLUTONI: 1.026E-21 (g/ml or Ci/ml) at 1400.0 years (3393)
 URANIUM-: 1.574E-27 (g/ml or Ci/ml) at 1750.0 years (3743)
 TRITIUM : 1.816E-17 (g/ml or Ci/ml) at 10.3 years (2003)
 URANIUM-: 5.125E-18 (g/ml or Ci/ml) at 10.6 years (2003)
 THORIUM-: 4.886E-22 (g/ml or Ci/ml) at 10.6 years (2003)
 AMMONIA : 1.527E-10 (g/ml or Ci/ml) at 10.6 years (2003)
 NITRATE : 6.611E-11 (g/ml or Ci/ml) at 10.6 years (2003)
 SULFATE : 3.202E-08 (g/ml or Ci/ml) at 10.6 years (2003)
 URANIUM-: 5.125E-18 (g/ml or Ci/ml) at 10.6 years (2003)
 SILICATE: 4.461E-12 (g/ml or Ci/ml) at 741.2 years (2734)

Multimedia Environmental Pollutant Assessment System (MEPAS)

MEPAS Hazard Potential Output (VERSION 041292)

Pacific Northwest Laboratory

Richland, WA 99352

Developed for the U.S. Department of Energy

Run Date and Time: 11/22/1993 12:21:51

(This run used 630. effects per million man-rem)

Run Title: SNF-EIS 200 East Area

Ranking Unit 1 : TEDF08A

Number of Constituents is: 17

Time Discounted HPis are computed using 70 year time periods (Time Index = 0)

Num	Constituent Names -----	CASID -----
1	AMERICIUM-241	AM241
2	NEPTUNIUM-237	NP237
3	PROTACTINIUM-233	PA233
4	URANIUM-233	U233
5	CARBON-14	C14
6	CESIUM-137+0	CS137
7	PLUTONIUM-238	PU238
8	URANIUM-234	U234
9	THORIUM-230	TH230
10	PLUTONIUM-239	PU239
11	URANIUM-235	U235
12	TRITIUM (as tritiated water, HTO)	H3
13	Ammonia, Ammonium Hydroxide	7664417
14	Nitrate	14797558
15	Sulfate ion	12808798
16	URANIUM-238	U238
17	Silicate ion	6834920

Summary of Data from MEPAS Constituent Database
 CONSTITUENT DATA LIBRARY FOR MEPAS - UPDATED March 25, 1993 DLS/PEIS
 This Database Contains Entries for 400 Constituents

Constituent	Parameter	Constituent	Constituent	Constituent	Constituent
Parameter	Units	1	2	3	4
ID / CAS #:	(None)	AM241	NP237	PA233	U233
Toxicity Type:	(None)	1	1	1	1
Mol. Weight:	g/mole	2.410E+02	2.370E+02	2.330E+02	2.330E+02
Vapor Pressure:	mm-Hg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Henry's Law Con:	atm*m3/mole	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water Sol:	mg/L	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Carbon Mat Part:	ml/g	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Oct Wat Part:	(None)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1/2-life in AIR:	days	1.580E+05	7.820E+08	2.700E+01	5.790E+07
1/2-life in GW:	days	1.580E+05	7.820E+08	2.700E+01	5.790E+07
1/2-life in SW:	days	1.580E+05	7.820E+08	2.700E+01	5.790E+07

1/2-life in SOIL: days	1.580E+05	7.820E+08	2.700E+01	5.790E+07
Ing Dose Fact: 1/Kg or rem/pCi	3.640E-06	4.440E-06	3.630E-09	2.890E-07
Inh Dose Fact: 1/Kg or rem/pCi	4.440E-04	5.400E-04	9.550E-09	1.350E-04
Air Imm Fact: rem*m3/pCi*h	1.090E-11	1.370E-11	1.250E-10	2.170E-13
Soil Exp Fact: rem*m2/pCi*h	3.650E-13	3.820E-13	2.610E-12	9.530E-15
Water Imm Fact: rem*L/pCi*h	2.500E-11	3.080E-11	2.730E-10	4.840E-13
Fish Bioaccum: (None)	2.500E+02	2.500E+02	1.100E+01	5.000E+01
Shell Bioaccum: (None)	1.000E+03	4.000E+02	1.100E+02	6.000E+01
Veg Bioaccum: (None)	1.030E-04	2.350E-03	6.250E-05	3.500E-03
Meat Trans Fact: day/Kg	3.500E-06	5.500E-05	1.000E-05	2.000E-04
Milk Trans Fact: day/L	4.000E-07	5.000E-06	5.000E-06	6.000E-04
Water Pur Fact: (None)	7.000E-01	7.000E-01	7.000E-01	7.000E-01
Dep Velocity: m/sec	1.000E-03	1.000E-03	1.000E-03	1.000E-03
Atmos Dis Class: (None)	1	1	1	1
Inh Cancer Pot: (Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ing Cancer Pot: (Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Ref Dose: mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ing Ref Dose: mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Tox Uncert HPI units	5	5	5	5
Ing Tox Uncert HPI units	5	5	5	5
Phys Prop Uncert HPI units	3	3	3	3
Tran Fact Uncert HPI units	3	3	3	3

Toxicity Type 1: Radionuclide carcinogenic inhalation and ingestion
Toxicity Type 2: Chemical carcinogenic inhalation and ingestion
Toxicity Type 3: Chemical carcinogenic inhalation, non-carcinogenic ingestion
Toxicity Type 4: Chemical non-carcinogenic inhalation, carcinogenic ingestion
Toxicity Type 5: Chemical non-carcinogenic inhalation and ingestion

KEY for Constituent Table
Constituent 1 = AMERICIUM-241
Constituent 2 = NEPTUNIUM-237
Constituent 3 = PROTACTINIUM-233
Constituent 4 = URANIUM-233

Summary of Data from MEPAS Constituent Database (Cont)
CONSTITUENT DATA LIBRARY FOR MEPAS - UPDATED March 25, 1993 DLS/PEIS
This Database Contains Entries for 400 Constituents

Constituent Parameter	Parameter Units	Constituent 5	Constituent 6	Constituent 7	Constituent 8
ID / CAS #:	(None)	C14	CS137	PU238	U234
Toxicity Type:	(None)	1	1	1	1
Mol. Weight:	g/mole	1.400E+01	1.370E+02	2.380E+02	2.340E+02
Vapor Pressure:	mm-Hg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Henry's Law Con:	atm*m3/mole	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water Sol:	mg/L	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Carbon Mat Part:	ml/g	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Oct Wat Part:	(None)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1/2-life in AIR: days	days	2.090E+06	1.100E+04	3.210E+04	8.930E+07
1/2-life in GW: days	days	2.090E+06	1.100E+04	3.210E+04	8.930E+07
1/2-life in SW: days	days	2.090E+06	1.100E+04	3.210E+04	8.930E+07
1/2-life in SOIL: days	days	2.090E+06	1.100E+04	3.210E+04	8.930E+07
Ing Dose Fact: 1/Kg or rem/pCi	1/Kg or rem/pCi	2.090E-09	5.000E-08	3.200E-06	2.830E-07
Inh Dose Fact: 1/Kg or rem/pCi	1/Kg or rem/pCi	2.090E-09	3.200E-08	3.920E-04	1.320E-04
Air Imm Fact: rem*m3/pCi*h	rem*m3/pCi*h	2.990E-15	3.400E-10	6.490E-14	1.020E-13
Soil Exp Fact: rem*m2/pCi*h	rem*m2/pCi*h	2.140E-16	6.800E-12	1.110E-14	9.960E-15
Water Imm Fact: rem*L/pCi*h	rem*L/pCi*h	5.840E-15	6.900E-10	1.510E-13	2.330E-13
Fish Bioaccum: (None)	(None)	4.600E+03	2.000E+03	2.500E+02	5.000E+01
Shell Bioaccum: (None)	(None)	9.100E+03	1.000E+02	1.000E+02	6.000E+01
Veg Bioaccum: (None)	(None)	0.000E+00	1.230E-02	5.000E-05	3.500E-03
Meat Trans Fact: day/Kg	day/Kg	0.000E+00	2.000E-02	5.000E-07	2.000E-04
Milk Trans Fact: day/L	day/L	0.000E+00	7.000E-03	1.000E-07	6.000E-04
Water Pur Fact: (None)	(None)	1.000E+00	9.000E-01	7.000E-01	7.000E-01
Dep Velocity: m/sec	m/sec	1.000E-03	1.000E-03	1.000E-03	1.000E-03
Atmos Dis Class: (None)	(None)	1	1	1	1
Inh Cancer Pot: (Kg*day)/mg	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Ing Cancer Pot: (Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Ref Dose: mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ing Ref Dose: mg/(Kg*day)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Tox Uncert HPI units	5	5	5	5
Ing Tox Uncert HPI units	5	5	5	5
Phys Prop Uncert HPI units	3	3	3	3
Tran Fact Uncert HPI units	3	3	3	3

Toxicity Type 1: Radionuclide carcinogenic inhalation and ingestion
 Toxicity Type 2: Chemical carcinogenic inhalation and ingestion
 Toxicity Type 3: Chemical carcinogenic inhalation, non-carcinogenic ingestion
 Toxicity Type 4: Chemical non-carcinogenic inhalation, carcinogenic ingestion
 Toxicity Type 5: Chemical non-carcinogenic inhalation and ingestion

KEY for Constituent Table

Constituent 5 = CARBON-14
 Constituent 6 = CESIUM-137+0
 Constituent 7 = PLUTONIUM-238
 Constituent 8 = URANIUM-234

Summary of Data from MEPAS Constituent Database (Cont)
 CONSTITUENT DATA LIBRARY FOR MEPAS - UPDATED March 25, 1993 DLS/PEIS
 This Database Contains Entries for 400 Constituents

Constituent Parameter	Parameter Units	Constituent 9	Constituent 10	Constituent 11	Constituent 12
ID / CAS #:	(None)	TH230	PU239	U235	H3
Toxicity Type:	(None)	1	1	1	1
Mol. Weight:	g/mole	2.300E+02	2.390E+02	2.350E+02	2.000E+01
Vapor Pressure:	mm-Hg	0.000E+00	0.000E+00	0.000E+00	2.380E+01
Henry's Law Con:	atm*m3/mole	0.000E+00	0.000E+00	0.000E+00	6.000E-07
Water Sol:	mg/L	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Carbon Mat Part:	ml/g	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Oct Wat Part:	(None)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1/2-life in AIR:	days	2.810E+07	8.810E+06	2.570E+11	4.490E+03
1/2-life in GW:	days	2.810E+07	8.810E+06	2.570E+11	4.490E+03
1/2-life in SW:	days	2.810E+07	8.810E+06	2.570E+11	2.680E+01
1/2-life in SOIL:	days	2.810E+07	8.810E+06	2.570E+11	6.240E+01
Ing Dose Fact:	1/Kg or rem/pCi	5.480E-07	3.540E-06	2.700E-07	6.300E-11
Inh Dose Fact:	1/Kg or rem/pCi	3.260E-04	4.290E-04	1.200E-04	6.300E-11
Air Imm Fact:	rem*m3/pCi*h	2.330E-13	5.640E-14	8.900E-11	0.000E+00
Soil Exp Fact:	rem*m2/pCi*h	9.990E-15	4.890E-15	2.000E-12	0.000E+00
Water Imm Fact:	rem*L/pCi*h	5.240E-13	1.280E-13	3.000E-10	0.000E+00
Fish Bioaccum:	(None)	1.000E+02	2.500E+02	5.000E+01	1.000E+00
Shell Bioaccum:	(None)	5.000E+02	1.000E+02	6.000E+01	1.000E+00
Veg Bioaccum:	(None)	3.000E-05	5.000E-05	3.500E-03	0.000E+00
Meat Trans Fact:	day/Kg	6.000E-06	5.000E-07	2.000E-04	0.000E+00
Milk Trans Fact:	day/L	5.000E-06	1.000E-07	6.000E-04	0.000E+00
Water Pur Fact:	(None)	7.000E-01	7.000E-01	7.000E-01	1.000E+00
Dep Velocity:	m/sec	1.000E-03	1.000E-03	1.000E-03	0.000E+00
Atmos Dis Class:	(None)	1	1	1	4
Inh Cancer Pot: (Kg*day)/mg		0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ing Cancer Pot: (Kg*day)/mg		0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Ref Dose: mg/(Kg*day)		0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ing Ref Dose: mg/(Kg*day)		0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Tox Uncert HPI units		5	5	5	5
Ing Tox Uncert HPI units		5	5	5	5
Phys Prop Uncert HPI units		3	3	3	3
Tran Fact Uncert HPI units		3	3	3	3

Toxicity Type 1: Radionuclide carcinogenic inhalation and ingestion
 Toxicity Type 2: Chemical carcinogenic inhalation and ingestion
 Toxicity Type 3: Chemical carcinogenic inhalation, non-carcinogenic ingestion
 Toxicity Type 4: Chemical non-carcinogenic inhalation, carcinogenic ingestion
 Toxicity Type 5: Chemical non-carcinogenic inhalation and ingestion

KEY for Constituent Table
 Constituent 9 = THORIUM-230
 Constituent 10 = PLUTONIUM-239
 Constituent 11 = URANIUM-235
 Constituent 12 = TRITIUM

Summary of Data from MEPAS Constituent Database (Cont)
 CONSTITUENT DATA LIBRARY FOR MEPAS - UPDATED March 25, 1993 DLS/PEIS
 This Database Contains Entries for 400 Constituents

Constituent Parameter	Parameter Units	Constituent 13	Constituent 14	Constituent 15	Constituent 16
ID / CAS #:	(None)	7664417	14797558	12808798	U238
Toxicity Type:	(None)	5	5	5	1
Mol. Weight:	g/mole	1.700E+01	6.200E+01	9.606E+01	2.380E+02
Vapor Pressure:	mm-Hg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Henry's Law Con:	atm*m3/mole	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water Sol:	mg/L	1.000E+06	0.000E+00	0.000E+00	0.000E+00
Carbon Mat Part:	ml/g	1.320E+00	0.000E+00	0.000E+00	0.000E+00
Oct Wat Part:	(None)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1/2-life in AIR:	days	6.900E+07	6.900E+07	6.900E+07	1.630E+12
1/2-life in GW:	days	6.900E+07	6.900E+07	6.900E+07	1.630E+12
1/2-life in SW:	days	6.900E+07	6.900E+07	6.900E+07	1.630E+12
1/2-life in SOIL:	days	6.900E+07	6.900E+07	6.900E+07	1.630E+12
Ing Dose Fact:	1/Kg or rem/pCi	1.430E-02	1.430E-02	1.430E-02	2.550E-07
Inh Dose Fact:	1/Kg or rem/pCi	1.430E-02	1.430E-02	1.430E-02	1.180E-04
Air Imm Fact:	rem*m3/pCi*h	0.000E+00	0.000E+00	0.000E+00	4.530E-14
Soil Exp Fact:	rem*m2/pCi*h	0.000E+00	0.000E+00	0.000E+00	7.340E-15
Water Imm Fact:	rem*L/pCi*h	0.000E+00	0.000E+00	0.000E+00	1.060E-13
Fish Bioaccum:	(None)	0.000E+00	1.500E+05	7.500E+02	5.000E+01
Shell Bioaccum:	(None)	0.000E+00	0.000E+00	0.000E+00	6.000E+01
Veg Bioaccum:	(None)	0.000E+00	7.500E+00	3.750E-01	3.500E-03
Meat Trans Fact:	day/Kg	0.000E+00	7.500E-02	1.000E-01	2.000E-04
Milk Trans Fact:	day/L	0.000E+00	2.500E-02	1.500E-02	6.000E-04
Water Pur Fact:	(None)	1.000E+00	1.000E+00	1.000E+00	7.000E-01
Dep Velocity:	m/sec	1.000E-03	1.000E-03	1.000E-03	1.000E-03
Atmos Dis Class:	(None)	4	1	1	1
Inh Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ing Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Ref Dose:	mg/(Kg*day)	2.900E-02	1.600E+00	7.000E-02	0.000E+00
Ing Ref Dose:	mg/(Kg*day)	2.900E-02	1.600E+00	7.100E+01	0.000E+00
Inh Tox Uncert	HPI units	10	10	20	5
Ing Tox Uncert	HPI units	15	5	10	5
Phys Prop Uncert	HPI units	3	3	3	3
Tran Fact Uncert	HPI units	0	0	0	3

 Toxicity Type 1: Radionuclide carcinogenic inhalation and ingestion
 Toxicity Type 2: Chemical carcinogenic inhalation and ingestion
 Toxicity Type 3: Chemical carcinogenic inhalation, non-carcinogenic ingestion
 Toxicity Type 4: Chemical non-carcinogenic inhalation, carcinogenic ingestion
 Toxicity Type 5: Chemical non-carcinogenic inhalation and ingestion

KEY for Constituent Table
 Constituent 13 = AMMONIA
 Constituent 14 = NITRATE
 Constituent 15 = SULFATE
 Constituent 16 = URANIUM-238

Summary of Data from MEPAS Constituent Database (Cont)
 CONSTITUENT DATA LIBRARY FOR MEPAS - UPDATED March 25, 1993 DLS/PEIS
 This Database Contains Entries for 400 Constituents

Constituent Parameter	Parameter Units	Constituent 17
ID / CAS #:	(None)	6834920
Toxicity Type:	(None)	5

Mol. Weight:	g/mole	9.210E+01
Vapor Pressure:	mm-Hg	0.000E+00
Henry's Law Con:	atm*m3/mole	0.000E+00
Water Sol:	mg/L	0.000E+00
Carbon Mat Part:	ml/g	0.000E+00
Oct Wat Part:	(None)	0.000E+00
1/2-life in AIR:	days	6.900E+07
1/2-life in GW:	days	6.900E+07
1/2-life in SW:	days	6.900E+07
1/2-life in SOIL:	days	6.900E+07
Ing Dose Fact:	1/Kg or rem/pCi	1.430E-02
Inh Dose Fact:	1/Kg or rem/pCi	1.430E-02
Air Imm Fact:	rem*m3/pCi*h	0.000E+00
Soil Exp Fact:	rem*m2/pCi*h	0.000E+00
Water Imm Fact:	rem*L/pCi*h	0.000E+00
Fish Bioaccum:	(None)	2.500E+00
Shell Bioaccum:	(None)	2.500E+01
Veg Bioaccum:	(None)	1.500E-04
Meat Trans Fact:	day/Kg	4.000E-05
Milk Trans Fact:	day/L	1.000E-04
Water Pur Fact:	(None)	1.000E+00
Dep Velocity:	m/sec	1.000E-03
Atmos Dis Class:	(None)	1
Inh Cancer Pot:	(Kg*day)/mg	0.000E+00
Ing Cancer Pot:	(Kg*day)/mg	0.000E+00
Inh Ref Dose:	mg/(Kg*day)	7.000E-01
Ing Ref Dose:	mg/(Kg*day)	2.000E-01
Inh Tox Uncert	HPI units	10
Ing Tox Uncert	HPI units	20
Phys Prop Uncert	HPI units	3
Tran Fact Uncert	HPI units	3

Toxicity Type 1: Radionuclide carcinogenic inhalation and ingestion
 Toxicity Type 2: Chemical carcinogenic inhalation and ingestion
 Toxicity Type 3: Chemical carcinogenic inhalation, non-carcinogenic ingestion
 Toxicity Type 4: Chemical non-carcinogenic inhalation, carcinogenic ingestion
 Toxicity Type 5: Chemical non-carcinogenic inhalation and ingestion

KEY for Constituent Table
 Constituent 17 = SILICATE ION

USAGE LOCATION DATA FOR SURFACE WATER PATHWAY

Location Parameter	Units	Location 1	Location 2	Location 3	Location 4	Location 5
Drink Index:	(None)	0	0	0	2	2
Drink Pop:	People	0.000E+00	0.000E+00	0.000E+00	4.216E+04	2.034E+04
Rec Index:	(None)	0	0	0	0	0
Rec Pop:	People	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Aquatic Index:	(None)	1	0	0	0	0
FinFish Prod:	Kg/yr	1.500E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Shell Prod:	Kg/yr	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Irr Index:	(None)	0	1	1	0	0
Leaf Veg Prod:	Kg/yr	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Veg Product:	Kg/yr	0.000E+00	1.400E+08	5.800E+05	0.000E+00	0.000E+00
Meat Product:	Kg/yr	0.000E+00	1.200E+06	8.400E+02	0.000E+00	0.000E+00
Milk Product:	L/yr	0.000E+00	2.100E+06	2.800E+04	0.000E+00	0.000E+00
SW Trans Time:	days	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Irr. Rate:	L/mo	0.000E+00	1.280E+02	1.280E+02	0.000E+00	0.000E+00
Harvest Time:	days	6.000E+01	6.000E+01	3.000E+01	3.000E+01	0.000E+00
Transit Time:	days	0.000E+00	0.000E+00	0.000E+00	5.000E-01	5.000E-01
Water Treated:	yes/no	No	No	No	Yes	Yes
H2O Ing Rate:	L/day	2.000E+00	2.000E+00	2.000E+00	2.000E+00	2.000E+00
Fish Time Delay:	days	1.000E+01	1.000E+01	1.000E+01	1.000E+01	1.000E+01
Inv time delay:	days	1.000E+01	1.000E+01	1.000E+01	1.000E+01	1.000E+01

Drinking Index ----> 0 = No Drinking or Bathing, 1 = Bathing Only, and
 2 = Drinking and Bathing
 Recreation Index --> 1 = Swimming Only, 2 = Boating Only,
 3 = Shoreline Activities Only, and 4 = All of the Above
 Aquatic Index -----> 0 = No Aquatic food, 1 = Aquatic Food
 Irrigation Index --> -1 = Animals Drinking Only, 0 = No Farm Production,
 1 = Crops and Animals [Feed and Water], and
 2 = Crops and Animals Feed Only

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KEY for Usage Location in Table
 Usage Location 1 = Aquatic Foods
 Usage Location 2 = Benton Co.
 Usage Location 3 = Franklin Co.
 Usage Location 4 = Kennewick
 Usage Location 5 = Pasco

USAGE LOCATION DATA FOR SURFACE WATER PATHWAY

Location Parameter	Units	Location 6	Location 7	Location 8
Drink Index: (None)		2	2	0
Drink Pop: People		1.000E+00	3.232E+04	0.000E+00
Rec Index: (None)		4	4	0
Rec Pop: People		1.000E+00	3.330E+05	0.000E+00
Aquatic Index: (None)		0	0	0
Finfish Prod: Kg/yr		0.000E+00	0.000E+00	0.000E+00
Shell Prod: Kg/yr		0.000E+00	0.000E+00	0.000E+00
Irr Index: (None)		0	0	1
Leaf Veg Prod: Kg/yr		0.000E+00	0.000E+00	1.600E+05
Veg Product: Kg/yr		0.000E+00	0.000E+00	8.300E+06
Meat Product: Kg/yr		0.000E+00	0.000E+00	1.800E+05
Milk Product: L/yr		0.000E+00	0.000E+00	2.800E+05
SW Trans Time: days		0.000E+00	0.000E+00	0.000E+00
Irr. Rate: L/mo		0.000E+00	0.000E+00	1.280E+02
Harvest Time: days		0.000E+00	0.000E+00	0.000E+00
Transit Time: days		5.000E-01	5.000E-01	0.000E+00
Water Treated: yes/no		Yes	Yes	No
H2O Ing Rate: L/day		2.000E+00	2.000E+00	2.000E+00
Fish Time Delay: days		1.000E+01	1.000E+01	1.000E+01
Inv time delay: days		1.000E+01	1.000E+01	1.000E+01

=====

Drinking Index ----> 0 = No Drinking or Bathing, 1 = Bathing Only, and
 2 = Drinking and Bathing
 Recreation Index --> 1 = Swimming Only, 2 = Boating Only,
 3 = Shoreline Activities Only, and 4 = All of the Above
 Aquatic Index -----> 0 = No Aquatic food, 1 = Aquatic Food
 Irrigation Index --> -1 = Animals Drinking Only, 0 = No Farm Production,
 1 = Crops and Animals [Feed and Water], and
 2 = Crops and Animals Feed Only

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KEY for Usage Location in Table
 Usage Location 6 = Restricted
 Usage Location 7 = Richland
 Usage Location 8 = Walla Walla Co.

Population Health Effects By Pollutant Table

Pollutant	Health Effects, Unweighted	Weighted
# Type	Inhalation Ingestion Total	Inhalation Ingestion Total
1 1	0.00E+00 6.41E-06 6.41E-06	0.00E+00 3.98E-09 3.98E-09
2 1	0.00E+00 1.18E-08 1.18E-08	0.00E+00 1.73E-12 1.73E-12
3 1	0.00E+00 3.25E-12 3.25E-12	0.00E+00 4.75E-16 4.75E-16
4 1	0.00E+00 3.33E-12 3.33E-12	0.00E+00 1.95E-16 1.95E-16
5 1	0.00E+00 3.15E-02 3.15E-02	0.00E+00 3.15E-02 3.15E-02
6 1	0.00E+00 4.02E-10 4.02E-10	0.00E+00 1.20E-11 1.20E-11
7 1	0.00E+00 3.11E-07 3.11E-07	0.00E+00 1.62E-09 1.62E-09

8	1	0.00E+00	2.23E-03	2.23E-03	0.00E+00	2.23E-03	2.23E-03
9	1	0.00E+00	3.56E-07	3.56E-07	0.00E+00	3.56E-07	3.56E-07
10	1	0.00E+00	7.72E-04	7.72E-04	0.00E+00	1.17E-07	1.17E-07
11	1	0.00E+00	9.82E-11	9.82E-11	0.00E+00	6.25E-15	6.25E-15
12	1	0.00E+00	1.39E-06	1.39E-06	0.00E+00	1.39E-06	1.39E-06
13	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	1	0.00E+00	2.01E-03	2.01E-03	0.00E+00	2.01E-03	2.01E-03
17	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Population Health Effects Summary Table
Summary Results

	Unweighted	Weighted
Radiation dose (person-rem):	5.80E+01	5.67E+01
Chemical cancer incidence:	0.00E+00	0.00E+00
Radiation cancer incidence:	9.86E-02	9.65E-02
Total cancer incidence:	9.86E-02	9.65E-02
Radiation cancer fatalities:	2.89E-02	2.82E-02
Radiation cancer hereditary:	7.67E-03	7.51E-03

HPI Values by Usage Location for the SURFACE WATER Transport Pathway

Usage Location	Constituent				
	1	2	3	4	5
Aquatic Foods	-41.42	-75.31	-120.86	-121.87	24.21
Benton Co.	-25.59	-59.13	-98.68	-98.49	44.64
Franklin Co.	-49.42	-82.96	-122.51	-122.22	20.82
Kennewick	-33.81	-67.69	-98.62	-107.27	20.72
Pasco	-36.97	-70.86	-101.79	-110.43	17.56
Restricted	-82.75	-116.63	-147.52	-156.21	-28.22
Richland	-34.86	-68.75	-99.20	-108.34	19.64
Walla Walla Co.	-37.10	-70.68	-108.27	-110.02	32.50
Total for Constituent	-24.00	-57.63	-93.23	-97.09	44.98

Usage Location	Constituent				
	6	7	8	9	10
Aquatic Foods	-60.59	-45.33	8.70	-25.83	-26.73
Benton Co.	-51.68	-29.51	32.08	-6.03	-10.90
Franklin Co.	-74.81	-53.34	8.36	-29.86	-34.73
Kennewick	-60.91	-37.71	23.31	-14.24	-19.11
Pasco	-64.07	-40.88	20.14	-17.40	-22.27
Restricted	-108.71	-86.65	-25.64	-63.18	-68.05
Richland	-55.90	-38.78	22.24	-15.31	-20.18
Walla Walla Co.	-62.92	-41.02	20.55	-17.54	-22.41
Total for Constituent	-49.22	-27.92	33.48	-4.49	-9.31

HPI Values by Usage Location for the SURFACE WATER Transport Pathway (Cont)

Usage Location	Constituent				
	11	12	13	14	15
Aquatic Foods	-106.92	-39.96	-250.00	-2.50	-15.13
Benton Co.	-83.53	-.65	6.59	10.14	7.92
Franklin Co.	-107.26	-24.35	-17.24	-13.65	-15.80
Kennewick	-92.31	-6.81	-.05	-21.10	-10.72
Pasco	-95.48	-9.98	-3.22	-24.27	-13.89
Restricted	-141.12	-55.76	-48.99	-70.05	-59.67
Richland	-92.21	-7.91	-1.13	-22.19	-11.81

Walla Walla Co.	-95.07	-12.69	-4.91	-1.85	-3.87
Total for Constituent	-82.04	1.43	8.54	10.64	8.36

Usage Location	Constituent 16	17
Aquatic Foods	8.25	-57.14
Benton Co.	31.63	-21.29
Franklin Co.	7.91	-45.10
Kennewick	22.86	-27.19
Pasco	19.69	-30.35
Restricted	-26.09	-76.02
Richland	21.79	-27.23
Walla Walla Co.	20.10	-32.79
Total for Constituent	33.03	-18.96

--- Constituent Names ---

Constituent 11 = URANIUM-235	12 = TRITIUM
Constituent 13 = AMMONIA	14 = NITRATE
Constituent 15 = SULFATE	16 = URANIUM-238
17 = SILICATE ION	

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*****
*          Summary of Hazard Potential Index (HPI) Values For Run          *
*****
*          Constituent Name          HPI          *
*          *          *          *          *          *          *          *
*          AMERICIUM-241          -24.00          *
*          NEPTUNIUM-237          -57.63          *
*          PROTACTINIUM-233          -93.23          *
*          URANIUM-233          -97.09          *
*          CARBON-14          44.98          *
*          CESIUM-137+0          -49.22          *
*          PLUTONIUM-238          -27.92          *
*          URANIUM-234          33.48          *
*          THORIUM-230          -4.49          *
*          PLUTONIUM-239          -9.31          *
*          URANIUM-235          -82.04          *
*          TRITIUM          1.43          *
*          AMMONIA          8.54          *
*          NITRATE          10.64          *
*          SULFATE          8.36          *
*          URANIUM-238          33.03          *
*          SILICATE ION          -18.96          *
*****

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Maximum Individual Results by Pollutant

Pollutant	Unweighted Results			Time Weighted Results		
# Type	Total	Inhalation	Ingestion	Total	Inhalation	Ingestion
1 1	3.37E-12	0.00E+00	3.37E-12	5.91E-15	0.00E+00	5.91E-15
2 1	5.08E-15	0.00E+00	5.08E-15	2.10E-18	0.00E+00	2.10E-18
3 1	1.94E-18	0.00E+00	1.94E-18	8.04E-22	0.00E+00	8.04E-22
4 1	1.21E-18	0.00E+00	1.21E-18	1.79E-22	0.00E+00	1.79E-22
5 1	1.08E-07	0.00E+00	1.08E-07	1.08E-07	0.00E+00	1.08E-07
6 1	2.28E-15	0.00E+00	2.28E-15	8.18E-17	0.00E+00	8.18E-17
7 1	3.69E-13	0.00E+00	3.69E-13	3.09E-15	0.00E+00	3.09E-15
8 1	1.24E-08	0.00E+00	1.24E-08	1.24E-08	0.00E+00	1.24E-08
9 1	2.18E-12	0.00E+00	2.18E-12	2.18E-12	0.00E+00	2.18E-12
10 1	2.45E-10	0.00E+00	2.45E-10	1.52E-13	0.00E+00	1.52E-13
11 1	2.28E-17	0.00E+00	2.28E-17	5.66E-21	0.00E+00	5.66E-21
12 1	7.59E-12	0.00E+00	7.59E-12	7.59E-12	0.00E+00	7.59E-12
13 5	3.94E-05	0.00E+00	3.94E-05	3.94E-05	0.00E+00	3.94E-05
14 5	1.29E-04	0.00E+00	1.29E-04	1.29E-04	0.00E+00	1.29E-04
15 5	4.27E-05	0.00E+00	4.27E-05	4.27E-05	0.00E+00	4.27E-05

16	1	1.12E-08	0.00E+00	1.12E-08	1.12E-08	0.00E+00	1.12E-08
17	5	1.19E-06	0.00E+00	1.19E-06	1.46E-08	0.00E+00	1.46E-08

Final Result Parameter	Total
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Radiation Results, Time Weighted

MIR Fatal Cancer	1.04E-07
MIR Cancer Incidence	3.56E-07
MIR Hereditary Effects	2.77E-08
MEI radiation dose (rem)	2.09E-04

Radiation Results, Unweighted

MIR Fatal Cancer	1.04E-07
MIR Cancer Incidence	3.57E-07
MIR Hereditary Effects	2.78E-08
MEI radiation dose (rem)	2.10E-04

Chemical Cancer Effects, Time Weighted

MIR Cancer Incidence	0.00E+00
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Chemical Cancer Effects, Unweighted

MIR Cancer Incidence	0.00E+00
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Chemical Non-Cancer Effects, Time Weighted

MI Hazard Index	2.11E-04
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Chemical Non-Cancer Effects, Unweighted

MI Hazard Index	2.12E-04
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Total cancer effects, radiation + chemicals, Time Weighted

MIR fatal cancers	1.04E-07
MIR Cancer Incidence	3.56E-07
MIR Hereditary Effects	2.77E-08

Total cancer effects, radiation + chemicals, Unweighted

MIR fatal cancers	1.04E-07
MIR Cancer Incidence	3.57E-07
MIR Hereditary Effects	2.78E-08

Maximum Individual Risk Values/Rfd Ratios

Exposure Route	[AMERICIUM-241] 1				[NEPTUNIUM-237] 1			
	Time Weighted		Non-Time Weighted		Time Weighted		Non-Time Weighted	
	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INGESTION/DERMAL								
Drinking Water	1.89E-15	7	1.08E-12	15	6.62E-19	9	1.60E-15	21
Finfish	2.18E-15	7	1.24E-12	15	7.65E-19	9	1.85E-15	21
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	1.12E-15	7	6.41E-13	15	3.98E-19	9	9.61E-16	21
Other Vegetables	7.16E-16	7	4.08E-13	15	2.72E-19	9	6.57E-16	21
Meat	2.59E-19	7	1.47E-16	15	1.45E-21	9	3.50E-18	21

Milk	2.21E-19	7	1.26E-16	15	9.68E-22	9	2.34E-18	21
Swimming	3.34E-18	7	1.90E-15	15	1.17E-21	9	2.83E-18	21
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
EXTERNAL RADIATION								
Boating	1.52E-22	7	8.66E-20	15	5.39E-26	9	1.30E-22	21
Shoreline	7.65E-19	7	4.36E-16	15	2.37E-22	9	5.72E-19	21
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[PROTACTINIUM-233]				[URANIUM-233]			
	Time Weighted	Non-Time Weighted	Time Weighted	Non-Time Weighted	Time Weighted	Non-Time Weighted	Time Weighted	Non-Time Weighted
	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INGESTION/DERMAL								
Drinking Water	5.34E-22	9	1.29E-18	21	7.30E-23	9	4.96E-19	25
Finfish	2.13E-23	9	5.14E-20	21	1.69E-23	9	1.14E-19	25
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	2.10E-22	9	5.08E-19	21	4.41E-23	9	2.99E-19	25
Other Vegetables	3.01E-23	9	7.28E-20	21	3.12E-23	9	2.11E-19	25
Meat	1.04E-25	9	2.51E-22	21	5.84E-25	9	3.96E-21	25
Milk	5.51E-25	9	1.33E-21	21	1.28E-23	9	8.71E-20	25
Swimming	1.91E-24	9	4.62E-21	21	1.29E-25	9	8.78E-22	25
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
EXTERNAL RADIATION								
Boating	4.77E-25	9	1.15E-21	21	1.43E-30	9	9.73E-27	25
Shoreline	4.93E-24	9	1.19E-20	21	1.00E-26	9	6.79E-23	25
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used

For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[CARBON-14] 1				[CESIUM-137+D] 1			
	Time Weighted		Non-Time Weighted		Time Weighted		Non-Time Weighted	
	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INGESTION/DERMAL								
Drinking Water	2.80E-09	1	2.80E-09	1	7.02E-18	5	1.96E-16	6
Finfish	4.17E-08	1	4.17E-08	1	5.04E-17	5	1.41E-15	6
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	6.16E-09	1	6.16E-09	1	3.40E-18	5	9.48E-17	6
Other Vegetables	3.91E-08	1	3.91E-08	1	2.98E-18	5	8.33E-17	6
Meat	1.36E-08	1	1.36E-08	1	4.59E-18	5	1.28E-16	6
Milk	4.88E-09	1	4.88E-09	1	1.13E-17	5	3.14E-16	6
Swimming	3.47E-12	1	3.47E-12	1	1.14E-20	5	3.19E-19	6
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
EXTERNAL RADIATION								
Boating	6.43E-17	1	6.43E-17	1	8.83E-22	5	2.47E-20	6
Shoreline	8.33E-13	1	8.33E-13	1	2.12E-18	5	5.92E-17	6
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[PLUTONIUM-238] 1				[URANIUM-234] 1			
	Time Weighted		Non-Time Weighted		Time Weighted		Non-Time Weighted	
	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INGESTION/DERMAL								
Drinking Water	9.87E-16	7	1.18E-13	9	5.08E-09	1	5.08E-09	1
Finfish	1.14E-15	7	1.36E-13	9	1.17E-09	1	1.17E-09	1
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	5.88E-16	7	7.02E-14	9	3.07E-09	1	3.07E-09	1
Other Vegetables	3.73E-16	7	4.45E-14	9	2.17E-09	1	2.17E-09	1
Meat	1.93E-20	7	2.31E-18	9	4.06E-11	1	4.06E-11	1
Milk	2.88E-20	7	3.44E-18	9	8.93E-10	1	8.93E-10	1

Swimming	1.75E-18	7	2.09E-16	9	9.00E-12	1	9.00E-12	1
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
EXTERNAL RADIATION								
Boating	5.46E-25	7	6.52E-23	9	4.91E-17	1	4.91E-17	1
Shoreline	1.24E-20	7	1.49E-18	9	7.43E-13	1	7.43E-13	1
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[THORIUM-230] 1				[PLUTONIUM-239] 1			
	Time Weighted		Non-Time Weighted		Time Weighted		Non-Time Weighted	
	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INGESTION/DERMAL								
Drinking Water	8.94E-13	1	8.94E-13	1	4.84E-14	7	7.83E-11	21
Finfish	4.13E-13	1	4.13E-13	1	5.59E-14	7	9.05E-11	21
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	5.33E-13	1	5.33E-13	1	2.88E-14	7	4.67E-11	21
Other Vegetables	3.38E-13	1	3.38E-13	1	1.83E-14	7	2.96E-11	21
Meat	2.10E-16	1	2.10E-16	1	9.48E-19	7	1.53E-15	21
Milk	1.31E-15	1	1.31E-15	1	1.41E-18	7	2.29E-15	21
Swimming	1.58E-15	1	1.58E-15	1	8.57E-17	7	1.39E-13	21
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
EXTERNAL RADIATION								
Boating	1.00E-20	1	1.00E-20	1	2.05E-23	7	3.32E-20	21
Shoreline	6.77E-17	1	6.77E-17	1	2.78E-19	7	4.49E-16	21
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[URANIUM-235]				[TRITIUM]			
	Time		Non-Time		Time		Non-Time	
	Weighted		Weighted		Weighted		Weighted	
	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INGESTION/DERMAL								
Drinking Water	2.29E-21	9	9.22E-18	25	4.94E-12	1	4.94E-12	1
Finfish	5.28E-22	9	2.13E-18	25	1.60E-14	1	1.60E-14	1
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	1.38E-21	9	5.56E-18	25	1.81E-13	1	1.81E-13	1
Other Vegetables	9.75E-22	9	3.93E-18	25	1.14E-12	1	1.14E-12	1
Meat	1.83E-23	9	7.37E-20	25	5.76E-13	1	5.76E-13	1
Milk	4.02E-22	9	1.62E-18	25	7.30E-13	1	7.30E-13	1
Swimming	4.11E-24	9	1.66E-20	25	6.13E-15	1	6.13E-15	1
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
EXTERNAL RADIATION								
Boating	2.98E-26	9	1.20E-22	25	0.00E+00	0	0.00E+00	0
Shoreline	7.04E-23	9	2.84E-19	25	0.00E+00	0	0.00E+00	0
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[AMMONIA]				[NITRATE]			
	Time		Non-Time		Time		Non-Time	
	Weighted		Weighted		Weighted		Weighted	
	RfD Ratio	Time Per.	RfD Ratio	Time Per.	RfD Ratio	Time Per.	RfD Ratio	Time Per.
INGESTION/DERMAL								
Drinking Water	2.35E-05	1	2.35E-05	1	1.84E-07	1	1.84E-07	1
Finfish	0.00E+00	0	0.00E+00	0	8.91E-05	1	8.91E-05	1
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	9.76E-06	1	9.76E-06	1	2.20E-06	1	2.20E-06	1
Other Vegetables	6.19E-06	1	6.19E-06	1	1.35E-05	1	1.35E-05	1
Meat	0.00E+00	0	0.00E+00	0	1.76E-05	1	1.76E-05	1
Milk	0.00E+00	0	0.00E+00	0	6.29E-06	1	6.29E-06	1
Swimming	3.67E-08	1	3.67E-08	1	2.88E-10	1	2.88E-10	1

Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

	RfD Ratio	Time Per.	RfD Ratio	Time Per.	RfD Ratio	Time Per.	RfD Ratio	Time Per.
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
EXTERNAL RADIATION								
Boating	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Shoreline	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[SULFATE] 1				[URANIUM-238] 1			
	Time Weighted	Non-Time Weighted	Time Weighted	Non-Time Weighted	Time Weighted	Non-Time Weighted	Time Weighted	Non-Time Weighted
	RfD Ratio	Time Per.	RfD Ratio	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INGESTION/DERMAL								
Drinking Water	2.01E-06	1	2.01E-06	1	4.58E-09	1	4.58E-09	1
Finfish	4.86E-06	1	4.86E-06	1	1.06E-09	1	1.06E-09	1
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	2.00E-06	1	2.00E-06	1	2.76E-09	1	2.76E-09	1
Other Vegetables	7.89E-06	1	7.89E-06	1	1.95E-09	1	1.95E-09	1
Meat	1.80E-05	1	1.80E-05	1	3.66E-11	1	3.66E-11	1
Milk	7.90E-06	1	7.90E-06	1	8.05E-10	1	8.05E-10	1
Swimming	3.14E-09	1	3.14E-09	1	8.11E-12	1	8.11E-12	1
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
EXTERNAL RADIATION								
Boating	0.00E+00	0	0.00E+00	0	2.23E-17	1	2.23E-17	1
Shoreline	0.00E+00	0	0.00E+00	0	5.48E-13	1	5.48E-13	1
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[SILICATE ION]			
	Time		Non-Time	
	Weighted		Weighted	
	RfD Ratio	Time Per.	RfD Ratio	Time Per.
INGESTION/DERMAL				
Drinking Water	9.03E-09	6	7.34E-07	11
Finfish	6.09E-11	6	4.95E-09	11
Shellfish	0.00E+00	0	0.00E+00	0
Leafy Vegetables	3.14E-09	6	2.55E-07	11
Other Vegetables	2.00E-09	6	1.63E-07	11
Meat	8.26E-12	6	6.72E-10	11
Milk	1.54E-10	6	1.25E-08	11
Swimming	2.57E-10	6	2.09E-08	11
Soil Ingestion	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0
INHALATION				
Inhalation	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0
EXTERNAL RADIATION				
Boating	0.00E+00	0	0.00E+00	0
Shoreline	0.00E+00	0	0.00E+00	0
Ground	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

File Title Summary For Run

Run Title: SNF-EIS 200 East Are --- TEDF08A .HIN

Run Date and Time: 11/22/1993 12:21:59

Constituent Database:UPDATED March 25, 1993 DLS/PEIS

Water Data File: DOE Ha --- TEDF08A .WAT

*****4/17/1993 VERSION I1ldarc*****

RADCON -- WATERBORNE TRANSPORT COMPONENT for the Multimedia
Environmental Pollutant Assessment System (MEPAS):
Models movement of radionuclides and other chemicals
in groundwater, surface water, and overland pathways.

Battelle, Pacific Northwest Laboratory (PNL)
P.O. Box 999, Richland, WA 99352

Developed for the U.S. Department of Energy

Input file for this run is TEDF08B .WIN

Modeling Scenario Number 1

Name of Facility = DOE Hanford
Name of Waste Unit = SNF-EIS 200 East Area
Transport Scenario = SS-T3 Surface soil >Groundwater
Exposure Scenario = SW-E2
Usage Location Number = 6
Usage Location Medium = 3
Usage Location Name =

TLIFE is the duration of release for each contaminant expressed in years.
TDIFF is the time difference in years between the current date and the
date when contaminants were first released into the environment.

Constituent Name	TLIFE (years)	TDIFF (years)	TFINAL (years)
ALUMINUM	4.000E+00	0.000E+00	7.001E+03
ARSENIC	4.000E+00	0.000E+00	7.001E+03
BARIUM	4.000E+00	0.000E+00	7.001E+03
BORON	4.000E+00	0.000E+00	7.001E+03
CADMIUM	4.000E+00	0.000E+00	7.001E+03
CHLOROFO	4.000E+00	0.000E+00	7.001E+03
CHROMIUM	4.000E+00	0.000E+00	7.001E+03
COPPER	4.000E+00	0.000E+00	7.001E+03
FLUORIDE	4.000E+00	0.000E+00	7.001E+03
IRON	4.000E+00	0.000E+00	7.001E+03
LEAD	4.000E+00	0.000E+00	7.001E+03
MAGNESIU	4.000E+00	0.000E+00	7.001E+03
MERCURY	4.000E+00	0.000E+00	7.001E+03
POTASSIU	4.000E+00	0.000E+00	7.001E+03
SELENIUM	4.000E+00	0.000E+00	7.001E+03
SILVER	4.000E+00	0.000E+00	7.001E+03
SODIUM I	4.000E+00	0.000E+00	7.001E+03
STRONTIU	4.000E+00	0.000E+00	7.001E+03
URANIUM	4.000E+00	0.000E+00	7.001E+03
ZINC COM	4.000E+00	0.000E+00	7.001E+03

#	Constituent	NUM
1	ALUMINUM	2
2	ARSENIC	2
3	BARIUM	2
4	BORON	2
5	CADMIUM	2
6	CHLOROFO	2
7	CHROMIUM	2
8	COPPER	2
9	FLUORIDE	2
10	IRON	2
11	LEAD	2

12	MAGNESIU	2
13	MERCURY	2
14	POTASSIU	2
15	SELENIUM	2
16	SILVER	2
17	SODIUM I	2
18	STRONTIU	2
19	URANIUM	2
20	ZINC COM	2

Known Infiltration Rate to Unsaturated Zone (VLEACH) = 1.32E+02 cm/day

Source-Term Type (ISTYPE) = 1
 Source-Term Flux Boundary Conditions (ISOURC) = 2
 Liquid Impoundment Index (IPOND) = 1
 Source-Term Decay Index (IDECAY) = 2
 Direct Discharge Surface Water Index (IDDSW) = 0
 Number of Parent Constituents (NUMCON) = 20

Source-Term Configuration (ISCONF) = 4
 Number of Media (NMED) = 5
 Number of Integration Time Steps (NTIMES) = 40

Medium # 1 Equals Medium Type (MED) # 1
 Medium # 2 Equals Medium Type (MED) # 1
 Medium # 3 Equals Medium Type (MED) # 1
 Medium # 4 Equals Medium Type (MED) # 4
 Medium # 5 Equals Medium Type (MED) # 5

Length of Release Unit (AL1 OR CLEN) = 1.61E+04 cm
 Width of release Unit (B1) = 1.61E+04 cm

Water concentration units are: ATTO (1.000E-18) Ci OR g

Constituent	CAS ID	Half-Life (Years)	Initial Conc.	Surface Equilibrium Coeff. (ml/g)	Solubility limit (g/ml)	Constituent Inventory (g OR Ci)
ALUMINUM	7429905	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	2.49E+06
ARSENIC	7440382	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	2.49E+06
BARIUM	7440393	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	4.99E+07
BORON	7440428	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	7.98E+05
CADMIUM	7440439	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	4.99E+05
CHLOROFO	67663	1.00E+20	-9.99E+01	-9.99E+01	8.20E-03	2.99E+05
CHROMIUM	7440473	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	2.49E+06
COPPER	7440508	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	4.99E+07
FLUORIDE	7782414	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	9.97E+07
IRON	15438310	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	1.50E+07
LEAD	7439921	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	2.49E+06
MAGNESIU	7786303	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	7.83E+05
MERCURY	7439976	1.00E+20	-9.99E+01	-9.99E+01	3.00E-08	9.97E+04
POTASSIU	7447407	1.00E+20	-9.99E+01	-9.99E+01	3.50E-02	3.59E+07
SELENIUM	7782492	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	4.99E+05
SILVER	7440224	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	2.49E+06
SODIUM I	7647145	1.00E+20	-9.99E+01	-9.99E+01	3.60E-02	1.03E+08
STRONTIU	10476854	1.00E+20	-9.99E+01	-9.99E+01	5.38E-01	4.53E+06
URANIUM	7440611	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	2.94E+06
ZINC COM	7646857	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	2.49E+08

Constituent Flux (g/yr or Ci/yr) and Time (Years) at the Release Unit

Constituent #	Flux	Time	Constituent #	Flux	Time		
1	1	6.23E+05	0.000E+00	1	2	6.23E+05	4.000E+00
2	1	6.23E+05	0.000E+00	2	2	6.23E+05	4.000E+00
3	1	1.25E+07	0.000E+00	3	2	1.25E+07	4.000E+00
4	1	1.99E+05	0.000E+00	4	2	1.99E+05	4.000E+00
5	1	1.25E+05	0.000E+00	5	2	1.25E+05	4.000E+00

6	1	7.48E+04	0.000E+00	6	2	7.48E+04	4.000E+00
7	1	6.23E+05	0.000E+00	7	2	6.23E+05	4.000E+00
8	1	1.25E+07	0.000E+00	8	2	1.25E+07	4.000E+00
9	1	2.49E+07	0.000E+00	9	2	2.49E+07	4.000E+00
10	1	3.74E+06	0.000E+00	10	2	3.74E+06	4.000E+00
11	1	6.23E+05	0.000E+00	11	2	6.23E+05	4.000E+00
12	1	1.96E+05	0.000E+00	12	2	1.96E+05	4.000E+00
13	1	2.49E+04	0.000E+00	13	2	2.49E+04	4.000E+00
14	1	8.96E+06	0.000E+00	14	2	8.96E+06	4.000E+00
15	1	1.25E+05	0.000E+00	15	2	1.25E+05	4.000E+00
16	1	6.23E+05	0.000E+00	16	2	6.23E+05	4.000E+00
17	1	2.58E+07	0.000E+00	17	2	2.58E+07	4.000E+00
18	1	1.13E+06	0.000E+00	18	2	1.13E+06	4.000E+00
19	1	7.35E+05	0.000E+00	19	2	7.35E+05	4.000E+00
20	1	6.23E+07	0.000E+00	20	2	6.23E+07	4.000E+00

New Constituent Flux (g/yr or Ci/yr) and Time (Years) at the Release Unit

Constituent #		Flux	Time	Constituent #		Flux	Time
1	1	6.23E+05	0.000E+00	1	2	6.23E+05	4.000E+00
2	1	6.23E+05	0.000E+00	2	2	6.23E+05	4.000E+00
3	1	1.25E+07	0.000E+00	3	2	1.25E+07	4.000E+00
4	1	1.99E+05	0.000E+00	4	2	1.99E+05	4.000E+00
5	1	1.25E+05	0.000E+00	5	2	1.25E+05	4.000E+00
6	1	7.48E+04	0.000E+00	6	2	7.48E+04	3.999E+00
7	1	6.23E+05	0.000E+00	7	2	6.23E+05	4.000E+00
8	1	1.25E+07	0.000E+00	8	2	1.25E+07	4.000E+00
9	1	2.49E+07	0.000E+00	9	2	2.49E+07	4.000E+00
10	1	3.74E+06	0.000E+00	10	2	3.74E+06	4.000E+00
11	1	6.23E+05	0.000E+00	11	2	6.23E+05	4.000E+00
12	1	1.96E+05	0.000E+00	12	2	1.96E+05	4.000E+00
13	1	2.49E+04	0.000E+00	13	2	2.49E+04	4.000E+00
14	1	8.96E+06	0.000E+00	14	2	8.96E+06	4.000E+00
15	1	1.25E+05	0.000E+00	15	2	1.25E+05	4.000E+00
16	1	6.23E+05	0.000E+00	16	2	6.23E+05	4.000E+00
17	1	2.58E+07	0.000E+00	17	2	2.58E+07	4.000E+00
18	1	1.13E+06	0.000E+00	18	2	1.13E+06	4.000E+00
19	1	7.35E+05	0.000E+00	19	2	7.35E+05	4.000E+00
20	1	6.23E+07	0.000E+00	20	2	6.23E+07	4.000E+00

The New Duration of Time that Constituents are Released from the Release Unit

#	Constituent	New TLIFE (Years)
1	ALUMINUM	4.000E+00
2	ARSENIC	4.000E+00
3	BARIUM	4.000E+00
4	BORON	4.000E+00
5	CADMIUM	4.000E+00
6	CHLOROFO	3.999E+00
7	CHROMIUM	4.000E+00
8	COPPER	4.000E+00
9	FLUORIDE	4.000E+00
10	IRON	4.000E+00
11	LEAD	4.000E+00
12	MAGNESIU	4.000E+00
13	MERCURY	4.000E+00
14	POTASSIU	4.000E+00
15	SELENIUM	4.000E+00
16	SILVER	4.000E+00
17	SODIUM I	4.000E+00
18	STRONTIU	4.000E+00
19	URANIUM	4.000E+00
20	ZINC COM	4.000E+00

Modeling Medium # = 1
Medium Type (MED) = 1
Source Configuration = 4

Source Term Discharge Type = 1
PARTIALLY SATURATED ZONE

Thickness of Unsaturated Layer (H1) = 1.01E+03 cm
X-Direction Dispersivity (A1) = 1.01E+01 cm
Bulk Density (R2) = 1.80E+00 g/cm**3
Total Porosity (AN4) = 3.60E-01 (fraction)
Field Capacity (AN5) = 1.90E-01 (fraction)
Permeability (X2) = 1.32E+02 cm/day
Leach Rate (VLEACH) = 1.32E+02 cm/day
Soil-Type Coefficient (A2) = 4.05E+00

Moisture Content (AN5) = 36.00 %
Infiltration Rate (U) = 3.68E+02 cm/day

NO	PARENT	HALFLIFE YEARS	KD CC/GM	RETARDATION FACTOR
1	ALUMINUM	1.00000E+20	3.53000E+04	1.76501E+05
2	ARSENIC	1.00000E+20	5.86000E+00	3.03000E+01
3	BARIUM	1.00000E+20	1.00000E+01	5.10000E+01
4	BORON	1.00000E+20	0.00000E+00	1.00000E+00
5	CADMIUM	1.00000E+20	5.00000E+00	2.60000E+01
6	CHLOROFO	1.00000E+20	0.00000E+00	1.00000E+00
7	CHROMIUM	1.00000E+20	0.00000E+00	1.00000E+00
8	COPPER	1.00000E+20	1.00000E+00	6.00000E+00
9	FLUORIDE	1.00000E+20	0.00000E+00	1.00000E+00
10	IRON	1.00000E+20	1.00000E+01	5.10000E+01
11	LEAD	1.00000E+20	1.00000E+01	5.10000E+01
12	MAGNESIU	1.00000E+20	7.00000E+01	3.51000E+02
13	MERCURY	1.00000E+20	5.00000E+00	2.60000E+01
14	POTASSIU	1.00000E+20	0.00000E+00	1.00000E+00
15	SELENIUM	1.00000E+20	0.00000E+00	1.00000E+00
16	SILVER	1.00000E+20	1.00000E+01	5.10000E+01
17	SODIUM I	1.00000E+20	1.00000E+00	6.00000E+00
18	STRONTIU	1.00000E+20	7.00000E+00	3.60000E+01
19	URANIUM	1.00000E+20	0.00000E+00	1.00000E+00
20	ZINC COM	1.00000E+20	3.00000E+00	1.60000E+01

Constituent	CAS ID	Half-Life (Years)	Initial Conc.	Surface Equilibrium Coeff. (ml/g)	Solubility limit (g/ml)	Constituent Inventory (g OR Ci)
ALUMINUM	7429905	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	2.49E+06
ARSENIC	7440382	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	2.49E+06
BARIUM	7440393	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	4.99E+07
BORON	7440428	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	7.98E+05
CADMIUM	7440439	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	4.99E+05
CHLOROFO	67663	1.00E+20	-9.99E+01	-9.99E+01	8.20E-03	2.99E+05
CHROMIUM	7440473	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	2.49E+06
COPPER	7440508	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	4.99E+07
FLUORIDE	7782414	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	9.97E+07
IRON	15438310	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	1.50E+07
LEAD	7439921	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	2.49E+06
MAGNESIU	7786303	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	7.83E+05
MERCURY	7439976	1.00E+20	-9.99E+01	-9.99E+01	3.00E-08	9.97E+04
POTASSIU	7447407	1.00E+20	-9.99E+01	-9.99E+01	3.50E-02	3.59E+07
SELENIUM	7782492	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	4.99E+05
SILVER	7440224	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	2.49E+06
SODIUM I	7647145	1.00E+20	-9.99E+01	-9.99E+01	3.60E-02	1.03E+08
STRONTIU	10476854	1.00E+20	-9.99E+01	-9.99E+01	5.38E-01	4.53E+06
URANIUM	7440611	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	2.94E+06
ZINC COM	7646857	1.00E+20	-9.99E+01	-9.99E+01	1.00E+23	2.49E+08

Computed Initial at the Release Unit (DMAX) = 5.00E-08
 Computed Initial at the Release Unit (DMAX) = 5.00E-08
 Computed Initial at the Release Unit (DMAX) = 1.00E-06
 Computed Initial at the Release Unit (DMAX) = 1.60E-08
 Computed Initial at the Release Unit (DMAX) = 1.00E-08
 Computed Initial at the Release Unit (DMAX) = 6.00E-09
 Computed Initial at the Release Unit (DMAX) = 5.00E-08
 Computed Initial at the Release Unit (DMAX) = 1.00E-06
 Computed Initial at the Release Unit (DMAX) = 2.00E-06
 Computed Initial at the Release Unit (DMAX) = 3.00E-07
 Computed Initial at the Release Unit (DMAX) = 5.00E-08
 Computed Initial at the Release Unit (DMAX) = 1.57E-08
 Computed Initial at the Release Unit (DMAX) = 2.00E-09
 Computed Initial at the Release Unit (DMAX) = 7.19E-07
 Computed Initial at the Release Unit (DMAX) = 1.00E-08
 Computed Initial at the Release Unit (DMAX) = 5.00E-08
 Computed Initial at the Release Unit (DMAX) = 2.07E-06
 Computed Initial at the Release Unit (DMAX) = 9.08E-08
 Computed Initial at the Release Unit (DMAX) = 5.90E-08
 Computed Initial at the Release Unit (DMAX) = 5.00E-06

Modeling Medium # 2
 Medium Type (MED) = 1
 Source Configuration = 4
 Source Term Discharge Type = 1
 PARTIALLY SATURATED ZONE

Thickness of Unsaturated Layer (H1) = 5.00E+03 cm
 X-Direction Dispersivity (A1) = 5.00E+01 cm
 Bulk Density (R2) = 1.60E+00 g/cm**3
 Total Porosity (AN4) = 4.20E-01 (fraction)
 Field Capacity (AN5) = 8.50E-02 (fraction)
 Permeability (X2) = 4.33E+02 cm/day
 Leach Rate (VLEACH) = 3.62E-01 cm/day
 Soil-Type Coefficient (A2) = 4.05E+00

Moisture Content (AN5) = 37.75 %
 Infiltration Rate (U) = 3.50E+02 cm/day

NO	PARENT	DECAY RATE 1/YEARS	KD CC/GM	RETARDATION FACTOR
1	ALUMINUM	6.93147E-21	3.53000E+04	1.49631E+05
2	ARSENIC	6.93147E-21	5.86000E+00	2.58393E+01

3	BARIUM	6.93147E-21	1.00000E+01	4.33880E+01
4	BORON	6.93147E-21	0.00000E+00	1.00000E+00
5	CADMIUM	6.93147E-21	5.00000E+00	2.21940E+01
6	CHLOROFO	6.93147E-21	0.00000E+00	1.00000E+00
7	CHROMIUM	6.93147E-21	0.00000E+00	1.00000E+00
8	COPPER	6.93147E-21	1.00000E+00	5.23880E+00
9	FLUORIDE	6.93147E-21	0.00000E+00	1.00000E+00
10	IRON	6.93147E-21	1.00000E+01	4.33880E+01
11	LEAD	6.93147E-21	1.00000E+01	4.33880E+01
12	MAGNESIU	6.93147E-21	7.00000E+01	2.97716E+02
13	MERCURY	6.93147E-21	5.00000E+00	2.21940E+01
14	POTASSIU	6.93147E-21	0.00000E+00	1.00000E+00
15	SELENIUM	6.93147E-21	0.00000E+00	1.00000E+00
16	SILVER	6.93147E-21	1.00000E+01	4.33880E+01
17	SODIUM I	6.93147E-21	1.00000E+00	5.23880E+00
18	STRONTIU	6.93147E-21	7.00000E+00	3.06716E+01
19	URANIUM	6.93147E-21	0.00000E+00	1.00000E+00
20	ZINC COM	6.93147E-21	3.00000E+00	1.37164E+01

Modeling Medium # = 3
Medium Type (MED) = 1
Source Configuration = 4
Source Term Discharge Type = 1
PARTIALLY SATURATED ZONE

Thickness of Unsaturated Layer (H1) = 1.89E+03 cm
X-Direction Dispersion (A1) = 1.89E+01 cm
Bulk Density (R2) = 1.80E+00 g/cm**3
Total Porosity (AN4) = 3.60E-01 (fraction)
Field Capacity (AN5) = 1.90E-01 (fraction)
Permeability (X2) = 1.32E+02 cm/day
Leach Rate (VLEACH) = 3.62E-01 cm/day
Soil-Type Coefficient (A2) = 4.05E+00

Moisture Content (AN5) = 36.00 %
Infiltration Rate (U) = 3.68E+02 cm/day

NO	PARENT	DECAY RATE 1/YEARS	KD CC/GM	RETARDATION FACTOR
1	ALUMINUM	6.93147E-21	3.53000E+04	1.76501E+05
2	ARSENIC	6.93147E-21	5.86000E+00	3.03000E+01
3	BARIUM	6.93147E-21	1.00000E+01	5.10000E+01
4	BORON	6.93147E-21	0.00000E+00	1.00000E+00
5	CADMIUM	6.93147E-21	5.00000E+00	2.60000E+01
6	CHLOROFO	6.93147E-21	0.00000E+00	1.00000E+00
7	CHROMIUM	6.93147E-21	0.00000E+00	1.00000E+00
8	COPPER	6.93147E-21	1.00000E+00	6.00000E+00
9	FLUORIDE	6.93147E-21	0.00000E+00	1.00000E+00
10	IRON	6.93147E-21	1.00000E+01	5.10000E+01
11	LEAD	6.93147E-21	1.00000E+01	5.10000E+01
12	MAGNESIU	6.93147E-21	7.00000E+01	3.51000E+02
13	MERCURY	6.93147E-21	5.00000E+00	2.60000E+01
14	POTASSIU	6.93147E-21	0.00000E+00	1.00000E+00
15	SELENIUM	6.93147E-21	0.00000E+00	1.00000E+00
16	SILVER	6.93147E-21	1.00000E+01	5.10000E+01
17	SODIUM I	6.93147E-21	1.00000E+00	6.00000E+00
18	STRONTIU	6.93147E-21	7.00000E+00	3.60000E+01
19	URANIUM	6.93147E-21	0.00000E+00	1.00000E+00
20	ZINC COM	6.93147E-21	3.00000E+00	1.60000E+01

Modeling Medium # = 4

Medium Type (MED) = 4
 Source Configuration = 4
 Source Term Discharge Type = 1
 SATURATED ZONE AT A RIVER

NO	PARENT	DECAY RATE 1/YEARS	KD CC/GM	RETARDATION FACTOR
1	ALUMINUM	6.93147E-21	3.53000E+04	5.64801E+05
2	ARSENIC	6.93147E-21	5.86000E+00	9.47600E+01
3	BARIUM	6.93147E-21	1.00000E+01	1.61000E+02
4	BORON	6.93147E-21	0.00000E+00	1.00000E+00
5	CADMIUM	6.93147E-21	5.00000E+00	8.10000E+01
6	CHLOROFO	6.93147E-21	0.00000E+00	1.00000E+00
7	CHROMIUM	6.93147E-21	0.00000E+00	1.00000E+00
8	COPPER	6.93147E-21	1.00000E+00	1.70000E+01
9	FLUORIDE	6.93147E-21	0.00000E+00	1.00000E+00
10	IRON	6.93147E-21	1.00000E+01	1.61000E+02
11	LEAD	6.93147E-21	1.00000E+01	1.61000E+02
12	MAGNESIU	6.93147E-21	7.00000E+01	1.12100E+03
13	MERCURY	6.93147E-21	5.00000E+00	8.10000E+01
14	POTASSIU	6.93147E-21	0.00000E+00	1.00000E+00
15	SELENIUM	6.93147E-21	0.00000E+00	1.00000E+00
16	SILVER	6.93147E-21	1.00000E+01	1.61000E+02
17	SODIUM I	6.93147E-21	0.00000E+00	1.00000E+00
18	STRONTIU	6.93147E-21	7.00000E+00	1.13000E+02
19	URANIUM	6.93147E-21	0.00000E+00	1.00000E+00
20	ZINC COM	6.93147E-21	3.00000E+00	4.90000E+01

Groundwater Velocity (U) = 3.29E+02 cm/day
 Aquifer Thickness (H1) = 9.14E+02 cm
 X-Direction Dispersivity (A1) = 1.29E+05 cm
 Y-Direction Dispersivity (A2) = 2.58E+04 cm
 Z-Direction Dispersivity (A3) = 1.49E+02 cm
 Bulk Density (R2) = 1.60E+00 g/cm**3
 Total Porosity (AN4) = 1.80E-01 (fraction)
 Effective Porosity (AN5) = 1.00E-01 (fraction)
 Length of Burial Area (AL1) = 1.61E+04 cm
 Width of Burial Area (B1) = 1.61E+04 cm
 Depth of Release Unit Below Water Table (HW) = 0.00E+00 cm
 Distance Downgradient from Center of Source (X2) = 1.29E+06 cm
 Lateral Hydraulic Conductivity (HC) = 0.00E+00 cm/day

Modeling Medium # 5
 Medium Type (MED) = 5
 Source Configuration = 4
 Source Term Discharge Type = 1
 SURFACE WATER ENVIRONMENT

Number of River Receptor Locations (NUMREC) = 8
 Flow Velocity (U1) = 1.66E+09 cm/year
 Depth of Flow (H1) = 4.88E+02 cm
 Width of River (B1) = 3.96E+04 cm
 Downstream Discharge at First Receptor (QNEW) = 3.22E+16 cm**3/year
 Distance Downstream from Center of Source (X3) = 1.00E+04 cm

Uniform Mixing Distance = 1.04E+03 cm

Present Concentration for ALUMINUM IS 0.000E+00(g/ml or Ci/ml)

Concentrations for ARSENIC at run time (1993 , 0.0 years) is between:
0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
1.016E-17 (g/ml or Ci/ml) at 173.7 years (2166)

Concentrations for BARIUM at run time (1993 , 0.0 years) is between:
0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
9.183E-21 (g/ml or Ci/ml) at 175.0 years (2168)

Concentrations for BORON at run time (1993 , 0.0 years) is between:
0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
5.112E-17 (g/ml or Ci/ml) at 2.1 years (1995)

Concentrations for CADMIUM at run time (1993 , 0.0 years) is between:
0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
2.243E-18 (g/ml or Ci/ml) at 148.2 years (2141)

Concentrations for CHLOROFO at run time (1993 , 0.0 years) is between:
0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
1.875E-17 (g/ml or Ci/ml) at 2.1 years (1995)

Concentrations for CHROMIUM at run time (1993 , 0.0 years) is between:
0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
1.562E-16 (g/ml or Ci/ml) at 2.1 years (1995)

Concentrations for COPPER at run time (1993 , 0.0 years) is between:
0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
5.816E-16 (g/ml or Ci/ml) at 31.1 years (2024)

Concentrations for FLUORIDE at run time (1993 , 0.0 years) is between:
0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
6.414E-15 (g/ml or Ci/ml) at 2.1 years (1995)

Concentrations for IRON at run time (1993 , 0.0 years) is between:
0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
2.754E-21 (g/ml or Ci/ml) at 175.0 years (2168)

Concentrations for LEAD at run time (1993 , 0.0 years) is between:
0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
4.592E-22 (g/ml or Ci/ml) at 175.0 years (2168)

Present Concentration for MAGNESIU IS 0.000E+00(g/ml or Ci/ml)
Concentrations for MERCURY at run time (1993 , 0.0 years) is between:
0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
4.487E-19 (g/ml or Ci/ml) at 148.2 years (2141)

Concentrations for POTASSIU at run time (1993 , 0.0 years) is between:
0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
2.216E-15 (g/ml or Ci/ml) at 2.1 years (1995)

Concentrations for SELENIUM at run time (1993 , 0.0 years) is between:
0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
3.082E-17 (g/ml or Ci/ml) at 2.1 years (1995)

Concentrations for SILVER at run time (1993 , 0.0 years) is between:
0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
4.592E-22 (g/ml or Ci/ml) at 175.0 years (2168)

Concentrations for SODIUM I at run time (1993 , 0.0 years) is between:
0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
1.218E-15 (g/ml or Ci/ml) at 2.1 years (1995)

Concentrations for STRONTIU at run time (1993 , 0.0 years) is between:
0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
1.313E-18 (g/ml or Ci/ml) at 175.0 years (2168)

Concentrations for URANIUM at run time (1993 , 0.0 years) is between:
0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
1.844E-16 (g/ml or Ci/ml) at 2.1 years (1995)

Concentrations for ZINC COM at run time (1993 , 0.0 years) is between:
 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 1.743E-15 (g/ml or Ci/ml) at 89.9 years (2082)

Maximum Constituent Concentrations:

ALUMINUM:	0.000E+00 (g/ml or Ci/ml) at	.0 Years (1993)
ARSENIC :	4.039E-14 (g/ml or Ci/ml) at	868.5 Years (2861)
BARIUM :	4.777E-13 (g/ml or Ci/ml) at	1400.0 Years (3393)
BORON :	1.151E-12 (g/ml or Ci/ml) at	10.6 Years (2003)
CADMIUM :	9.316E-15 (g/ml or Ci/ml) at	741.2 Years (2734)
CHLOROFO:	4.124E-13 (g/ml or Ci/ml) at	10.6 Years (2003)
CHROMIUM:	3.437E-12 (g/ml or Ci/ml) at	10.6 Years (2003)
COPPER :	4.516E-12 (g/ml or Ci/ml) at	155.6 Years (2148)
FLUORIDE:	1.439E-10 (g/ml or Ci/ml) at	10.6 Years (2003)
IRON :	1.433E-13 (g/ml or Ci/ml) at	1400.0 Years (3393)
LEAD :	2.389E-14 (g/ml or Ci/ml) at	1400.0 Years (3393)
MAGNESIU:	7.798E-16 (g/ml or Ci/ml) at	6827.5 Years (8820)
MERCURY :	1.863E-15 (g/ml or Ci/ml) at	741.2 Years (2734)
POTASSIU:	4.722E-11 (g/ml or Ci/ml) at	10.6 Years (2003)
SELENIUM:	6.568E-13 (g/ml or Ci/ml) at	10.6 Years (2003)
SILVER :	2.389E-14 (g/ml or Ci/ml) at	1400.0 Years (3393)
SODIUM I:	1.505E-10 (g/ml or Ci/ml) at	10.6 Years (2003)
STRONTIU:	6.093E-14 (g/ml or Ci/ml) at	1050.0 Years (3043)
URANIUM :	4.056E-12 (g/ml or Ci/ml) at	10.6 Years (2003)
ZINC COM:	7.842E-12 (g/ml or Ci/ml) at	449.3 Years (2442)

Modeling Scenario Number 2

Name of Facility = DOE Hanford
 Name of Waste Unit = SNF-EIS 200 East Area
 Transport Scenario = SS-T3 Surface soil >Groundwater
 Exposure Scenario = SW-E3 SW-E4 SW-E5
 Usage Location Number = 1
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

ALUMINUM:	0.000E+00 (g/ml or Ci/ml) at	.0 years (1993)
ARSENIC :	7.528E-14 (g/ml or Ci/ml) at	868.5 years (2861)
BARIUM :	8.902E-13 (g/ml or Ci/ml) at	1400.0 years (3393)
BORON :	2.146E-12 (g/ml or Ci/ml) at	10.6 years (2003)
CADMIUM :	1.736E-14 (g/ml or Ci/ml) at	741.2 years (2734)
CHLOROFO:	7.686E-13 (g/ml or Ci/ml) at	10.6 years (2003)
CHROMIUM:	6.406E-12 (g/ml or Ci/ml) at	10.6 years (2003)
COPPER :	8.418E-12 (g/ml or Ci/ml) at	155.6 years (2148)
FLUORIDE:	2.682E-10 (g/ml or Ci/ml) at	10.6 years (2003)
IRON :	2.670E-13 (g/ml or Ci/ml) at	1400.0 years (3393)
LEAD :	4.452E-14 (g/ml or Ci/ml) at	1400.0 years (3393)
MAGNESIU:	1.453E-15 (g/ml or Ci/ml) at	6827.5 years (8820)
MERCURY :	3.473E-15 (g/ml or Ci/ml) at	741.2 years (2734)
POTASSIU:	8.802E-11 (g/ml or Ci/ml) at	10.6 years (2003)
SELENIUM:	1.224E-12 (g/ml or Ci/ml) at	10.6 years (2003)
SILVER :	4.452E-14 (g/ml or Ci/ml) at	1400.0 years (3393)
SODIUM I:	2.805E-10 (g/ml or Ci/ml) at	10.6 years (2003)

STRONTIU: 1.135E-13 (g/ml or Ci/ml) at 1050.0 years (3043)
URANIUM : 7.559E-12 (g/ml or Ci/ml) at 10.6 years (2003)
ZINC COM: 1.462E-11 (g/ml or Ci/ml) at 449.3 years (2442)

Modeling Scenario Number 3

Name of Facility = DOE Hanford
Name of Waste Unit = SNF-EIS 200 East Area
Transport Scenario = SS-T3 Surface soil >Groundwater
Exposure Scenario = SW-E3 SW-E4 SW-E5
Usage Location Number = 7
Usage Location Medium = 3
Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

ALUMINUM: 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
ARSENIC : 7.528E-14 (g/ml or Ci/ml) at 868.5 years (2861)
BARIUM : 8.902E-13 (g/ml or Ci/ml) at 1400.0 years (3393)
BORON : 2.146E-12 (g/ml or Ci/ml) at 10.6 years (2003)
CADMIUM : 1.736E-14 (g/ml or Ci/ml) at 741.2 years (2734)
CHLOROFO: 7.686E-13 (g/ml or Ci/ml) at 10.6 years (2003)
CHROMIUM: 6.406E-12 (g/ml or Ci/ml) at 10.6 years (2003)
COPPER : 8.418E-12 (g/ml or Ci/ml) at 155.6 years (2148)
FLUORIDE: 2.682E-10 (g/ml or Ci/ml) at 10.6 years (2003)
IRON : 2.670E-13 (g/ml or Ci/ml) at 1400.0 years (3393)
LEAD : 4.452E-14 (g/ml or Ci/ml) at 1400.0 years (3393)
MAGNESIU: 1.453E-15 (g/ml or Ci/ml) at 6827.5 years (8820)
MERCURY : 3.473E-15 (g/ml or Ci/ml) at 741.2 years (2734)
POTASSIU: 8.802E-11 (g/ml or Ci/ml) at 10.6 years (2003)
SELENIUM: 1.224E-12 (g/ml or Ci/ml) at 10.6 years (2003)
SILVER : 4.452E-14 (g/ml or Ci/ml) at 1400.0 years (3393)
SODIUM I: 2.805E-10 (g/ml or Ci/ml) at 10.6 years (2003)
STRONTIU: 1.135E-13 (g/ml or Ci/ml) at 1050.0 years (3043)
URANIUM : 7.559E-12 (g/ml or Ci/ml) at 10.6 years (2003)
ZINC COM: 1.462E-11 (g/ml or Ci/ml) at 449.3 years (2442)

Modeling Scenario Number 4

Name of Facility = DOE Hanford
Name of Waste Unit = SNF-EIS 200 East Area
Transport Scenario = SS-T3 Surface soil >Groundwater
Exposure Scenario = SW-E1 SW-E6
Usage Location Number = 4
Usage Location Medium = 3
Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

ALUMINUM: 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
ARSENIC : 7.528E-14 (g/ml or Ci/ml) at 868.5 years (2861)
BARIUM : 8.902E-13 (g/ml or Ci/ml) at 1400.0 years (3393)
BORON : 2.146E-12 (g/ml or Ci/ml) at 10.6 years (2003)
CADMIUM : 1.736E-14 (g/ml or Ci/ml) at 741.2 years (2734)
CHLOROFO: 7.686E-13 (g/ml or Ci/ml) at 10.6 years (2003)

CHROMIUM: 6.406E-12 (g/ml or Ci/ml) at 10.6 years (2003)
 COPPER : 8.418E-12 (g/ml or Ci/ml) at 155.6 years (2148)
 FLUORIDE: 2.682E-10 (g/ml or Ci/ml) at 10.6 years (2003)
 IRON : 2.670E-13 (g/ml or Ci/ml) at 1400.0 years (3393)
 LEAD : 4.452E-14 (g/ml or Ci/ml) at 1400.0 years (3393)
 MAGNESIU: 1.453E-15 (g/ml or Ci/ml) at 6827.5 years (8820)
 MERCURY : 3.473E-15 (g/ml or Ci/ml) at 741.2 years (2734)
 POTASSIU: 8.802E-11 (g/ml or Ci/ml) at 10.6 years (2003)
 SELENIUM: 1.224E-12 (g/ml or Ci/ml) at 10.6 years (2003)
 SILVER : 4.452E-14 (g/ml or Ci/ml) at 1400.0 years (3393)
 SODIUM I: 2.805E-10 (g/ml or Ci/ml) at 10.6 years (2003)
 STRONTIU: 1.135E-13 (g/ml or Ci/ml) at 1050.0 years (3043)
 URANIUM : 7.559E-12 (g/ml or Ci/ml) at 10.6 years (2003)
 ZINC COM: 1.462E-11 (g/ml or Ci/ml) at 449.3 years (2442)

Modeling Scenario Number 5

Name of Facility = DOE Hanford
 Name of Waste Unit = SNF-EIS 200 East Area
 Transport Scenario = SS-T3 Surface soil >Groundwater
 Exposure Scenario = SW-E1 SW-E6
 Usage Location Number = 5
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm³/day

Maximum Constituent Concentrations:

ALUMINUM: 0.000E+00 (g/ml or Ci/ml) at .0 years (1993)
 ARSENIC : 7.528E-14 (g/ml or Ci/ml) at 868.5 years (2861)
 BARIUM : 8.902E-13 (g/ml or Ci/ml) at 1400.0 years (3393)
 BORON : 2.146E-12 (g/ml or Ci/ml) at 10.6 years (2003)
 CADMIUM : 1.736E-14 (g/ml or Ci/ml) at 741.2 years (2734)
 CHLOROFO: 7.686E-13 (g/ml or Ci/ml) at 10.6 years (2003)
 CHROMIUM: 6.406E-12 (g/ml or Ci/ml) at 10.6 years (2003)
 COPPER : 8.418E-12 (g/ml or Ci/ml) at 155.6 years (2148)
 FLUORIDE: 2.682E-10 (g/ml or Ci/ml) at 10.6 years (2003)
 IRON : 2.670E-13 (g/ml or Ci/ml) at 1400.0 years (3393)
 LEAD : 4.452E-14 (g/ml or Ci/ml) at 1400.0 years (3393)
 MAGNESIU: 1.453E-15 (g/ml or Ci/ml) at 6827.5 years (8820)
 MERCURY : 3.473E-15 (g/ml or Ci/ml) at 741.2 years (2734)
 POTASSIU: 8.802E-11 (g/ml or Ci/ml) at 10.6 years (2003)
 SELENIUM: 1.224E-12 (g/ml or Ci/ml) at 10.6 years (2003)
 SILVER : 4.452E-14 (g/ml or Ci/ml) at 1400.0 years (3393)
 SODIUM I: 2.805E-10 (g/ml or Ci/ml) at 10.6 years (2003)
 STRONTIU: 1.135E-13 (g/ml or Ci/ml) at 1050.0 years (3043)
 URANIUM : 7.559E-12 (g/ml or Ci/ml) at 10.6 years (2003)
 ZINC COM: 1.462E-11 (g/ml or Ci/ml) at 449.3 years (2442)

Modeling Scenario Number 6

Name of Facility = DOE Hanford
 Name of Waste Unit = SNF-EIS 200 East Area
 Transport Scenario = SS-T3 Surface soil >Groundwater
 Exposure Scenario = SW-E1 SW-E6 SW-E7 SW-E8
 Usage Location Number = 3
 Usage Location Medium = 3
 Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm³/day

Maximum Constituent Concentrations:

ALUMINUM:	0.000E+00 (g/ml or Ci/ml) at	.0 years (1993)
ARSENIC :	7.528E-14 (g/ml or Ci/ml) at	868.5 years (2861)
BARIUM :	8.902E-13 (g/ml or Ci/ml) at	1400.0 years (3393)
BORON :	2.146E-12 (g/ml or Ci/ml) at	10.6 years (2003)
CADMIUM :	1.736E-14 (g/ml or Ci/ml) at	741.2 years (2734)
CHLOROFO:	7.686E-13 (g/ml or Ci/ml) at	10.6 years (2003)
CHROMIUM:	6.406E-12 (g/ml or Ci/ml) at	10.6 years (2003)
COPPER :	8.418E-12 (g/ml or Ci/ml) at	155.6 years (2148)
FLUORIDE:	2.682E-10 (g/ml or Ci/ml) at	10.6 years (2003)
IRON :	2.670E-13 (g/ml or Ci/ml) at	1400.0 years (3393)
LEAD :	4.452E-14 (g/ml or Ci/ml) at	1400.0 years (3393)
MAGNESIU:	1.453E-15 (g/ml or Ci/ml) at	6827.5 years (8820)
MERCURY :	3.473E-15 (g/ml or Ci/ml) at	741.2 years (2734)
POTASSIU:	8.802E-11 (g/ml or Ci/ml) at	10.6 years (2003)
SELENIUM:	1.224E-12 (g/ml or Ci/ml) at	10.6 years (2003)
SILVER :	4.452E-14 (g/ml or Ci/ml) at	1400.0 years (3393)
SODIUM I:	2.805E-10 (g/ml or Ci/ml) at	10.6 years (2003)
STRONTIU:	1.135E-13 (g/ml or Ci/ml) at	1050.0 years (3043)
URANIUM :	7.559E-12 (g/ml or Ci/ml) at	10.6 years (2003)
ZINC COM:	1.462E-11 (g/ml or Ci/ml) at	449.3 years (2442)

Modeling Scenario Number 7

Name of Facility = DOE Hanford
Name of Waste Unit = SNF-EIS 200 East Area
Transport Scenario = SS-T3 Surface soil >Groundwater
Exposure Scenario = SW-E1 SW-E6 SW-E7 SW-E8
Usage Location Number = 2
Usage Location Medium = 3
Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm³/day

Maximum Constituent Concentrations:

ALUMINUM:	0.000E+00 (g/ml or Ci/ml) at	.0 years (1993)
ARSENIC :	7.528E-14 (g/ml or Ci/ml) at	868.5 years (2861)
BARIUM :	8.902E-13 (g/ml or Ci/ml) at	1400.0 years (3393)
BORON :	2.146E-12 (g/ml or Ci/ml) at	10.6 years (2003)
CADMIUM :	1.736E-14 (g/ml or Ci/ml) at	741.2 years (2734)
CHLOROFO:	7.686E-13 (g/ml or Ci/ml) at	10.6 years (2003)
CHROMIUM:	6.406E-12 (g/ml or Ci/ml) at	10.6 years (2003)
COPPER :	8.418E-12 (g/ml or Ci/ml) at	155.6 years (2148)
FLUORIDE:	2.682E-10 (g/ml or Ci/ml) at	10.6 years (2003)
IRON :	2.670E-13 (g/ml or Ci/ml) at	1400.0 years (3393)
LEAD :	4.452E-14 (g/ml or Ci/ml) at	1400.0 years (3393)
MAGNESIU:	1.453E-15 (g/ml or Ci/ml) at	6827.5 years (8820)
MERCURY :	3.473E-15 (g/ml or Ci/ml) at	741.2 years (2734)
POTASSIU:	8.802E-11 (g/ml or Ci/ml) at	10.6 years (2003)
SELENIUM:	1.224E-12 (g/ml or Ci/ml) at	10.6 years (2003)
SILVER :	4.452E-14 (g/ml or Ci/ml) at	1400.0 years (3393)
SODIUM I:	2.805E-10 (g/ml or Ci/ml) at	10.6 years (2003)
STRONTIU:	1.135E-13 (g/ml or Ci/ml) at	1050.0 years (3043)
URANIUM :	7.559E-12 (g/ml or Ci/ml) at	10.6 years (2003)
ZINC COM:	1.462E-11 (g/ml or Ci/ml) at	449.3 years (2442)

Modeling Scenario Number 8

Name of Facility = DOE Hanford
Name of Waste Unit = SNF-EIS 200 East Area
Transport Scenario = SS-T3 Surface soil >Groundwater
Exposure Scenario = SW-E3 SW-E4 SW-E5
Usage Location Number = 8
Usage Location Medium = 3
Usage Location Name =

Downstream Discharge (QNEW) = 3.22E+16 cm3/day

Maximum Constituent Concentrations:

ALUMINUM:	0.000E+00 (g/ml or Ci/ml)	at	.0 years (1993)
ARSENIC :	7.528E-14 (g/ml or Ci/ml)	at	868.5 years (2861)
BARIUM :	8.902E-13 (g/ml or Ci/ml)	at	1400.0 years (3393)
BORON :	2.146E-12 (g/ml or Ci/ml)	at	10.6 years (2003)
CADMIUM :	1.736E-14 (g/ml or Ci/ml)	at	741.2 years (2734)
CHLOROFO:	7.686E-13 (g/ml or Ci/ml)	at	10.6 years (2003)
CHROMIUM:	6.406E-12 (g/ml or Ci/ml)	at	10.6 years (2003)
COPPER :	8.418E-12 (g/ml or Ci/ml)	at	155.6 years (2148)
FLUORIDE:	2.682E-10 (g/ml or Ci/ml)	at	10.6 years (2003)
IRON :	2.670E-13 (g/ml or Ci/ml)	at	1400.0 years (3393)
LEAD :	4.452E-14 (g/ml or Ci/ml)	at	1400.0 years (3393)
MAGNESIU:	1.453E-15 (g/ml or Ci/ml)	at	6827.5 years (8820)
MERCURY :	3.473E-15 (g/ml or Ci/ml)	at	741.2 years (2734)
POTASSIU:	8.802E-11 (g/ml or Ci/ml)	at	10.6 years (2003)
SELENIUM:	1.224E-12 (g/ml or Ci/ml)	at	10.6 years (2003)
SILVER :	4.452E-14 (g/ml or Ci/ml)	at	1400.0 years (3393)
SODIUM I:	2.805E-10 (g/ml or Ci/ml)	at	10.6 years (2003)
STRONTIU:	1.135E-13 (g/ml or Ci/ml)	at	1050.0 years (3043)
URANIUM :	7.559E-12 (g/ml or Ci/ml)	at	10.6 years (2003)
ZINC COM:	1.462E-11 (g/ml or Ci/ml)	at	449.3 years (2442)

Multimedia Environmental Pollutant Assessment System (MEPAS)

MEPAS Hazard Potential Output (VERSION 041292)
Pacific Northwest Laboratory
Richland, WA 99352
Developed for the U.S. Department of Energy

Run Date and Time: 11/22/1993 19: 2:19
(This run used 630. effects per million man-rem)
Run Title: SNF-EIS 200 East Area
Ranking Unit 1 : TEDF088

Number of Constituents is: 20
Time Discounted HPis are computed using 70 year time periods (Time Index = 0)

Num	Constituent Names	CASID
1	Aluminum	7429905
2	Arsenic	7440382
3	Barium	7440393
4	Boron (elemental)	7440428
5	Cadmium	7440439
6	Chloroform, Trichloromethane, Freon 20	67663
7	Chromium VI, Chrome	7440473
8	Copper, C.I. pigmentmetal 2	7440508
9	Fluoride, Fluoro	7782414
10	Iron, Ferrous	15438310
11	Lead, DI, Col. Pigment metal 4	7439921
12	Magnesium	7786303
13	Mercury, Quicksilver	7439976
14	Potassium ion (as Potassium chloride)	7447407
15	Selenium	7782492
16	Silver	7440224
17	Sodium ion (as sodium chloride)	7647145
18	Strontium ion (as strontium chloride)	10476854
19	Uranium, Pyrophoric	7440611
20	Zinc compounds	7646857

Summary of Data from MEPAS Constituent Database
CONSTITUENT DATA LIBRARY FOR MEPAS - UPDATED March 25, 1993 DLS/PEIS
This Database Contains Entries for 400 Constituents

Constituent Parameter	Parameter Units	Constituent 1	Constituent 2	Constituent 3	Constituent 4
ID / CAS #:	(None)	7429905	7440382	7440393	7440428
Toxicity Type:	(None)	5	2	5	5
Mol. Weight:	g/mole	2.698E+01	7.500E+01	1.370E+02	1.080E+01
Vapor Pressure:	mm-Hg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Henry's Law Con:	atm*m3/mole	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water Sol:	mg/L	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Carbon Mat Part:	ml/g	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Oct Wat Part:	(None)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1/2-life in AIR:	days	6.900E+07	6.900E+07	6.900E+07	6.900E+07
1/2-life in GW:	days	6.900E+07	6.900E+07	6.900E+07	6.900E+07
1/2-life in SW:	days	6.900E+07	6.900E+07	6.900E+07	6.900E+07
1/2-life in SOIL:	days	6.900E+07	6.900E+07	6.900E+07	6.900E+07
Ing Dose Fact:	1/Kg or rem/pCi	1.430E-02	1.430E-02	1.430E-02	1.430E-02
Inh Dose Fact:	1/Kg or rem/pCi	1.430E-02	1.430E-02	1.430E-02	1.430E-02
Air Imm Fact:	rem*m3/pCi*h	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Soil Exp Fact:	rem*m2/pCi*h	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water Imm Fact:	rem*L/pCi*h	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Fish Bioaccum:	(None)	1.000E+01	1.000E+02	2.000E+02	2.200E-01
Shell Bioaccum:	(None)	6.300E+01	4.000E+01	2.000E-01	5.000E+01
Veg Bioaccum:	(None)	1.800E-04	1.500E-03	3.750E-03	1.200E-01
Meat Trans Fact:	day/Kg	1.500E-03	2.000E-03	1.500E-04	8.000E-04
Milk Trans Fact:	day/L	5.000E-04	6.000E-05	3.500E-04	2.700E-03
Water Pur Fact:	(None)	1.000E+00	7.000E-01	1.000E+00	1.000E+00
Dep Velocity:	m/sec	1.000E-03	1.000E-03	1.000E-03	1.000E-03
Atmos Dis Class:	(None)	1	1	1	1
Inh Cancer Pot:	(Kg*day)/mg	0.000E+00	1.500E+01	0.000E+00	0.000E+00
Ing Cancer Pot:	(Kg*day)/mg	0.000E+00	1.750E+00	0.000E+00	0.000E+00
Inh Ref Dose:	mg/(Kg*day)	1.400E-03	0.000E+00	1.000E-04	9.000E-02
Ing Ref Dose:	mg/(Kg*day)	4.000E-04	3.000E-04	7.000E-02	9.000E-02
Inh Tox Uncert	HPI units	10	5	5	10
Ing Tox Uncert	HPI units	15	5	5	15
Phys Prop Uncert	HPI units	3	3	3	3
Tran Fact Uncert	HPI units	3	3	3	3

Toxicity Type 1: Radionuclide carcinogenic inhalation and ingestion
 Toxicity Type 2: Chemical carcinogenic inhalation and ingestion
 Toxicity Type 3: Chemical carcinogenic inhalation, non-carcinogenic ingestion
 Toxicity Type 4: Chemical non-carcinogenic inhalation, carcinogenic ingestion
 Toxicity Type 5: Chemical non-carcinogenic inhalation and ingestion

KEY for Constituent Table

Constituent 1 = ALUMINUM
 Constituent 2 = ARSENIC
 Constituent 3 = BARIUM
 Constituent 4 = BORON

Summary of Data from MEPAS Constituent Database (Cont) CONSTITUENT DATA LIBRARY FOR MEPAS - UPDATED March 25, 1993 DLS/PEIS This Database Contains Entries for 400 Constituents

Constituent Parameter	Parameter Units	Constituent 5	Constituent 6	Constituent 7	Constituent 8
ID / CAS #:	(None)	7440439	67663	7440473	7440508
Toxicity Type:	(None)	3	2	3	5
Mol. Weight:	g/mole	1.120E+02	1.190E+02	5.200E+01	6.355E+01
Vapor Pressure:	mm-Hg	0.000E+00	1.510E+02	0.000E+00	0.000E+00
Henry's Law Con:	atm*m3/mole	0.000E+00	2.870E+03	0.000E+00	0.000E+00
Water Sol:	mg/L	0.000E+00	8.200E+03	0.000E+00	0.000E+00
Carbon Mat Part:	ml/g	0.000E+00	5.000E+01	0.000E+00	0.000E+00
Oct Wat Part:	(None)	0.000E+00	9.330E+01	0.000E+00	0.000E+00
1/2-life in AIR:	days	6.900E+07	6.900E+07	6.900E+07	6.900E+07
1/2-life in GW:	days	6.900E+07	6.900E+07	6.900E+07	6.900E+07
1/2-life in SW:	days	6.900E+07	1.460E-01	6.900E+07	6.900E+07
1/2-life in SOIL:	days	6.900E+07	7.540E+00	6.900E+07	6.900E+07
Ing Dose Fact:	1/Kg or rem/pCi	1.430E-02	1.430E-02	1.430E-02	1.430E-02
Inh Dose Fact:	1/Kg or rem/pCi	1.430E-02	1.430E-02	1.430E-02	1.430E-02
Air Imm Fact:	rem*m3/pCi*h	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Soil Exp Fact:	rem*m2/pCi*h	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water Imm Fact:	rem*L/pCi*h	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Fish Bioaccum:	(None)	2.000E+02	1.850E+01	2.000E+02	5.000E+01
Shell Bioaccum:	(None)	2.000E+03	2.933E+00	2.000E+03	4.000E+02
Veg Bioaccum:	(None)	3.750E-02	7.037E-01	1.130E-03	6.250E-02

Meat Trans Fact: day/Kg	5.500E-04	2.344E-06	5.500E-03	1.000E-02
Milk Trans Fact: day/L	1.000E-03	7.411E-07	1.500E-03	1.500E-03
Water Pur Fact: (None)	6.000E-01	1.000E+00	9.000E-01	6.000E-01
Dep Velocity: m/sec	1.000E-03	1.497E-06	1.000E-03	1.000E-03
Atmos Dis Class: (None)	1	5	1	1
Inh Cancer Pot: (Kg*day)/mg	6.300E+00	8.100E-02	4.100E+01	0.000E+00
Ing Cancer Pot: (Kg*day)/mg	6.300E+00	6.100E-03	4.100E+01	0.000E+00
Inh Ref Dose: mg/(Kg*day)	5.000E-04	1.000E-02	5.000E-03	1.000E-02
Ing Ref Dose: mg/(Kg*day)	5.000E-04	1.000E-02	5.000E-03	3.700E-01
Inh Tox Uncert HPI units	5	5	5	5
Ing Tox Uncert HPI units	5	5	5	5
Phys Prop Uncert HPI units	3	13	3	3
Tran Fact Uncert HPI units	3	10	3	3

Toxicity Type 1: Radionuclide carcinogenic inhalation and ingestion
 Toxicity Type 2: Chemical carcinogenic inhalation and ingestion
 Toxicity Type 3: Chemical carcinogenic inhalation, non-carcinogenic ingestion
 Toxicity Type 4: Chemical non-carcinogenic inhalation, carcinogenic ingestion
 Toxicity Type 5: Chemical non-carcinogenic inhalation and ingestion

KEY for Constituent Table

Constituent 5 = CADMIUM
 Constituent 6 = CHLOROFORM
 Constituent 7 = CHROMIUM VI
 Constituent 8 = COPPER

Summary of Data from MEPAS Constituent Database (Cont)
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Constituent Parameter	Parameter Units	Constituent 9	Constituent 10	Constituent 11	Constituent 12
ID / CAS #:	(None)	7782414	15438310	7439921	7786303
Toxicity Type:	(None)	5	5	5	5
Mol. Weight:	g/mole	3.800E+01	5.600E+01	2.070E+02	2.430E+01
Vapor Pressure:	mm-Hg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Henry's Law Con:	atm*m3/mole	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water Sol:	mg/L	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Carbon Mat Part:	ml/g	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Oct Wat Part:	(None)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1/2-life in AIR:	days	6.900E+07	6.900E+07	6.900E+07	6.900E+07
1/2-life in GW:	days	6.900E+07	6.900E+07	6.900E+07	6.900E+07
1/2-life in SW:	days	6.900E+07	6.900E+07	6.900E+07	6.900E+07
1/2-life in SOIL:	days	6.900E+07	6.900E+07	6.900E+07	6.900E+07
Ing Dose Fact:	1/Kg or rem/pCi	1.430E-02	1.430E-02	1.430E-02	1.430E-02
Inh Dose Fact:	1/Kg or rem/pCi	1.430E-02	1.430E-02	1.430E-02	1.430E-02
Air Imm Fact:	rem*m3/pCi*h	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Soil Exp Fact:	rem*m2/pCi*h	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water Imm Fact:	rem*L/pCi*h	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Fish Bioaccum:	(None)	1.000E+01	2.000E+03	1.000E+02	5.000E+01
Shell Bioaccum:	(None)	1.000E+02	3.200E+03	1.000E+02	1.000E+02
Veg Bioaccum:	(None)	2.000E-02	2.500E-04	8.000E-04	1.380E-01
Meat Trans Fact:	day/Kg	2.000E-02	2.000E-02	3.000E-04	5.000E-03
Milk Trans Fact:	day/L	7.000E-03	2.500E-04	2.500E-04	4.000E-03
Water Pur Fact:	(None)	1.000E+00	2.000E-01	9.000E-01	1.000E+00
Dep Velocity:	m/sec	1.000E-03	1.000E-03	1.000E-03	1.000E-03
Atmos Dis Class:	(None)	1	1	1	1
Inh Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ing Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Ref Dose:	mg/(Kg*day)	6.000E-02	8.600E-03	4.300E-04	7.000E-02
Ing Ref Dose:	mg/(Kg*day)	6.000E-02	1.300E+00	1.400E-03	5.000E+01
Inh Tox Uncert	HPI units	10	5	5	10
Ing Tox Uncert	HPI units	5	10	5	10
Phys Prop Uncert	HPI units	3	3	3	3
Tran Fact Uncert	HPI units	3	3	3	3

Toxicity Type 1: Radionuclide carcinogenic inhalation and ingestion
 Toxicity Type 2: Chemical carcinogenic inhalation and ingestion
 Toxicity Type 3: Chemical carcinogenic inhalation, non-carcinogenic ingestion
 Toxicity Type 4: Chemical non-carcinogenic inhalation, carcinogenic ingestion
 Toxicity Type 5: Chemical non-carcinogenic inhalation and ingestion

KEY for Constituent Table
 Constituent 9 = FLUORIDE
 Constituent 10 = IRON
 Constituent 11 = LEAD
 Constituent 12 = MAGNESIUM

Summary of Data from MEPAS Constituent Database (Cont)
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Constituent Parameter	Parameter Units	Constituent 13	Constituent 14	Constituent 15	Constituent 16
ID / CAS #:	(None)	7439976	7447407	7782492	7440224
Toxicity Type:	(None)	5	5	5	5
Mol. Weight:	g/mole	2.010E+02	3.910E+01	7.900E+01	1.080E+02
Vapor Pressure:	mm-Hg	2.000E-03	0.000E+00	0.000E+00	0.000E+00
Henry's Law Con:	atm*m3/mole	1.140E-03	0.000E+00	0.000E+00	0.000E+00
Water Sol:	mg/L	3.000E-02	3.500E+04	0.000E+00	0.000E+00
Carbon Mat Part:	ml/g	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Oct Wat Part:	(None)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1/2-life in AIR:	days	6.900E+07	6.900E+07	6.900E+07	6.900E+07
1/2-life in GW:	days	6.900E+07	6.900E+07	6.900E+07	6.900E+07
1/2-life in SW:	days	6.900E+07	6.900E+07	6.900E+07	6.900E+07
1/2-life in SOIL:	days	6.900E+07	6.900E+07	6.900E+07	6.900E+07
Ing Dose Fact:	1/Kg or rem/pCi	1.430E-02	1.430E-02	1.430E-02	1.430E-02
Inh Dose Fact:	1/Kg or rem/pCi	1.430E-02	1.430E-02	1.430E-02	1.430E-02
Air Imm Fact:	rem*m3/pCi*h	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Soil Exp Fact:	rem*m2/pCi*h	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water Imm Fact:	rem*L/pCi*h	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Fish Bioaccum:	(None)	1.000E+03	1.000E+03	1.700E+02	2.300E+00
Shell Bioaccum:	(None)	2.000E+05	8.300E+02	1.700E+02	7.700E+02
Veg Bioaccum:	(None)	5.000E-02	1.380E-01	6.250E-03	3.250E-04
Meat Trans Fact:	day/Kg	2.500E-01	2.000E-02	1.500E-02	3.000E-03
Milk Trans Fact:	day/L	4.500E-04	7.000E-03	4.000E-03	2.000E-02
Water Pur Fact:	(None)	5.000E-01	9.000E-01	8.000E-01	7.000E-01
Dep Velocity:	m/sec	1.000E-03	1.000E-03	1.000E-03	1.000E-03
Atmos Dis Class:	(None)	1	1	1	1
Inh Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ing Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Ref Dose:	mg/(Kg*day)	8.600E-05	5.100E+02	1.000E-03	5.000E-03
Ing Ref Dose:	mg/(Kg*day)	3.000E-04	5.100E+02	5.000E-03	5.000E-03
Inh Tox Uncert	HPI units	5	25	5	10
Ing Tox Uncert	HPI units	5	20	5	5
Phys Prop Uncert	HPI units	3	3	3	3
Tran Fact Uncert	HPI units	3	3	3	3

 Toxicity Type 1: Radionuclide carcinogenic inhalation and ingestion
 Toxicity Type 2: Chemical carcinogenic inhalation and ingestion
 Toxicity Type 3: Chemical carcinogenic inhalation, non-carcinogenic ingestion
 Toxicity Type 4: Chemical non-carcinogenic inhalation, carcinogenic ingestion
 Toxicity Type 5: Chemical non-carcinogenic inhalation and ingestion

 KEY for Constituent Table
 Constituent 13 = MERCURY
 Constituent 14 = POTASSIUM ION
 Constituent 15 = SELENIUM
 Constituent 16 = SILVER

Summary of Data from MEPAS Constituent Database (Cont)
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Constituent Parameter	Parameter Units	Constituent 17	Constituent 18	Constituent 19	Constituent 20
ID / CAS #:	(None)	7647145	10476854	7440611	7646857
Toxicity Type:	(None)	5	5	5	5
Mol. Weight:	g/mole	2.299E+01	8.762E+01	2.380E+02	6.538E+01
Vapor Pressure:	mm-Hg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Henry's Law Con:	atm*m3/mole	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water Sol:	mg/L	3.600E+04	5.380E+05	0.000E+00	0.000E+00
Carbon Mat Part:	ml/g	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Oct Wat Part:	(None)	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1/2-life in AIR:	days	6.900E+07	6.900E+07	6.900E+07	6.900E+07
1/2-life in GW:	days	6.900E+07	6.900E+07	6.900E+07	6.900E+07
1/2-life in SW:	days	6.900E+07	6.900E+07	6.900E+07	6.900E+07
1/2-life in SOIL:	days	6.900E+07	6.900E+07	6.900E+07	6.900E+07
Ing Dose Fact:	1/Kg or rem/pCi	1.430E-02	1.430E-02	1.430E-02	1.430E-02
Inh Dose Fact:	1/Kg or rem/pCi	1.430E-02	1.430E-02	1.430E-02	1.430E-02
Air Imm Fact:	rem*m3/pCi*h	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Soil Exp Fact:	rem*m2/pCi*h	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water Imm Fact:	rem*L/pCi*h	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Fish Bioaccum:	(None)	1.000E+02	5.000E+01	5.000E+01	2.500E+03
Shell Bioaccum:	(None)	2.000E+02	1.000E+02	6.000E+01	1.000E+04
Veg Bioaccum:	(None)	1.380E-02	2.030E-01	3.500E-03	1.480E-01
Meat Trans Fact:	day/Kg	5.500E-02	3.000E-04	2.000E-04	1.000E-01
Milk Trans Fact:	day/L	3.500E-02	1.500E-03	6.000E-04	1.000E-02
Water Pur Fact:	(None)	9.000E-01	2.000E-01	7.000E-01	4.000E-01
Dep Velocity:	m/sec	1.000E-03	1.000E-03	1.000E-03	1.000E-03
Atmos Dis Class:	(None)	1	1	1	1
Inh Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ing Cancer Pot:	(Kg*day)/mg	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Inh Ref Dose:	mg/(Kg*day)	3.000E+02	1.700E-01	1.400E-03	3.000E-01
Ing Ref Dose:	mg/(Kg*day)	3.000E+02	6.000E-01	1.400E-03	3.000E-01
Inh Tox Uncert	HPI units	15	25	10	10
Ing Tox Uncert	HPI units	10	20	15	10
Phys Prop Uncert	HPI units	3	3	3	3
Tran Fact Uncert	HPI units	3	3	3	3

Toxicity Type 1: Radionuclide carcinogenic inhalation and ingestion
Toxicity Type 2: Chemical carcinogenic inhalation and ingestion
Toxicity Type 3: Chemical carcinogenic inhalation, non-carcinogenic ingestion
Toxicity Type 4: Chemical non-carcinogenic inhalation, carcinogenic ingestion
Toxicity Type 5: Chemical non-carcinogenic inhalation and ingestion

KEY for Constituent Table
Constituent 17 = SODIUM ION
Constituent 18 = STRONTIUM ION
Constituent 19 = URANIUM
Constituent 20 = ZINC COMPOUNDS

USAGE LOCATION DATA FOR SURFACE WATER PATHWAY

Location Parameter	Units	Location 1	Location 2	Location 3	Location 4	Location 5
Drink Index:	(None)	0	0	0	2	2
Drink Pop:	People	0.000E+00	0.000E+00	0.000E+00	4.216E+04	2.034E+04
Rec Index:	(None)	0	0	0	0	0
Rec Pop:	People	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Aquatic Index:	(None)	1	0	0	0	0
FinFish Prod:	Kg/yr	1.500E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Shell Prod:	Kg/yr	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Irr Index:	(None)	0	1	1	0	0
Leaf Veg Prod:	Kg/yr	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Veg Product:	Kg/yr	0.000E+00	1.400E+08	5.800E+05	0.000E+00	0.000E+00
Meat Product:	Kg/yr	0.000E+00	1.200E+06	8.400E+02	0.000E+00	0.000E+00
Milk Product:	L/yr	0.000E+00	2.100E+06	2.800E+04	0.000E+00	0.000E+00
SW Trans Time:	days	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Irr. Rate: L/mo	0.000E+00	1.280E+02	1.280E+02	0.000E+00	0.000E+00
Harvest Time: days	6.000E+01	6.000E+01	3.000E+01	3.000E+01	0.000E+00
Transit Time: days	0.000E+00	0.000E+00	0.000E+00	5.000E-01	5.000E-01
Water Treated:yes/no	No	No	No	Yes	Yes
H2O Ing Rate: L/day	2.000E+00	2.000E+00	2.000E+00	2.000E+00	2.000E+00
Fish Time Delay:days	1.000E+01	1.000E+01	1.000E+01	1.000E+01	1.000E+01
Inv time delay: days	1.000E+01	1.000E+01	1.000E+01	1.000E+01	1.000E+01

=====

Drinking Index ----> 0 = No Drinking or Bathing, 1 = Bathing Only, and
2 = Drinking and Bathing

Recreation Index --> 1 = Swimming Only, 2 = Boating Only,
3 = Shoreline Activities Only, and 4 = All of the Above

Aquatic Index -----> 0 = No Aquatic food, 1 = Aquatic Food

Irrigation Index --> -1 = Animals Drinking Only, 0 = No Farm Production,
1 = Crops and Animals [Feed and Water], and
2 = Crops and Animals Feed Only

=====

KEY for Usage Location in Table

Usage Location 1 = Aquatic Foods

Usage Location 2 = Benton Co.

Usage Location 3 = Franklin Co.

Usage Location 4 = Kennewick

Usage Location 5 = Pasco

USAGE LOCATION DATA FOR SURFACE WATER PATHWAY

Location Parameter	Units	Location 6	Location 7	Location 8
Drink Index: (None)		2	2	0
Drink Pop: People		1.000E+00	3.232E+04	0.000E+00
Rec Index: (None)		4	4	0
Rec Pop: People		1.000E+00	3.330E+05	0.000E+00
Aquatic Index:(None)		0	0	0
FinFish Prod: Kg/yr		0.000E+00	0.000E+00	0.000E+00
Shell Prod: Kg/yr		0.000E+00	0.000E+00	0.000E+00
Irr Index: (None)		0	0	1
Leaf Veg Prod:Kg/yr		0.000E+00	0.000E+00	1.600E+05
Veg Product: Kg/yr		0.000E+00	0.000E+00	8.300E+06
Meat Product: Kg/yr		0.000E+00	0.000E+00	1.800E+05
Milk Product: L/yr		0.000E+00	0.000E+00	2.800E+05
SW Trans Time:days		0.000E+00	0.000E+00	0.000E+00
Irr. Rate: L/mo		0.000E+00	0.000E+00	1.280E+02
Harvest Time: days		0.000E+00	0.000E+00	0.000E+00
Transit Time: days		5.000E-01	5.000E-01	0.000E+00
Water Treated:yes/no		Yes	Yes	No
H2O Ing Rate: L/day		2.000E+00	2.000E+00	2.000E+00
Fish Time Delay:days		1.000E+01	1.000E+01	1.000E+01
Inv time delay: days		1.000E+01	1.000E+01	1.000E+01

=====

Drinking Index ----> 0 = No Drinking or Bathing, 1 = Bathing Only, and
2 = Drinking and Bathing

Recreation Index --> 1 = Swimming Only, 2 = Boating Only,
3 = Shoreline Activities Only, and 4 = All of the Above

Aquatic Index -----> 0 = No Aquatic food, 1 = Aquatic Food

Irrigation Index --> -1 = Animals Drinking Only, 0 = No Farm Production,
1 = Crops and Animals [Feed and Water], and
2 = Crops and Animals Feed Only

=====

KEY for Usage Location in Table

Usage Location 6 = Restricted

Usage Location 7 = Richland

Usage Location 8 = Walla Walla Co.

Population Health Effects By Pollutant Table

Pollutant	Health Effects, Unweighted	Weighted
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#	Type	Inhalation	Ingestion	Total	Inhalation	Ingestion	Total
1	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	2	0.00E+00	1.56E-02	1.56E-02	0.00E+00	3.94E-05	3.94E-05
3	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	2	9.80E-05	1.49E-05	1.13E-04	9.80E-05	1.49E-05	1.13E-04
7	3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
18	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Population Health Effects Summary Table
Summary Results

	Unweighted	Weighted
Radiation dose (person-rem):	0.00E+00	0.00E+00
Chemical cancer incidence:	1.57E-02	1.52E-04
Radiation cancer incidence:	0.00E+00	0.00E+00
Total cancer incidence:	1.57E-02	1.52E-04
Radiation cancer fatalities:	0.00E+00	0.00E+00
Radiation cancer hereditary:	0.00E+00	0.00E+00

HPI Values by Usage Location for the SURFACE WATER Transport Pathway

Usage Location	1	2	Constituent 3	4	5
Aquatic Foods	-250.00	-5.59	-52.87	-63.22	-1.20
Benton Co.	-250.00	14.46	-35.49	-9.44	19.40
Franklin Co.	-250.00	-9.37	-59.26	-33.17	-4.34
Kennewick	-250.00	6.02	-42.65	-23.49	6.88
Pasco	-250.00	2.86	-45.81	-26.66	3.72
Restricted	-250.00	-42.92	-91.58	-72.44	-42.03
Richland	-250.00	4.98	-43.61	-24.58	6.09
Walla Walla Co.	-250.00	2.94	-47.05	-21.44	7.56
Total for Constituent	-250.00	15.95	-33.64	-8.81	20.22

Usage Location	6	7	Constituent 8	9	10
Aquatic Foods	-20.97	36.79	-33.44	-23.91	-60.78
Benton Co.	9.64	53.91	-5.36	8.72	-53.79
Franklin Co.	-14.19	30.31	-29.12	-14.51	-77.69
Kennewick	16.58	47.92	-19.48	-.76	-67.55
Pasco	13.41	44.75	-22.65	-3.93	-70.72
Restricted	-32.37	-.83	-68.42	-49.71	-116.47
Richland	15.52	48.51	-20.52	-1.85	-68.31
Walla Walla Co.	-2.23	42.53	-17.24	-2.64	-65.12
Total for Constituent	20.53	56.36	-4.72	9.97	-52.41

HPI Values by Usage Location for the SURFACE WATER Transport Pathway (Cont)

Usage Location	Constituent				
	11	12	13	14	15
Aquatic Foods	-51.90	-197.43	-33.97	-48.05	-24.23
Benton Co.	-31.95	-166.69	-18.81	-30.24	-5.46
Franklin Co.	-55.73	-190.39	-43.26	-53.87	-28.81
Kennewick	-39.21	-181.26	-33.42	-45.36	-14.18
Pasco	-42.37	-184.43	-36.59	-48.52	-17.35
Restricted	-88.15	-230.16	-82.30	-94.31	-63.10
Richland	-40.30	-182.33	-33.87	-46.45	-15.00
Walla Walla Co.	-43.45	-178.67	-29.85	-42.12	-16.75
Total for Constituent	-30.16	-166.09	-18.03	-29.61	-3.99

Usage Location	Constituent				
	16	17	18	19	20
Aquatic Foods	-73.81	-50.65	-69.93	-16.11	-18.65
Benton Co.	-36.11	-27.19	-37.81	7.28	-4.36
Franklin Co.	-57.83	-48.87	-61.59	-16.45	-28.05
Kennewick	-45.73	-37.96	-60.74	-1.33	-23.45
Pasco	-48.89	-41.12	-63.91	-4.50	-26.62
Restricted	-94.65	-86.90	-109.66	-50.25	-72.39
Richland	-46.64	-39.04	-61.58	-2.14	-24.45
Walla Walla Co.	-46.63	-37.59	-49.89	-4.26	-16.00
Total for Constituent	-34.82	-26.08	-37.48	8.73	-3.79

--- Constituent Names ---

Constituent 11 = LEAD
 Constituent 13 = MERCURY
 Constituent 15 = SELENIUM
 Constituent 17 = SODIUM ION
 Constituent 19 = URANIUM
 12 = MAGNESIUM
 14 = POTASSIUM ION
 16 = SILVER
 18 = STRONTIUM ION
 20 = ZINC COMPOUNDS

Summary of Hazard Potential Index (HPI) Values For Run		
Constituent Name	HPI	
ALUMINUM	-250.00	
ARSENIC	15.95	
BARIUM	-33.64	
BORON	-8.81	
CADMIUM	20.22	
CHLOROFORM	20.53	
CHROMIUM VI	56.36	
COPPER	-4.72	
FLUORIDE	9.97	
IRON	-52.41	
LEAD	-30.16	
MAGNESIUM	-166.09	
MERCURY	-18.03	
POTASSIUM ION	-29.61	
SELENIUM	-3.99	
SILVER	-34.82	
SODIUM ION	-26.08	
STRONTIUM ION	-37.48	
URANIUM	8.73	
ZINC COMPOUNDS	-3.79	

Maximum Individual Results by Pollutant

Pollutant #	Type	Unweighted Results			Time Weighted Results		
		Total	Inhalation	Ingestion	Total	Inhalation	Ingestion
1	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	2	6.49E-09	0.00E+00	6.49E-09	4.51E-11	0.00E+00	4.51E-11

3	5	8.60E-07	0.00E+00	8.60E-07	5.18E-10	0.00E+00	5.18E-10
4	5	3.91E-07	0.00E+00	3.91E-07	3.91E-07	0.00E+00	3.91E-07
5	3	N/A	0.00E+00	7.84E-03	N/A	0.00E+00	9.65E-05
6	2	1.10E-09	1.03E-09	7.04E-11	1.10E-09	1.03E-09	7.04E-11
7	3	N/A	0.00E+00	3.64E+00	N/A	0.00E+00	3.64E+00
8	5	1.67E-06	0.00E+00	1.67E-06	6.15E-07	0.00E+00	6.15E-07
9	5	7.97E-05	0.00E+00	7.97E-05	7.97E-05	0.00E+00	7.97E-05
10	5	4.47E-08	0.00E+00	4.47E-08	2.69E-11	0.00E+00	2.69E-11
11	5	1.72E-06	0.00E+00	1.72E-06	1.03E-09	0.00E+00	1.03E-09
12	5	3.79E-12	0.00E+00	3.79E-12	8.63E-24	0.00E+00	8.63E-24
13	5	4.47E-06	0.00E+00	4.47E-06	5.50E-08	0.00E+00	5.50E-08
14	5	6.88E-09	0.00E+00	6.88E-09	6.88E-09	0.00E+00	6.88E-09
15	5	3.69E-06	0.00E+00	3.69E-06	3.69E-06	0.00E+00	3.69E-06
16	5	1.36E-06	0.00E+00	1.36E-06	8.19E-10	0.00E+00	8.19E-10
17	5	4.60E-08	0.00E+00	4.60E-08	4.60E-08	0.00E+00	4.60E-08
18	5	1.93E-08	0.00E+00	1.93E-08	6.92E-11	0.00E+00	6.92E-11
19	5	4.19E-05	0.00E+00	4.19E-05	4.19E-05	0.00E+00	4.19E-05
20	5	2.44E-05	0.00E+00	2.44E-05	1.38E-06	0.00E+00	1.38E-06

Final Result Parameter	Total
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Radiation Results, Time Weighted

MIR Fatal Cancer	0.00E+00
MIR Cancer Incidence	0.00E+00
MIR Hereditary Effects	0.00E+00
MEI radiation dose (rem)	0.00E+00

Radiation Results, Unweighted

MIR Fatal Cancer	0.00E+00
MIR Cancer Incidence	0.00E+00
MIR Hereditary Effects	0.00E+00
MEI radiation dose (rem)	0.00E+00

Chemical Cancer Effects, Time Weighted

MIR Cancer Incidence	1.15E-09
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Chemical Cancer Effects, Unweighted

MIR Cancer Incidence	7.60E-09
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Chemical Non-Cancer Effects, Time Weighted

MI Hazard Index	3.64E+00
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Chemical Non-Cancer Effects, Unweighted

MI Hazard Index	3.65E+00
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Total cancer effects, radiation + chemicals, Time Weighted

MIR fatal cancers	0.00E+00
MIR Cancer Incidence	1.15E-09
MIR Hereditary Effects	0.00E+00

Total cancer effects, radiation + chemicals, Unweighted

MIR fatal cancers	0.00E+00
MIR Cancer Incidence	7.60E-09
MIR Hereditary Effects	0.00E+00

Maximum Individual Risk Values/RfD Ratios

[ALUMINUM

]

[ARSENIC

]

Exposure Route	Time Weighted		Non-Time Weighted		Time Weighted		Non-Time Weighted	
	RfD Ratio	Time Per.	RfD Ratio	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INGESTION/DERMAL								
Drinking Water	0.00E+00	0	0.00E+00	0	1.77E-11	6	2.54E-09	13
Finfish	0.00E+00	0	0.00E+00	0	8.12E-12	6	1.17E-09	13
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	0.00E+00	0	0.00E+00	0	1.05E-11	6	1.52E-09	13
Other Vegetables	0.00E+00	0	0.00E+00	0	7.01E-12	6	1.01E-09	13
Meat	0.00E+00	0	0.00E+00	0	1.39E-12	6	2.00E-10	13
Milk	0.00E+00	0	0.00E+00	0	3.08E-13	6	4.44E-11	13
Swimming	0.00E+00	0	0.00E+00	0	4.27E-14	6	6.15E-12	13
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
EXTERNAL RADIATION								
Boating	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Shoreline	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[BARIUM]		[BORON]	
	Time Weighted	Non-Time Weighted	Time Weighted	Non-Time Weighted
INGESTION/DERMAL				
Drinking Water	2.14E-10	7	3.55E-07	21
Finfish	1.36E-10	7	2.25E-07	21
Shellfish	0.00E+00	0	0.00E+00	0
Leafy Vegetables	8.86E-11	7	1.47E-07	21
Other Vegetables	6.31E-11	7	1.05E-07	21
Meat	8.81E-13	7	1.46E-09	21
Milk	1.50E-11	7	2.50E-08	21
Swimming	9.48E-13	7	1.57E-09	21
Soil Ingestion	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0
INHALATION				

Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
EXTERNAL RADIATION								
Boating	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Shoreline	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, Rfd VALUES are used [dose/Rfd]

Maximum Individual Risk Values/Rfd Ratios (Cont)

Exposure Route	[CADMIUM]				[CHLOROFORM]			
	Time Weighted	Non-Time Weighted			Time Weighted	Non-Time Weighted		
	Rfd Ratio	Time Per.	Rfd Ratio	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
INGESTION/DERMAL								
Drinking Water	2.30E-05	6	1.87E-03	11	4.43E-11	1	4.43E-11	1
Finfish	2.39E-05	6	1.94E-03	11	1.27E-12	1	1.27E-12	1
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	1.75E-05	6	1.43E-03	11	9.92E-12	1	9.92E-12	1
Other Vegetables	2.33E-05	6	1.90E-03	11	1.25E-11	1	1.25E-11	1
Meat	6.84E-07	6	5.56E-05	11	1.88E-15	1	1.88E-15	1
Milk	7.77E-06	6	6.31E-04	11	3.36E-15	1	3.36E-15	1
Swimming	1.91E-07	6	1.56E-05	11	2.44E-12	1	2.44E-12	1
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	1.03E-09	1	1.03E-09	1
EXTERNAL RADIATION								
Boating	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Shoreline	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, Rfd VALUES are used [dose/Rfd]

Maximum Individual Risk Values/Rfd Ratios (Cont)

[CHROMIUM VI]				[COPPER]			
Time	Non-Time			Time	Non-Time		

Exposure Route	Weighted		Weighted		Weighted		Weighted	
	RfD Ratio	Time Per.	RfD Ratio	Time Per.	RfD Ratio	Time Per.	RfD Ratio	Time Per.
INGESTION/DERMAL								
Drinking Water	1.47E+00	1	1.47E+00	1	1.30E-07	2	3.52E-07	3
Finfish	7.55E-01	1	7.55E-01	1	3.48E-08	2	9.44E-08	3
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	4.89E-01	1	4.89E-01	1	1.11E-07	2	3.00E-07	3
Other Vegetables	3.22E-01	1	3.22E-01	1	1.89E-07	2	5.12E-07	3
Meat	1.77E-01	1	1.77E-01	1	8.14E-08	2	2.21E-07	3
Milk	3.58E-01	1	3.58E-01	1	6.91E-08	2	1.88E-07	3
Swimming	7.04E-02	1	7.04E-02	1	3.52E-10	2	9.54E-10	3
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
EXTERNAL RADIATION								
Boating	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Shoreline	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used.
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[FLUORIDE]		[IRON]	
	Time Weighted	Non-Time Weighted	Time Weighted	Non-Time Weighted
INGESTION/DERMAL				
Drinking Water	RfD Ratio	Time Per.	RfD Ratio	Time Per.
Finfish	1.99E-05	1	1.99E-05	1
Shellfish	6.43E-07	1	6.43E-07	1
Leafy Vegetables	0.00E+00	0	0.00E+00	0
Other Vegetables	8.90E-06	1	8.90E-06	1
Meat	9.15E-06	1	9.15E-06	1
Milk	1.22E-05	1	1.22E-05	1
Swimming	2.89E-05	1	2.89E-05	1
Soil Ingestion	3.12E-08	1	3.12E-08	1
Special Foods	0.00E+00	0	0.00E+00	0
INHALATION				
Inhalation	0.00E+00	0	0.00E+00	0

Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
EXTERNAL RADIATION								
Boating	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Shoreline	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)

	[LEAD]				[MAGNESIUM]			
	Time Weighted		Non-Time Weighted		Time Weighted		Non-Time Weighted	
Exposure Route	RfD Ratio	Time Per.	RfD Ratio	Time Per.	RfD Ratio	Time Per.	RfD Ratio	Time Per.
INGESTION/DERMAL								
Drinking Water	4.72E-10	7	7.83E-07	21	1.90E-24	24	8.33E-13	100
Finfish	1.69E-10	7	2.81E-07	21	3.05E-25	24	1.34E-13	100
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	2.19E-10	7	3.64E-07	21	1.19E-24	24	5.23E-13	100
Other Vegetables	1.43E-10	7	2.37E-07	21	3.05E-24	24	1.34E-12	100
Meat	4.33E-12	7	7.19E-09	21	4.76E-25	24	2.09E-13	100
Milk	2.68E-11	7	4.45E-08	21	1.71E-24	24	7.50E-13	100
Swimming	6.53E-13	7	1.08E-09	21	0.00E+00	0	1.57E-15	100
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
EXTERNAL RADIATION								
Boating	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Shoreline	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)

	[MERCURY]		[POTASSIUM ION]	
	Time		Time	
	Non-Time		Non-Time	

Exposure Route	Weighted		Weighted		Weighted		Weighted	
	RfD Ratio	Time Per.	RfD Ratio	Time Per.	RfD Ratio	Time Per.	RfD Ratio	Time Per.
INGESTION/DERMAL								
Drinking Water	2.15E-09	6	1.75E-07	11	6.91E-10	1	6.91E-10	1
Finfish	1.26E-08	6	1.03E-06	11	2.48E-09	1	2.48E-09	1
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	1.93E-09	6	1.57E-07	11	4.83E-10	1	4.83E-10	1
Other Vegetables	2.95E-09	6	2.40E-07	11	1.24E-09	1	1.24E-09	1
Meat	3.49E-08	6	2.84E-06	11	7.73E-10	1	7.73E-10	1
Milk	3.73E-10	6	3.03E-08	11	1.21E-09	1	1.21E-09	1
Swimming	3.69E-11	6	3.00E-09	11	9.66E-13	1	9.66E-13	1
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
EXTERNAL RADIATION								
Boating	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Shoreline	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[SELENIUM]				[SILVER]			
	Time Weighted	Non-Time Weighted	Time Weighted	Non-Time Weighted	Time Weighted	Non-Time Weighted	Time Weighted	Non-Time Weighted
INGESTION/DERMAL								
Drinking Water	9.05E-07	1	9.05E-07	1	1.05E-10	7	1.75E-07	21
Finfish	5.98E-07	1	5.98E-07	1	1.09E-12	7	1.81E-09	21
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	4.64E-07	1	4.64E-07	1	6.12E-11	7	1.02E-07	21
Other Vegetables	3.54E-07	1	3.54E-07	1	3.93E-11	7	6.52E-08	21
Meat	4.64E-07	1	4.64E-07	1	1.21E-11	7	2.01E-08	21
Milk	8.94E-07	1	8.94E-07	1	6.00E-10	7	9.96E-07	21
Swimming	7.07E-09	1	7.07E-09	1	5.87E-13	7	9.74E-10	21
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
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	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
EXTERNAL RADIATION								
Boating	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Shoreline	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)

Exposure Route	[SODIUM ION]				[STRONTIUM ION]			
	Time Weighted	Non-Time Weighted			Time Weighted	Non-Time Weighted		
	RfD Ratio	Time Per.	RfD Ratio	Time Per.	RfD Ratio	Time Per.	RfD Ratio	Time Per.
INGESTION/DERMAL								
Drinking Water	3.80E-09	1	3.80E-09	1	3.74E-12	7	1.04E-09	15
Finfish	1.36E-09	1	1.36E-09	1	3.01E-12	7	8.39E-10	15
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	1.85E-09	1	1.85E-09	1	1.36E-11	7	3.79E-09	15
Other Vegetables	1.68E-09	1	1.68E-09	1	4.19E-11	7	1.17E-08	15
Meat	6.88E-09	1	6.88E-09	1	3.41E-13	7	9.52E-11	15
Milk	3.04E-08	1	3.04E-08	1	6.58E-12	7	1.84E-09	15
Swimming	6.46E-12	1	6.46E-12	1	2.71E-14	7	7.56E-12	15
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
	RfD Ratio	Time Per.	RfD Ratio	Time Per.	RfD Ratio	Time Per.	RfD Ratio	Time Per.
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.	Risk Value	Time Per.
EXTERNAL RADIATION								
Boating	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Shoreline	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

For radionuclides and carcinogenic chemicals, RISK VALUES are used
For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

Maximum Individual Risk Values/RfD Ratios (Cont)

[URANIUM]		[ZINC COMPOUNDS]	
Time	Non-Time	Time	Non-Time

Exposure Route	Weighted		Weighted		Weighted		Weighted	
	RfD Ratio	Time Per.	RfD Ratio	Time Per.	RfD Ratio	Time Per.	RfD Ratio	Time Per.
INGESTION/DERMAL								
Drinking Water	1.75E-05	1	1.75E-05	1	3.03E-08	4	5.34E-07	7
Finfish	3.88E-06	1	3.88E-06	1	6.10E-07	4	1.08E-05	7
Shellfish	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Leafy Vegetables	1.01E-05	1	1.01E-05	1	4.87E-08	4	8.60E-07	7
Other Vegetables	7.17E-06	1	7.17E-06	1	1.29E-07	4	2.28E-06	7
Meat	1.34E-07	1	1.34E-07	1	3.93E-07	4	6.93E-06	7
Milk	2.95E-06	1	2.95E-06	1	1.72E-07	4	3.03E-06	7
Swimming	1.40E-07	1	1.40E-07	1	1.05E-10	4	1.86E-09	7
Soil Ingestion	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Special Foods	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
INHALATION								
Inhalation	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Showering	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
EXTERNAL RADIATION								
Boating	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Shoreline	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0
Ground	0.00E+00	0	0.00E+00	0	0.00E+00	0	0.00E+00	0

 For radionuclides and carcinogenic chemicals, RISK VALUES are used
 For non-carcinogenic chemicals, RfD VALUES are used [dose/RfD]

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Run Title: SNF-EIS 200 East Are --- TEDF088 .HIM

Run Date and Time: 11/22/1993 19: 2:28

Constituent Database: UPDATED March 25, 1993 DLS/PEIS

Water Data File: DOE Ha --- TEDF088 .WAT

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