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September 2002

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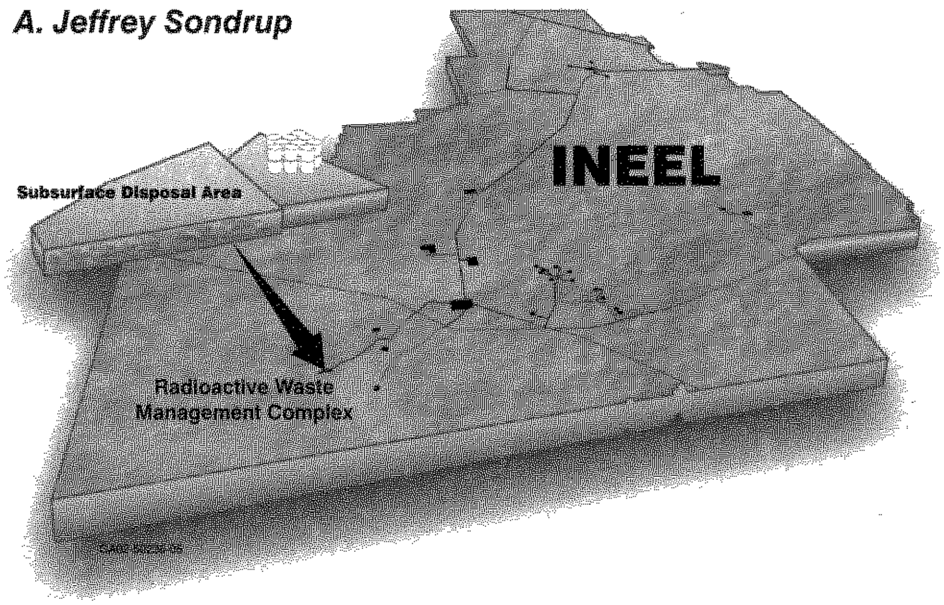

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ABSTRACT

The Subsurface Disposal Area is a radioactive waste landfill located at the Radioactive Waste Management Complex at the Idaho National Engineering and Environmental Laboratory in southeastern Idaho. Contaminants in the landfill include hazardous chemicals, remote-handled fission and activation products, and transuranic radionuclides. The Ancillary Basis for Risk Analysis was prepared to support the future comprehensive remedial investigation/feasibility study within the framework of the Comprehensive Environmental Response, Compensation, and Liability Act as implemented in the Federal Facility Agreement and Consent Order between the U.S. Department of Energy, the Idaho Department of Environmental Quality, and the U.S. Environmental Protection Agency.

Estimated cumulative human health and ecological risks associated with the Subsurface Disposal Area are presented in this Ancillary Basis for Risk Analysis. Based on risk analysis described in this document, 12 radionuclides and four chemical contaminants are identified as human health contaminants of concern: Am-241, C-14, I-129, Nb-94, Np-237, Sr-90, Tc-99, U-233, U-234, U-235, U-236, U-238, carbon tetrachloride, methylene chloride, nitrates, and tetrachloroethylene. In addition, Pu-238, Pu-239, and Pu-240 were classified as special case contaminants of concern to acknowledge uncertainties about plutonium mobility in the environment and to reassure stakeholders that risk management decisions for the SDA will be fully protective of the Snake River Plain Aquifer. Ecological risk assessment identified four radionuclides and three chemical contaminants of concern: Am-241, Pu-239, Pu-240, Sr-90, cadmium, lead, and nitrates.

The conclusion of this report is that the Subsurface Disposal Area poses unacceptable long-term risk to human health and the environment.

EXECUTIVE SUMMARY

The Subsurface Disposal Area is a radioactive waste landfill located at the Idaho National Engineering and Environmental Laboratory (INEEL) Radioactive Waste Management Complex (RWMC) in southeastern Idaho. Contaminants in the landfill include hazardous chemicals, remote-handled fission and activation products, and transuranic radionuclides. The Ancillary Basis for Risk Analysis was prepared to support the future comprehensive remedial investigation/feasibility study (RI/FS) for the RWMC, which will be developed within the framework of the Comprehensive Environmental Response, Compensation, and Liability Act as implemented in the Federal Facility Agreement and Consent Order between the U.S. Department of Energy, the Idaho Department of Environmental Quality, and the U.S. Environmental Protection Agency.

Estimates of cumulative human health and ecological risks associated with the Subsurface Disposal Area are presented in this Ancillary Basis for Risk Analysis. Twelve radionuclides and four chemical contaminants are identified as human health contaminants of concern: Am-241, C-14, I-129, Nb-94, Np-237, Sr-90, Tc-99, U-233, U-234, U-235, U-236, U-238, carbon tetrachloride, methylene chloride, nitrates, and tetrachloroethylene. In addition, Pu-238, Pu-239, and Pu-240 are classified as special case contaminants of concern to acknowledge uncertainties about plutonium mobility in the environment and to reassure stakeholders that risk management decisions for the Subsurface Disposal Area will be fully protective. In the ecological risk assessment described in this document, four radionuclides and three chemicals were identified as ecological contaminants of concern: Am-241, Pu-239, Pu-240, Sr-90, cadmium, lead, and nitrates.

Site evaluation typically is an iterative process, with each iteration providing an increasingly refined assessment. This study is a continuation and update of the 1998 *Interim Risk Assessment and Contaminant Screening for the Waste Area Group 7 Remedial Investigation*. Much of the information in this document was taken from the Interim Risk Assessment and updated to reflect additional information developed over the past few years. The setting for analysis, nature and extent of environmental contamination associated with the site, modeling to estimate media concentrations over time, and baseline risk assessment are summarized below.

Historical and Physical Setting

The INEEL is located in southeastern Idaho and occupies 2,305 km^2 (890 mi^2) in the northeastern region of the Snake River Plain. Regionally, the INEEL is nearest to the cities of Idaho Falls and Pocatello and to U.S. Interstate Highways I-15 and I-86. The INEEL Site extends nearly 63 km (39 mi) from north to south, is about 58 km (36 mi) wide in its broadest southern portion, and occupies parts of five southeast Idaho counties. Public highways (i.e., U.S. 20 and 26 and Idaho 22, 28, and 33) within the INEEL boundary and the Experimental Breeder Reactor I, which is a national historic landmark, are accessible without restriction. Otherwise, access to the INEEL is controlled.

Neighboring lands are used primarily for farming or grazing, or are in the public domain (e.g., national forests and state-owned land). Various programs at the INEEL are conducted under supervision of three U.S. Department of Energy offices: the U.S. Department of Energy Idaho Operations Office, the Pittsburgh Naval Reactors Office, and the Chicago Operations Office. With overall responsibility for the INEEL Laboratory, the U.S. Department of Energy Idaho Operations Office selects and authorizes government contractors to operate at the Site. The Site provides a variety of programmatic and support services related to nuclear reactor design and development, nonnuclear energy development, materials testing and evaluation, operational safety, radioactive waste management, and environmental restoration. Spent nuclear fuel management, hazardous and mixed waste management and minimization, cultural resources preservation, environmental engineering, protection, and remediation, and long-term stewardship are challenges addressed by current INEEL activities. The laboratory's future mission, delivering science-based solutions to current challenges of DOE, other federal agencies, and industrial clients, encompasses four areas: environmental quality, energy resources, national security, and science.

The Radioactive Waste Management Complex, located in the southwestern quadrant of the INEEL, encompasses a total of 72 ha (177 acres) and is divided into three separate areas by function: the Subsurface Disposal Area, the Transuranic Storage Area, and the administration and operations area. The original landfill, established in 1952, covered 5.2 ha (13 acres) and was used for shallow land disposal of solid radioactive waste. In 1958, the landfill was expanded to 35.6 ha (88 acres). Relocating the security fence in 1988 to outside the dike surrounding the landfill established the current size of the Subsurface Disposal Area as 39 ha (97 acres). The Transuranic Storage Area was added to the Radioactive Waste Management Complex in 1970. Located adjacent to the east side of the Subsurface Disposal Area, the Transuranic Storage Area encompasses 23 ha (58 acres) and is used to store, prepare, and ship retrievable transuranic waste to the Waste Isolation Pilot Plant. The 9-ha (22-acre) administration and operations area at the Radioactive Waste Management Complex includes administrative offices, maintenance buildings, equipment storage, and miscellaneous support facilities.

Waste acceptance criteria and record-keeping protocols for the Subsurface Disposal Area have changed over time in keeping with waste management technology and legal requirements. Today's requirements are much more stringent as a consequence of knowledge developed over the past several decades about potential environmental impacts of waste management techniques. In the past, however, shallow landfill disposal of radioactive and hazardous waste was the technology of choice. At the Subsurface Disposal Area, transuranic and mixed waste, mostly from the Rocky Flats Plant in Colorado, were disposed of through 1970. Mixed waste containing hazardous chemical and radioactive contaminants was accepted through 1984. Since 1985 waste disposals in the Subsurface Disposal Area have been limited to low-level radioactive waste from INEEL waste generators. Waste is buried in pits, trenches, and soil vaults, as illustrated in Figure E-1.

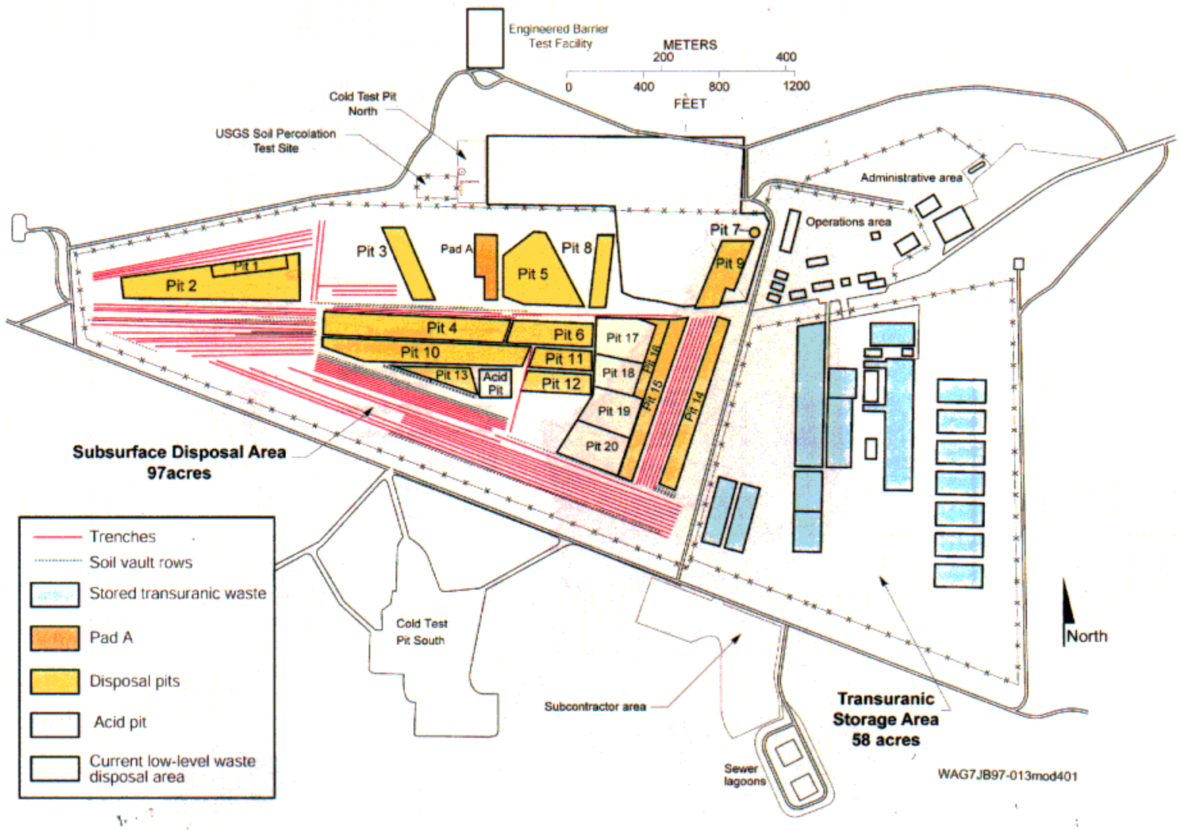

Figure E-1. Layout of the Radioactive Waste Management Complex and pits, trenches, and soil vaults in the Subsurface Disposal Area.

The INEEL region is classified as arid to semiarid because of the low average rainfall of 22.1 cm/year (8.7 in./year). The Radioactive Waste Management Complex is located within a natural topographic depression with no permanent surface water features. However, the local depression tends to hold precipitation and to collect additional runoff from surrounding slopes. Surface water either eventually evaporates or infiltrates into the vadose zone (i.e., unsaturated subsurface) and the underlying aquifer.

The crescent-shaped Snake River Plain Aquifer underlies the eastern portion of the Snake River Plain. The aquifer is bounded on the north and south by the edge of the Snake River Plain, on the west by surface discharge into the Snake River near Twin Falls, Idaho, and on the northeast by the Yellowstone basin. Consisting of a series of water-saturated basalt layers and sediment, the aquifer underlies the Radioactive Waste Management Complex at an approximate depth of 177 m (580 ft), and flows generally from the northeast to the southwest. Figure E-2 illustrates the location of the INEEL relative to the aquifer.

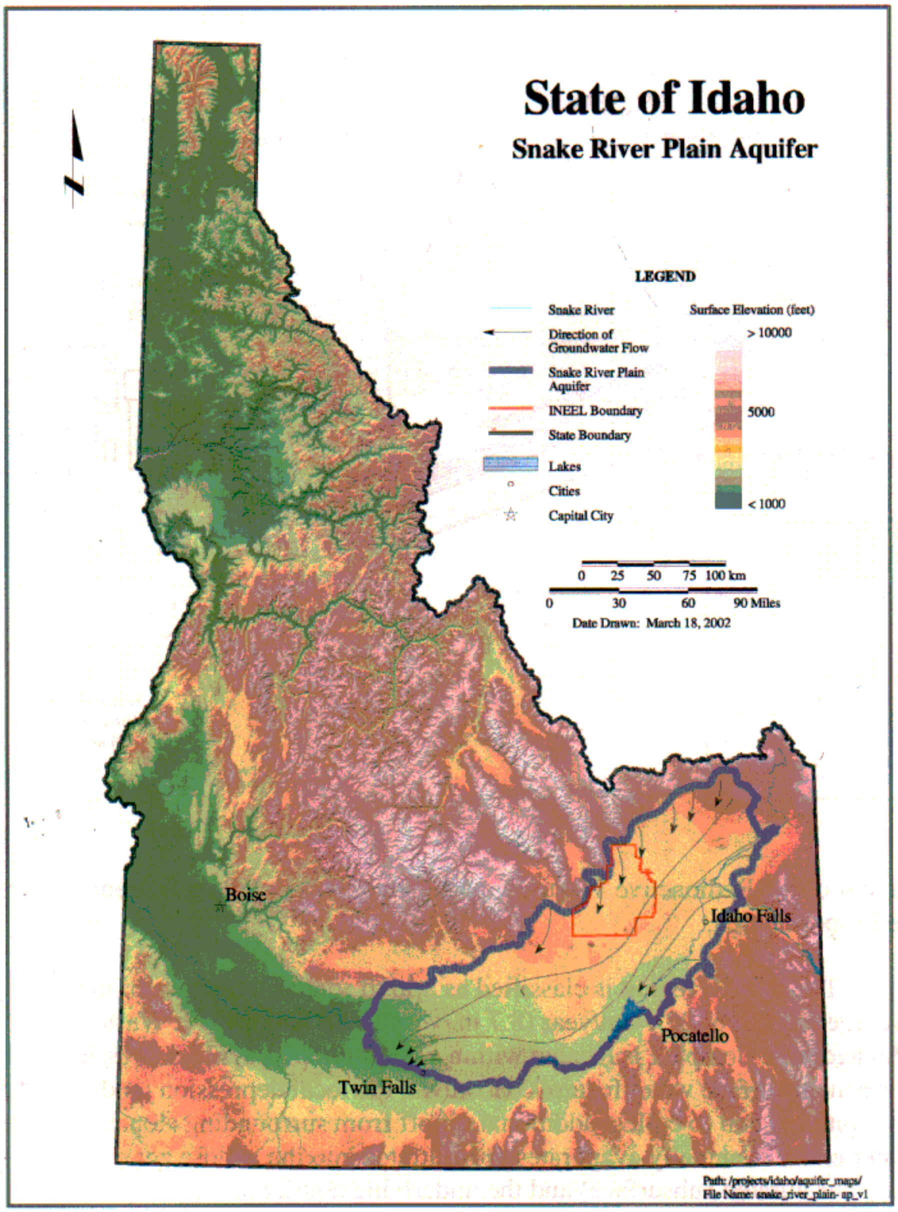

Figure E-2. Location of the Idaho National Engineering and Environmental Laboratory relative to the Snake River Plain Aquifer.

The regional subsurface consists mostly of layered basalt flows with a few comparatively thin layers of sedimentary deposits. Layers of sediment, referred to as interbeds, tend to retard infiltration to the aquifer and are important features in assessing the fate and transport of contaminants. In the 177-m (580-ft) interval from the surface to the aquifer, three major interbeds are of particular importance. Using nomenclature established by the U.S. Geological Survey, these sedimentary layers are referred to as the A-B, B-C, and C-D interbeds.

Nature and Extent of Contamination

The nature and extent of contamination associated with the Subsurface Disposal Area in all environmental media were evaluated in the Operable Unit 7-13/14 remedial investigation. The human health contaminant screening in the Interim Risk Assessment and the ecological contaminant screening in the *Review of Waste Area Group 7 Ecological Contaminants of Potential Concern* document were used to define contaminants for analysis. The final human health list of contaminants of potential concern contained 20 radionuclides and four chemical contaminants. Many of these contaminants are ecological contaminants of potential concern.

In addition to routine monitoring at the Radioactive Waste Management Complex, several unique approaches were adopted to characterize the nature and extent of contamination. To describe the waste zone, a database containing contaminant inventories and waste descriptions was developed. A second database was created to map characterization data and disposal locations in the Subsurface Disposal Area. Called WasteOScope, the mapping software is based on historical disposal records including shipping manifests and trailer load lists. In addition, electromagnetic and soil gas surveys were evaluated against waste zone maps. More than 300 probes were installed to characterize buried waste using instruments developed at the INEEL. Data from surveys and probes were incorporated into WasteOScope to allow visually superimposing various data sets. A new type of tensiometer, referred to as the advanced tensiometer, also was developed at the INEEL to allow deeper tensiometer monitoring in the vadose zone.

The evaluation of nature and extent considered depth intervals as follows: the waste zone, the interval excluding the waste zone and extending from the surface to 11 m (35 ft), from 11 to 43 m (35 to 140 ft), from 43 to 77 m (140 ft to 250 ft), and depths greater than 77 m (250 ft). These intervals were defined to reflect the regions bounded by the A-B, B-C, and C-D interbeds.

Contaminants of potential concern have been detected at low concentrations in the vadose zone and may be migrating toward the aquifer. Most vadose zone detections are in the 0 to 11-m (0 to 35-ft) and 11 to 43-m (35 to 140-ft) intervals above the B-C interbed, with some contaminants detected in deeper intervals. The most frequently detected contaminants in the environment include nitrates, carbon tetrachloride, C-14, Tc-99, and uranium isotopes. Other contaminants including Am-241, I-129, Pu-238, and Pu-239/240 have been detected sporadically at concentrations near the detection limits. Carbon tetrachloride has been detected down to the aquifer, though concentrations decrease significantly below the B-C interbed and again below the C-D interbed. Because carbon tetrachloride migrates in the gaseous phase, it also has been detected hundreds of meters laterally away from buried waste.

A conclusion of the evaluation of the nature and extent of contamination is that low concentrations of carbon tetrachloride, nitrates, and C-14 have been detected in the Snake River Plain Aquifer near the Subsurface Disposal Area. Carbon tetrachloride has been measured slightly above the maximum contaminant level. Low concentrations of nitrate and C-14, well below maximum contaminant levels, also have been detected in the region and may be increasing. The Subsurface Disposal Area is the obvious source of the carbon tetrachloride, but the source of the nitrate and C-14 is not as clear.

The monitoring network at the Radioactive Waste Management Complex has been greatly expanded since 1998 with 22 additional vadose zone lysimeters, four upgradient aquifer wells, an aquifer well inside the Subsurface Disposal Area, and more than 300 probes in the buried waste. Most of these new installations have not been operational long enough to provide substantial quantities of data. The expanded network will continue to produce data for continued evaluation of source release into the vadose zone, contaminant migration through the vadose zone, and potential impacts to the aquifer beneath the Subsurface Disposal Area. Monitoring data will also support future remediation by providing a baseline for remediation goals.

Contaminant Fate and Transport

Modeling was conducted to simulate release and migration of contaminants from waste buried in the Subsurface Disposal Area and to estimate future contaminant concentrations in environmental media. Models implemented were essentially the same as those used in the Interim Risk Assessment with some improvements to incorporate additional data. Several sensitivity cases were modeled to evaluate effects of variations in several parameters of interest on estimated media concentrations and risk.

Complete exposure pathways defined by the conceptual site model formed the basis for three types of simulations: source release, subsurface transport, and biotic transport. The persistence of contaminants in the environment was evaluated based on contaminant mobility controlled by dissolved-phase transport and biotic transfer by animals and plants intruding into the waste. For radioactive contaminants of potential concern, half-lives also were considered. Chemical degradation was not assessed.

The DUST-MS source term model was used to simulate release of contaminants from waste and into the subsurface. Based on waste inventory estimates and waste characteristics, the model simulated the release of contaminant mass from buried waste for three types of release mechanisms: surface washoff, diffusion, and dissolution. Once mass was released, it was available for biotic transport to the surface or for migration in the subsurface. Sample data for the shallow subsurface from areas around the Subsurface Disposal Area were not representative of concentrations beneath the waste and, therefore, were not useful for calibrating the source term model. Indirect, limited calibration was achieved by comparing measured to simulated aquifer concentrations.

Subsurface fate and transport modeling focused on dissolved-phase transport using the TETRAD simulator. Vapor-phase transport was not specifically modeled for this investigation for contaminants such as C-14. For volatile organic compounds, concentrations were estimated by scaling the results in the Interim Risk Assessment on the basis of revised inventory estimates. Using information from the source release model, the TETRAD model simulated migration of dissolved-phase contaminants in the vadose zone and aquifer. The model emulated fate and transport beginning in 1952 and extending until concentrations peaked in the aquifer up to 10,000 years in the future. The model domain was based on interpolations of known characteristics of the subsurface, such as depths and thicknesses of interbeds and water velocity in the aquifer. Other model parameters to describe contaminant migration, such as partition coefficients, were defined using site-specific information. Reasonable values from the literature were selected when site-specific information was not available. Estimated media concentrations were compared to monitoring data. However, model calibration beyond the limited calibration achieved previously in the Interim Risk Assessment was not attempted because of the lack of calibration targets provided by monitoring data. In other words, contaminants of particular interest for model calibration, such as C-14, uranium, and other actinides, have been detected sporadically and at very low concentrations that do not describe migration trends. Low concentrations, coupled with lack of trends, cannot be emulated with any confidence.

The DOSTOMAN code was used to simulate transport of contaminants to the surface by plants and animals and to estimate resulting surface soil concentrations. Rate constants and other input parameters used in the code were selected from current literature, with preference given to values specific to the Subsurface Disposal Area and the INEEL. Though limited comparisons of estimated-to-measured surface soil concentrations were produced, calibration for the biotic model was not pursued. Maintenance, contouring, and subsidence repairs at the landfill disturb the surface of the site, and the sparse data that are available are not representative of biotic uptake. In addition, the analysis adopts the fundamental assumption that future action at the Subsurface Disposal Area under any remediation scenario will include a cap that would inhibit human intrusion and biotic uptake.

Baseline Risk Assessment

The Subsurface Disposal Area was considered in a comprehensive manner by evaluating the cumulative, simultaneous risk for all complete exposure pathways for all contaminants of potential concern. The assessment evaluated the impacts of exposure to the concentrations of contaminants in soil and groundwater estimated by the models described above. Methodology applied to estimate current and future impacts to human health and the environment are described below.

Human Health Baseline Risk Assessment

Potential risks to human receptors posed by the 24 contaminants of potential concern defined in the Interim Risk Assessment were quantitatively evaluated in the human health component of the baseline risk assessment. Analysis included exposure and toxicity assessments, risk characterization, and limited evaluation of sensitivity and uncertainty. For radionuclides, long-lived decay chain products were considered to assess cumulative effects. Risks from volatile organic compounds were scaled from the Interim Risk Assessment results based on the inventory updates.

Risk estimates were developed for current and future occupational receptors and for current and hypothetical future residential receptors. For the current residential scenario, groundwater ingestion risk at the INEEL boundary was assessed. Surface exposure pathways were not examined for a current residential exposure because residential development near the Radioactive Waste Management Complex is prohibited by site access restrictions. Future residential exposures were simulated to begin in 2110 to reflect a postulated remediation in 2010 followed by an assumed 100-year institutional control period. The future residential analysis reflects assumptions that a cap and institutional controls would preclude access into the waste, but that a location immediately adjacent to the Radioactive Waste Management Complex could be inhabited. Concentrations and risks were simulated out to 1,000 years for all pathways except groundwater ingestion. Groundwater risks were simulated until peak concentrations occurred up to a maximum of 10,000 years.

Risk estimates for hypothetical future residential exposure bounded risks for all scenarios by exceeding those for both occupational scenarios and for the current residential scenario. The location of the maximum cumulative risk is near the southeast corner of the Subsurface Disposal Area and the primary exposure pathway is groundwater ingestion.

Ecological Risk Assessment

The scope of the ecological risk assessment was limited because of the fundamental assumption that the Subsurface Disposal Area will be covered with a cap under any remediation scenario. Current-year and 100-year scenarios were evaluated for representative receptors. Contaminant screening was performed in the *Review of Waste Area Group 7 Ecological Contaminants of Potential Concern* document to limit the evaluation to those contaminants with a maximum likelihood to pose unacceptable risk. Concentrations in surface soil and subsurface intervals were estimated with the DOSTOMAN biotic uptake model.

Conclusions

Contaminants of concern for Operable Unit 7-13/14 for human and ecological exposures are given in Tables E-1 and E-2. Contaminants of concern were identified initially based on human health and ecological risk estimates. Risk-based criteria for human health of 1E-05 risk and a cumulative hazard index in excess of 2 were applied. Sixteen human health contaminants of concern were identified. In addition, three plutonium isotopes were classified as special case contaminants of concern to acknowledge uncertainties about plutonium mobility in the environment and to reassure stakeholders that risk management decisions for the SDA will be fully protective. Seven ecological contaminants of concern were identified based on a hazard quotient in excess of 1 for radionuclides and a hazard quotient of 10 or greater for nonradionuclides.

Table E-1. Human health contaminants of concern.

Contaminant	Note	Peak Risk	Year	Peak Hazard Index	Year	Primary 1,000-Year Exposure Pathway
Ac-227		3E-06	3010[a]	NA[b]	NA	Groundwater ingestion
Am-241	**1,3**	**3E-05**	2953	NA	NA	Soil ingestion, inhalation, external exposure, and crop ingestion
Am-243		4E-08	3010[a]	NA	NA	External exposure
C-14	**1,4**	**6E-04**	2278	NA	NA	Groundwater ingestion
Cl-36		6E-06	2110	NA	NA	Groundwater ingestion
Cs-137		5E-06	2110	NA	NA	External exposure
I-129	**1,3**	**6E-05**	2110	NA	NA	Groundwater ingestion
Nb-94	**1,3**	**8E-05**	3010[a]	NA	NA	External exposure (groundwater ingestion)
Np-237	**1,4**	**4E-04**	3010[a]	NA	NA	Groundwater ingestion
Pa-231		3E-06	3010[a]	NA	NA	Groundwater ingestion
Pb-210		5E-07	3010[a]	NA	NA	Soil and crop ingestion
Pu-238	**2**	**1E-09**	2286	NA	NA	Soil and crop ingestion
Pu-239	**2**	**2E-06**	3010[a]	NA	NA	Soil and crop ingestion
Pu-240	**2**	**2E-06**	3010[a]	NA	NA	Soil and crop ingestion
Ra-226		3E-06	3010[a]	NA	NA	External exposure
Sr-90	**1,4**	**1E-04**	2110	NA	NA	Crop ingestion
Tc-99	**1,4**	**4E-04**	2110	NA	NA	Groundwater ingestion and crop ingestion
Th-229		4E-07	3010[a]	NA	NA	Groundwater ingestion
Th-230		7E-07	3010[a]	NA	NA	Groundwater ingestion
Th-232		1E-09	3010[a]	NA	NA	Crop ingestion
U-233	**1,3**	**3E-05**	3010[a]	NA	NA	Groundwater ingestion
U-234	**1,4**	**2E-03**	3010[a]	NA	NA	Groundwater ingestion
U-235	**1,4**	**1E-04**	2662	NA	NA	Groundwater ingestion
U-236	**1,4**	**1E-04**	3010[a]	NA	NA	Groundwater ingestion
U-238	**1,4**	**3E-03**	3010[a]	NA	NA	Groundwater ingestion
Carbon tetrachloride	**1,5**	**2E-03[c]**	2105	**5E+01[c]**	2105	Inhalation and groundwater ingestion
Methylene chloride	**1,3**	**2E-05[c]**	2185	1E-01[c]	2185	Groundwater ingestion
Nitrates	**1,6**	NA	NA	**1E+00**	2120	Groundwater ingestion
Tetrachloroethylene	**1,6**	NA	1952	**1E+00[c]**	2137	Groundwater ingestion and dermal exposure to contaminated water

Notes: For toxicological risk, the peak hazard index is given, and for carcinogenic probability, the peak risk is given.

1. **Green** = the contaminant is identified as a human health contaminant of concern based on carcinogenic risk greater than 1E-05 or a hazard index greater than or equal to 1 contributing to a cumulative hazard index greater than 2.
2. Brown = plutonium isotopes are classified as special case contaminants of concern to acknowledge uncertainties about plutonium mobility in the environment and to reassure stakeholders that risk management decisions for the SDA will be fully protective
3. **Blue** = carcinogenic risk between 1E-05 and 1E-04
4. Red = carcinogenic risk greater than 1E-04
5. **Pink** = toxicological (noncarcinogenic) hazard index greater than or equal to 1.

a. The peak groundwater concentration does not occur before the end of the 1,000-year simulation period. Groundwater ingestion risks and hazard indices were simulated for the peak concentration occurring within 10,000 years and are not presented in this table.
b. NA = not applicable.
c. The risk estimates were produced by scaling results from the Interim Risk Assessment (IRA) (Becker et al. 1998) based on inventory updates.

Table E-2. Ecological contaminants of concern and risk summary for subsurface soil contamination.

Nonradionuclide Contaminant	Hazard Quotient[a] Current Scenario	Hazard Quotient[a] 100-year Scenario	Radionuclide Contaminant	Hazard Quotient[a,b] Current Scenario	Hazard Quotient[a,b] 100-year Scenario
Cadmium	<1 to <9	<1 to 20	Am-241	<0.1 to 21	0.7 to 41
Lead	<1 to <6	<1 to 20	Pu-239	NA	<0.1 to >1
Nitrates	<1 to >10	< 0.1	Pu-240	NA	<0.1 to >1
			Sr-90	<0.1 to >25	NA

NA— Concentrations for this contaminant did not exceed the ecologically based screening level. Therefore, it was not evaluated in the ecological assessment as a contaminant of potential concern for the given scenario.

a. Values reported represent the range of maximum hazard quotients calculated across receptor functional groups and species.

b. Range represents hazard quotients for both internal and external exposures.

Volatile organic compounds (i.e., carbon tetrachloride, methylene chloride, and tetrachloroethylene) and nitrates pose the most imminent risk. Nearly all of the volatile organic compounds and nitrates in the Subsurface Disposal Area originated at Rocky Flats Plant. Carbon tetrachloride has been detected in the aquifer slightly above the maximum contaminant level and is being extracted from the vadose zone to reduce risk. However, volatile organic compound release from waste buried in the Subsurface Disposal Area is ongoing, and, if not sufficiently mitigated by the vadose zone vapor vacuum extraction, poses the most imminent risk.

Mobile long-lived fission and activation products are the next most immediate concern. The majority of the mobile fission and activation products was generated by INEEL reactor operations. The degree of urgency associated with risk estimates for fission and activation products has not been validated because of uncertainties associated with C-14, I-129, and Tc-99 model parameters. Though these contaminants have been detected sporadically in the environment and some trends may be developing, they do not occur at levels predicted by the modeling. Monitoring locations immediately proximal to the waste using waste zone probes is extremely important to assess the rate at which potential contamination in the vadose zone is developing. Interpreting monitoring data can be used to validate the appropriateness of expedited remediation of buried waste to mitigate risk.

Uranium and Np-237 contribute the majority of the risk several hundred years in the future. Roughly half of the uranium inventories were generated at the INEEL while the other half was generated off-Site, primarily at Rocky Flats Plant. Evaluating the nature and extent of uranium in the environment is confounded by naturally occurring concentrations of various isotopes in environmental media. Uranium attributable to human activities has been detected in the vadose zone beneath the Subsurface Disposal Area, indicating that some migration may be occurring. However, all local aquifer concentrations are consistent with natural uranium background values. Most of the original disposals of Np-237 originated at the INEEL, nearly all of the Am-241, the parent of Np-237, was generated at Rocky Flats Plant. Though Am-241 has been detected sporadically in the environment, Np-237 has not been detected.

Risks in excess of threshold values are associated with waste buried in the Subsurface Disposal Area, and identifying contaminants of concern and their associated waste streams in this Ancillary Basis for Risk Analysis is an appropriate basis for project planning for Waste Area Group 7. Tasks defined for Waste Area Group 7 should focus on developing information that could substantially influence remedial decision making. Examples include validating or refuting expedited remediation of fission and activation products.

A second revision to the Scope of Work and second Addendum to the Work Plan are being developed for Operable Unit 7-13/14 by the U.S. Department of Energy in cooperation with the Idaho Department of Environmental Quality and the U.S. Environmental Protection Agency. Scope required to complete the comprehensive remedial investigation/feasibility study will be outlined in the revised Scope of Work and described in detail in the Work Plan addendum. Efforts will focus on monitoring, waste zone mapping, and developing the feasibility study to assess remedial alternatives to mitigate risk associated with waste buried in the Subsurface Disposal Area.

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ACRONYMS

ABRA	Ancillary Basis for Risk Analysis
AEC	U.S. Atomic Energy Commission
AMWTF	Advanced Mixed Waste Treatment Facility
ANL-W	Argonne National Laboratory-West
ARA	Advanced Reactor Area
ASWS	air support weather shield
BBWI	Bechtel BWXT Idaho, LLC
BLM	U.S. Bureau of Land Management
BNFL	British Nuclear Fuels
BRA	baseline risk assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CFR	Code of Federal Regulations
CIDRA	Contaminant Inventory Database for Risk Assessment
COC	contaminant of concern
COPC	contaminant of potential concern
DOE	U.S. Department of Energy
DOE-ID	U.S. Department of Energy Idaho Operations Office
EBR-1	Experimental Breeder Reactor I
EBSL	ecologically based screening level
EDTA	ethylenediaminetetraacetic acid
EPA	U.S. Environmental Protection Agency
ERIS	Environmental Restoration Information System
ESRF	Environmental Science and Research Foundation
ESRP	Eastern Snake River Plain
FFA/CO	Federal Facility Agreement and Consent Order
FSP	field sampling plan
HDT	Historical Data Task
HEAST	Health Effects Assessment Summary Tables
HEPA	high efficiency particulate air (filter)
HI	hazard index
HQ	hazard quotient
HTO	tritiated water vapor
IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game
INEEL	Idaho National Engineering and Environmental Laboratory
INPS	Idaho Native Plant Society
INTEC	Idaho Nuclear Technology and Engineering Center
IRA	Interim Risk Assessment
IRIS	Integrated Risk Information System
LLW	low-level waste
MCL	maximum contaminant level
NAT	neutron-probe access tube
ND	nondetection

NPL	National Priorities List
NRF	Naval Reactors Facility
NRTS	National Reactor Testing Station
OCVZ	organic contamination in the vadose zone
OU	operable unit
PCE	tetrachloroethylene
PERA	Preliminary Evaluation of Remedial Alternatives
PSRA	Preliminary Scoping Risk Assessment
PRG	preliminary remediation goal
RAGS	Risk Assessment Guidance for Superfund
RAO	remedial action objective
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RfC	reference concentration
RfD	reference dose
RFP	Rocky Flats Plant
RI/BRA	remedial investigation/baseline risk assessment
RI/FS	remedial investigation/feasibility study
ROD	record of decision
RPDT	Recent and Projected Data Task
RWMC	Radioactive Waste Management Complex
RWMIS	Radioactive Waste Management Information System
SDA	Subsurface Disposal Area
SF	slope factor
SOW	scope of work
SRPA	Snake River Plain Aquifer
SVR	soil vault row
SWEPP	Stored Waste Examination Pilot Plant
TAN	Test Area North
TCA	1,1,1 trichloroethane
TCE	trichloroethylene
T/E	threatened or endangered
TIMS	thermal ionization mass spectrometry
TPR	technical procedure
TRA	Test Reactor Area
TRU	transuranic
TRV	toxicity reference value
TSA	Transuranic Storage Area
USFWS	U.S. Fish and Wildlife Service
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
VOC	volatile organic compound
VVE	vapor vacuum extraction
WAG	waste area group
WIPP	Waste Isolation Pilot Plant
WMF	Waste Management Facility