DOE/EA-0692

# ENVIRONMENTAL ASSESSMENT

# RETRIEVAL AND RE-STORAGE OF TRANSURANIC STORAGE AREA WASTE AT THE IDAHO NATIONAL ENGINEERING LABORATORY

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U.S. Department of Energy

OFFICE OF ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT

## EXECUTIVE SUMMARY

The U.S. Department of Energy (DOE) has prepared this environmental assessment (EA) to identify and evaluate the environmental consequences of retrieving and re-storing waste at the Transuranic Storage Area (TSA) within the Radioactive Waste Management Complex (RWMC) at the Idaho National Engineering Laboratory (INEL).

Since 1970, DOE defense-generated and other transuranic (TRU) waste has been placed in 20-year retrievable storage at the TSA. Presently, approximately 65,000 $m^3$ (2.3 million $ft^3$) of contact-handled (CH) TRU waste are stored in drums and boxes that are stacked on above-ground asphalt pads at the TSA. Approximately 70% of the waste is stored on pads that are covered with 1 to 1.5 m (3 to 4 ft) of soil overburden or a fabric tarpaulin. The remaining CH TRU waste is stored in air-supported buildings.

Approximately 95% of the TSA waste is contaminated with chemically hazardous/toxic constituents and is termed "mixed" waste. It is conservatively estimated, based on previous waste retrieval and container deterioration studies, that up to 10% of the waste containers may be breached.

Approximately 43% (28,000 $m^3$, or 1 million $ft^3$) of the 65,000 $m^3$ of TSA waste is expected to be reclassified as LLW or mixed LLW. The reclassified LLW and mixed LLW would eventually be disposed of in approved land disposal sites after any necessary treatment is accomplished.

The remaining 57% (37,000 $m^3$, or 1.3 million $ft^3$) of the TSA waste is expected to remain classified as TRU waste. DOE's strategy for long-term management of CH TRU waste stored at the INEL and other DOE facilities is to eventually transport the waste to DOE's Waste Isolation Pilot Plant, a deep geologic repository near Carlsbad, New Mexico, for final disposal.

The proposed action is to retrieve and re-store TSA waste at the INEL's RWMC. The purpose of the proposed action is to: 1) prevent or delay possible deterioration of TSA waste containers to decrease the probability of future environmental contamination; and 2) bring the TSA waste storage facilities into compliance with the Resource Conservation and Recovery Act (RCRA) and the State of Idaho's Hazardous Waste Management Act (HWMA) requirements.

The preferred alternative to accomplish these objectives is to construct and operate the following proposed facilities and utility upgrades:

- a waste retrieval enclosure (RE) over TSA Pads 1, 2, and R,
- a waste storage facility (WSF),
- an operations control building, and
- upgrade firewater, potable water, power, fencing, and sewage utilities.

Other alternatives include: 1) No Action; 2) Retrieval Without an Enclosure; 3) Storage Without an Enclosure; and 4) Retrieval but Transportation and Storage Elsewhere.

Air emissions of hazardous and radioactive materials from the RE may occur during retrieval operations due to the presence of breached waste containers. Air emissions of hazardous constituents and radionuclides would not occur due to normal operations of the other proposed facilities.

Emissions of regulated hazardous constituents of the waste (volatile organic compounds and possibly metals), may occur due to normal operations of the RE. Calculated emission rates would be below applicable National Ambient Air Quality Standards (NAAQS) and State of Idaho Toxic Air Pollutant Emissions Limits.

Potential noncarcinogenic health risks from exposure to normal emissions of hazardous constituents were calculated. Hazard indices (HIs) for workers at the proposed RE, for workers at an office building 137 m (449 ft) away, for members of the public visiting the Experimental Breeder Reactor-I (EBR-I) [2.9 km (1.8 mi) away], and for members of the public at the nearest site boundary [6.0 km (3.7 mi) away] were 1E-03 ($1 \times 10^{-3}$), 4E-08, 3E-06, and 2E-06, respectively. A HI <1E+00 ($1 \times 10^{0}$) implies that a health risk is not present.

Potential carcinogenic health risks due to normal emissions of hazardous constituents at the same locations were 4E-05, 2E-08, 4E-08, and 2E-08, respectively, which represent the incremental (above background) probabilities of an individual developing cancer over a lifetime as a result of exposure to potential carcinogens. For perspective, the Environmental Protection Agency (EPA) suggests that remedial actions at Comprehensive Environmental Response, Compensation, and Liability Act sites should reduce the ambient chemical concentrations at sites to levels associated with a carcinogenic risk in the range of 1E-04 (1 in 10,000) to 1E-07 (1 in 10,000,000).

Annual effective dose equivalents (EDEs) for normal radiological emissions from the RE were determined for the maximum individual located at 100 m, at EBR-I, and at the INEL boundary [6.0 km (3.8 mi) away] where the maximum radionuclide air concentrations were determined to occur. These values were 2.0E-06 mrem/yr [millirem (milliroentgen equivalent man)], 2.4E-07 mrem/yr, and 3.2E-07 mrem/yr, respectively. The EDE of 3.2E-07 mrem/yr at the maximum INEL boundary falls well below 1% of the 10 mrem/yr National Emission Standards for Hazardous Air Pollutants (NESHAP) promulgated by the EPA (54 FR 51654), and represents a maximum 0.007% increase in the site wide INEL EDE to a maximally exposed individual. The EDE received by the population within 80 km (50 mi) of the RWMC was calculated to be 2.1E-07 person-rem/yr. The excess number of latent cancer fatalities (i.e., increases in lifetime fatal cancers) associated with doses to the maximum individual at 100 m, at EBR-I, at the maximum INEL boundary, and for the 80-km population were calculated to be 1E-11, 2E-12, 2E-12, and 9E-11, respectively, for normal radiological emissions.

A bounding annual occupational dose was calculated to assess the maximum hypothetical impact on workers of having waste stored in the WSF rather than under the TSA soil overburden. If the WSF was filled to capacity, a maximum bounding annual occupational dose of 176 mrem/yr could be expected. Actual doses received would be considerably less than this. Nevertheless, the 176 mrem/yr is below the 5.0 rem/yr DOE limit for radiation workers and below the 1.5 rem/yr ALARA (as low as reasonably achievable) goal at the RWMC. Additionally, it is below the hourly DOE Order 6430.1A shielding design limit of 1 rem/yr; thus, additional shielding from the WSF would not be required.

The impacts of three postulated accidents were evaluated for the preferred alternative in addition to the nine presented in a previous Environmental Impact Statement (EIS) and safety analysis documents. The first two accident scenarios, both with a probability of 1.2E-01 events per year, involved dropped waste containers that breached upon impact. The highest HIs for individual hazardous constituents for the dropped box scenario were 3E-02 for workers inside the WSF and 2E-03 for the public at the INEL boundary. Committed EDEs ranged from 4.94E+00 rem for workers inside the WSF to 4.51E-03 rem for members of the public at the nearest INEL boundary.

The third postulated accident, with a probability of less than 1.0E-08 events per year, was a design basis tornado displacing and breaching 100% of the waste boxes and 10% of the waste drums inside a WSF module filled to capacity. The highest His for individual hazardous constituents for this accident scenario were 8E-02 for workers and 5E-02 for the public at the INEL boundary. Committed EDEs for the design basis tornado were 1.40E+01 rem for workers and 9.65E-02 rem for members of the public at the nearest site boundary.

Cumulative impacts of existing air-supported waste storage and drum venting facilities, the proposed retrieval and re-storage facilities and a potential future waste characterization facility were evaluated. Radiological and nonradiological impacts of airborne releases were determined for a worker at 100 m from the facilities and the maximally exposed individual at the INEL boundary. Cumulative radiation doses from airborne particulate releases would be 3.4E-03 mrem/yr for the 100 m worker and 1.3E-06 mrem/yr for the maximally exposed member of the public. The bounding cumulative dose to a SWEPP office worker from gamma radiation would be 193 mrem/yr. Estimated EDEs resulting from the proposed action to a maximally exposed member of the public and the exposed population within an 80-km (50 mi) radius of the RWMC would be 3.2E-7 mrem/yr and 2.1E-07 person mrem/yr respectively. Cumulative His for workers and the maximally exposed individual, from hazardous chemical releases, would be 1E-04 and 8E-04 respectively. Associated carcinogenic risks at these locations would be 8E-05 and 8E-06.

A No Action alternative to the proposed action would result in the continued "as is" storage of waste at the TSA, and would present a variety of programmatic, environmental, and regulatory problems. Waste containers in storage since the 1970s would continue to deteriorate and would, in the long-term, release hazardous, toxic, and/or radioactive contaminants to the soil, groundwater, and/or air. In the short-term, the radiological and hazardous air emissions that were estimated for the proposed action would not occur under the no action alternative. However, if no action is taken, existing storage conditions would continue in conflict with RCRA and HWMA monitoring access, waste segregation, and spill containment requirements.

The environmental impacts of the No Action alternative with respect to the proposed office control building, utility upgrades, RWMC boundary extension, and sewage lagoon would be minor, because no changes in environmental quality would occur in the short-term. However, without these facilities and upgrades to the RWMC, waste management operations at the RWMC could be impacted to the point of delaying or preventing waste retrieval and storage operations.

A Retrieval Without Enclosure Alternative would result in an extended, seasonal retrieval process, and in emissions of hazardous and radioactive constituents of the TSA waste beyond those expected for the preferred alternative. Greater emissions would occur because of the lack of a controlled atmosphere and the lack of High Efficiency Particulate Air (HEPA) filtration.

A Storage Without an Enclosure Alternative would result in a higher potential for environmental impacts of hazardous and radioactive materials in the event of an accident and the stored containers would be subject to weather-induced deterioration.

A Retrieval but Transportation and Storage Elsewhere Alternative would require transportation to DOE facilities off the INEL which would in turn require the repackaging of much of the waste to meet DOT requirements. Facilities are not present at the INEL to repackage waste, and adequate storage facilities that meet the requirements of RCRA and the HWMA do not presently exist at the INEL or other DOE facilities. Therefore, this alternative would require construction of adequate storage facilities elsewhere and would pose transportation risks beyond those of the proposed action.

## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ALARA | as low as reasonably achievable |
| ASB-2 | Air Support Building-2 |
| CH | contact-handled |
| cfs | cubic feet per second |
| C&S | Certified and Segregated Waste Storage Building |
| DOE | U.S. Department of Energy |
| DVF | Drum Venting Facility |
| EA | Environmental Assessment |
| EDE | effective dose equivalent |
| EPA | Environmental Protection Agency |
| EBR-I | Experimental Breeder Reactor-I |
| HEPA | high efficiency particulate air |
| HI | hazard index |
| HWMA | Hazardous Waste Management Act |
| INEL | Idaho National Engineering Laboratory |
| LLW | low-level waste |
| mR | milliroentgen |
| mrem | millirem (milliroentgen equivalent man) |
| NA | no action alternative |
| NAAQS | National Ambient Air Quality Standards |
| nCi | nanocuries |
| NEPA | National Environmental Policy Act |
| NESHAP | National Emission Standards for Hazardous Air Pollutants |
| NON | Notice of Noncompliance |
| PA | preferred alternative |
| PCB | polychlorinated biphenyls |
| PSD | Prevention of Significant Deterioration |
| RCRA | Resource Conservation and Recovery Act |
| RE | Retrieval Enclosure |
| RWMC | Radioactive Waste Management Complex |
| SDA | Subsurface Disposal Area |
| SWEPP | Stored Waste Examination Pilot Plant |
| TLV | threshold limit value |
| TRU | transuranic |
| TSA | Transuranic Storage Area |
| TSCA | Toxic Substances Control Act |
| VOC | volatile organic compound |
| WIPP | Waste Isolation Pilot Plant |
| WMF-613 | Waste Management Facility-613 |
| WSF | Waste Storage Facility |

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# 1. INTRODUCTION

This environmental assessment (EA) was prepared in accordance with the requirements of the National Environmental Policy Act (NEPA), as implemented by the Council on Environmental Quality Regulations (40 CFR 1500-1508) and the U.S. Department of Energy (DOE) guidelines for compliance with NEPA (52 FR 47662).

The purpose of this EA is to identify and evaluate the expected environmental impacts of the proposed retrieval and re-storage of waste currently stored at the Radioactive Waste Management Complex's (RWMC) Transuranic Storage Area (TSA) on the Idaho National Engineering Laboratory (INEL). TSA waste includes contact-handled (CH) transuranic (TRU) waste, low-level waste (LLW), mixed (radioactive and chemically hazardous) TRU waste, and mixed LLW. This EA will aid decision makers in determining whether a finding of no significant impact should be issued or whether an environmental impact statement should be prepared prior to implementation of the proposed action.

## 1.1 Purpose of the Proposed Action

The purpose of the proposed action is to: 1) prevent or delay deterioration of TSA waste containers to decrease the probability of future environmental contamination; and 2) bring the TSA waste storage facilities into compliance with Resource Conservation and Recovery Act (RCRA) and Idaho Hazardous Waste Management Act (HWMA) requirements.

## 1.2 Need for the Proposed Action

### 1.2.1 Background

DOE defense and research programs generate TRU wastes, LLW, and mixed wastes, which contain both radioactive and hazardous chemical constituents and may be either mixed TRU waste or mixed LLW. In 1970, the Atomic Energy Commission established a national policy requiring that TRU wastes [then defined as wastes containing >10 nCi/g (nanocuries/gram) of TRU nuclides] be packaged and stored such that they could be retrieved intact after storage for up to 20 years. A 20-year interim storage site, the TSA, was established in 1970 at the INEL's RWMC. Prior to opening the TSA, TRU waste was disposed of in the Subsurface Disposal Area of the RWMC. Approximately 65,000 $m^3$ (2.3 million $ft^3$) of CH TRU waste is currently stored at the TSA (Becker et al., 1989). CH waste has a waste container surface dose rate of <200 mrem/hr (milliroentgen equivalent man/hr), and does not require shielding during normal handling operations.

The location of the INEL and the RWMC are shown in Figure 1. The TSA is located within the eastern third of the RWMC. The western two-thirds of the RWMC is known as the Subsurface Disposal Area (SDA).

| | |
|---|---|
| ARA | Auxiliary Reactor Facility |
| ANL-W | Argonne National Laboratory - West |
| CFA | Central Facilities Area |
| EBR I | Experimental Breeder Reactor I |
| EBR II | Experimental Breeder Reactor II |
| ICPP | Idaho Chemical Processing Plant |
| IET | Initial Engineering Test |
| LOFT | Loss-of-Fluid Test (Facility) |
| MWSF | Mixed Waste Storage Facility |
| NRF | Naval Reactor Facility |
| PBF | Power Burst Facility |
| PREPP | Process Experimental Pilot Plant |
| RWMC | Radioactive Waste Management Complex |
| STF | Security Training Facility |
| TAN | Test Area North |
| TRA | Test Reactor Area |
| TREAT | Transient Reactor Test (Facility) |
| WEDF | Waste Experimental Development Facility |
| WERF | Waste Experimental Reduction Facility |
| WRRTF | Water Reactor Research Test Facility |
| ZPPR | Zero Power Physics Reactor |

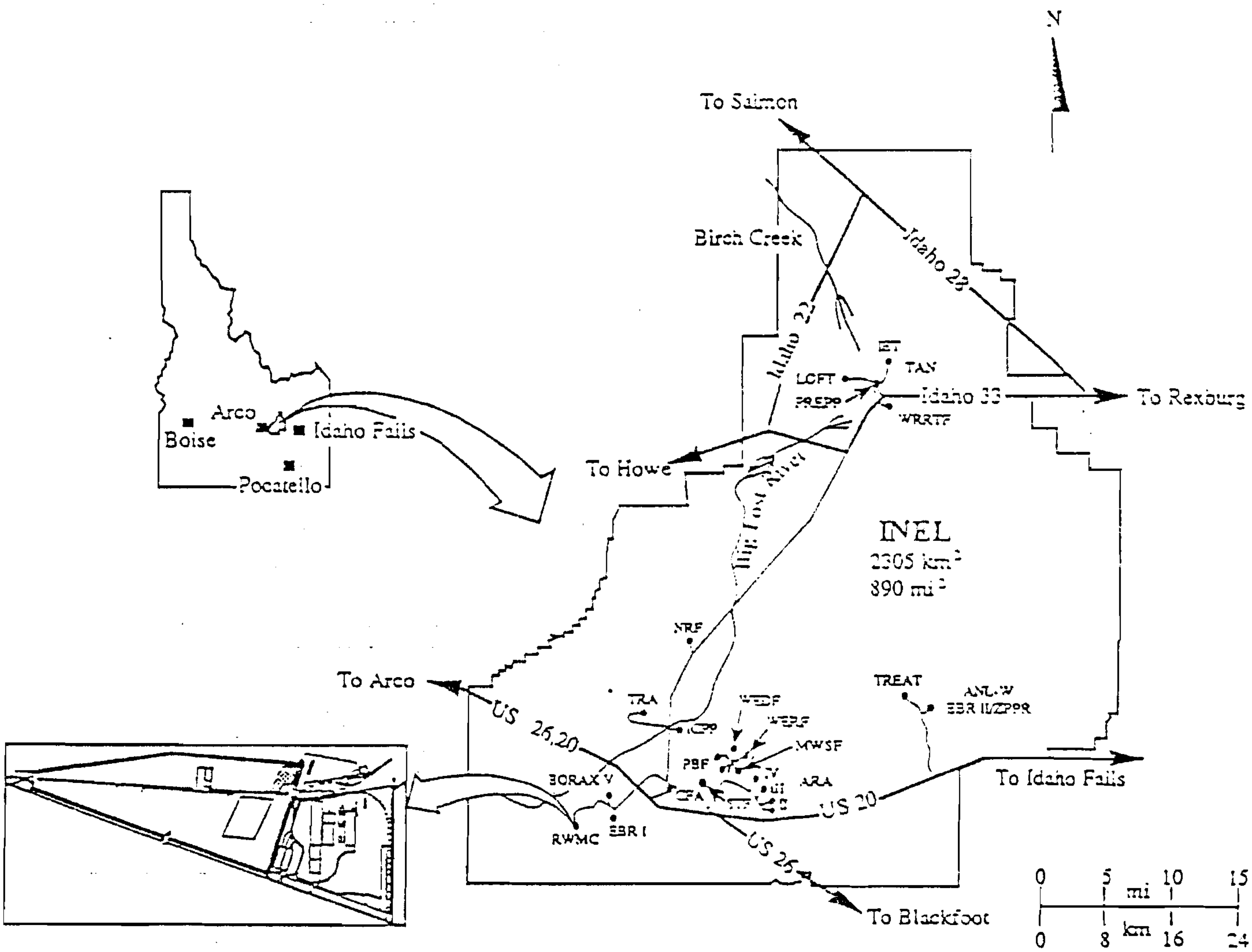


Figure 1. Location of major facilities at the INEL.

Approximately 95% of the waste stored at the TSA is assumed, based on process knowledge, to be contaminated with chemically hazardous substances regulated under RCRA and HWMA, or the Toxic Substances Control Act (Becker et al., 1989). RCRA and the HWMA govern the handling, treatment, and disposal of hazardous wastes. 40 CFR 260-280 (RCRA) defines and identifies hazardous waste types and specifies how they must be transported, handled, and disposed of. Mixed wastes forms at the TSA include combustibles (e.g., rags, paper, and cloth), noncombustibles (e.g., metal, glass, and filters), and absorbed or solidified process sludges (Clements, 1982).

Prior to 1982, TRU waste was considered to be any waste containing in excess of 10 nCi/g of any TRU nuclide (AEC Manual Chapter 0511). In 1982, a TRU waste workshop involving government (DOE, EPA, Nuclear Regulatory Commission) and university scientists concluded that the limit of concern for TRU radionuclides could safely be increased to 100 nCi/g. This limit was used in a subsequent DOE Order defining TRU waste.

Approximately 43% (28,000 $m^3$, or 1 million $ft^3$) of the 65,000 $m^3$ of TSA waste was received prior to 1982 and contains less than 100 nCi/g TRU. This waste is expected to be reclassified as LLW or mixed LLW (Becker et al., 1989).

There are presently no available treatment or disposal facilities for the TSA waste, including the fraction containing less than 100 nCi/g of TRU radionuclides that will be reclassified upon retrieval as LLW. The RWMC does not accept waste for disposal if it contains TRU radionuclide concentrations >10 nCi/g. Therefore, the reclassified waste must remain in storage until appropriate treatment and disposal facilities become available.

The DOE does not plan to store the reclassified waste at the TSA indefinitely. Preliminary studies are underway to identify ultimate treatment and disposal alternatives. The studies, which focus on developing successful disposal alternatives, are being performed through aggressive participation and industry cooperation under DOE's Private Sector Participation Initiative and through DOE's own resources. The available data from these studies will not support specific proposals or meaningful NEPA analysis at the present time; however, appropriate NEPA documentation will be prepared as proposals are developed.

The remaining 57% (37,000 $m^3$, or 1.3 million $ft^3$) of the TSA waste is expected to remain classified as TRU waste (Becker et al., 1989). DOE's strategy for long-term management of stored TRU waste at the INEL and other DOE facilities is to provide appropriate treatment, packaging and transport to the Waste Isolation Pilot Plant (WIPP) or other approved disposal facilities (DOE, 1983, 1984, 1987 and P.L. 97-90, 1982).

The TSA waste is stored in steel boxes, fiberglass reinforced plywood boxes, and 208-l (55-gal) and 314-l (83-gal) steel drums stacked approximately 5 m (16 ft) high on three above-ground asphalt pads (TSA-1, TSA-2, and TSA-R). Approximately 70% of the waste is stored on pads that are covered with 1 to 1.5 m (3 to 4 ft) of soil overburden or a fabric tarpaulin. The remaining waste is stored in air-supported buildings [Certified and Segregated Waste Storage Building (C&S) and Air Support Building-2 (ASB-2)]. The pads are 46 m (150 ft) wide. The combined length of TSA-1 and TSA-R is 366 m (1200 ft), and TSA-2 is 213 m (700 ft) long. These waste storage facilities generally do not meet monitoring access, waste segregation, and spill containment provisions required by RCRA and the State of Idaho's Hazardous Waste Management Act (HWMA) to ensure safety and environmental protection.

Because retrievable storage of TSA waste began in 1970 at the RWMC, some of the waste containers have been stored for over 20 years. It has been conservatively estimated, based on container integrity inspections performed in 1978, 1979, and 1984, and corrosion rate studies and modeling, that up to 10% of the TSA waste containers may be breached (Maughan, 1990; Berglund, 1991). The corrosion and possible breaching of waste containers presents the risk of potential radiological and hazardous chemical contamination of the environment unless mitigating steps are taken.

1.2.2 Need for Waste Retrieval and Re-Storage

DOE needs to implement the proposed waste retrieval and re-storage action to provide additional protection for continued storage of the TSA waste until appropriate treatment and/or disposal facilities are developed. In addition, the proposed action is needed to comply with regulatory requirements for waste storage.

The TSA waste containers in the air-supported buildings are arranged in a dense pack configuration. DOE received a Notice of Noncompliance (NON) from the Environmental Protection Agency (EPA) that alleged that the current configuration does not comply with RCRA storage regulations that require the maintenance of appropriate aisles to facilitate container inspections for deterioration and leakage, and for unobstructed movement of personnel or emergency equipment (40 CFR 265.35, 40 CFR 265.174). A compliance plan has been negotiated between DOE, EPA and the State to implement appropriate corrective measures. It is anticipated that a draft Consent Order, which presently incorporates this compliance plan, will be finalized and executed by DOE, EPA, and the State in the near future. The compliance plan stipulates relocating and reconfiguring the waste presently in the air-supported buildings to proposed new storage buildings designed to meet RCRA and Toxic Substances Control Act (TSCA) requirements. One-half of the waste inventory in the air-supported buildings must be relocated by January 1, 1996 and the remainder by January 1, 1998. A storage configuration will be provided that balances the goals of RCRA inspections/emergency response, and minimizes the risks of radiation and hazardous chemical exposures to operations personnel.

Continued storage of the waste on soil covered pads at the TSA, without mitigative measures, would present a variety of programmatic, environmental, and regulatory problems. Waste containers would continue to deteriorate and may release hazardous, toxic, and/or radioactive contaminants to the soil, groundwater, and/or air. Future retrieval operations would become more complex due to reduced container integrity, increased contamination levels, and associated increased environmental and safety risks. In addition, continued storage in the existing configuration would not resolve RCRA/HWMA noncompliance issues.

The proposed waste retrieval and re-storage action is needed to prevent or delay additional corrosion and breaching of waste containers resulting from infiltration of precipitation and the potential for waste migration and environmental contamination resulting from precipitation infiltration into the existing storage areas. The preferred alternative for accomplishing the proposed action includes the construction and operation of a retrieval enclosure, storage modules, and RWMC support facilities. The retrieval enclosure would prevent or delay additional container deterioration through sheltering the waste pads from precipitation and snowmelt infiltration, and would provide a controlled environment for year-round retrieval of waste containers. The proposed storage modules would provide re-storage facilities in compliance with RCRA, HWMA and DOE requirements. The initial storage modules would be used for re-storage of those wastes presently in the air-supported buildings. Proposed RWMC administrative and personnel facilities and utility upgrades are needed to support retrieval and other waste management operations.

# 2. PROPOSED ACTION AND ALTERNATIVES

## 2.1 Proposed Action

The proposed action is to retrieve and re-store TSA waste. The retrieval process would consist of four steps: 1) removing and disposing the soil covering the waste; 2) removing waste containers from the air support buildings and from TSA pads 1, 2, and R; 3) surveying the containers for contamination, and decontaminating or overpacking the containers if necessary; and 4) re-storing the waste in weather-protected, RCRA permitted facilities.

The purpose of the proposed action is to: 1) prevent or delay possible deterioration of TSA waste containers so as to decrease the probability of future environmental contamination; and 2) bring the TSA waste storage facilities at the TSA into compliance with RCRA and the State of Idaho's HWMA requirements.

## 2.2 Preferred Alternative

The preferred alternative to accomplish the proposed action is to construct and operate the following facilities and upgrades:

- a waste retrieval enclosure (RE) over TSA Pads 1, 2, and R,
- a waste storage facility (WSF),
- an operations control building, and
- upgraded RWMC firewater, potable water, power, fencing, and sewage utilities.

Specifically, the facilities identified above would provide: 1) weather protection for the TSA and a controlled environment in which the waste presently stored within the TSA can be retrieved year-round; 2) replacement storage facilities at the RWMC for retrieved waste that meet the requirements of RCRA and Idaho's HWMA; and 3) a supporting infrastructure for waste retrieval and re-storage operations.

The locations of the existing and proposed facilities at the RWMC are shown in Figure 2. The preferred alternative is consistent with DOE Radioactive Waste Management Order 5820.2A.

### 2.2.1 TSA Waste Retrieval and Retrieval Enclosure

The RE would be a metal building approximately 61 m wide x 358 m long x 14 m high (200 ft x 1175 ft x 46 ft) over TSA-R and TSA-1, with an adjacent 61 m wide x 105 m long x 14 m high (200 ft x 350 ft x 46 ft) appendage over TSA-2. Total area would be approximately 28,335 $m^2$ (305,000 $ft^2$). The building would cover the waste stacks, berms, and sloped earth cover.

Two movable interior parallel walls, approximately 45 m (150 ft) apart and perpendicular to the RE exterior walls, would provide a smaller work area for retrieval operations. This work area would enclose the earth overburden that would be removed to expose the waste container stack face, the stacked

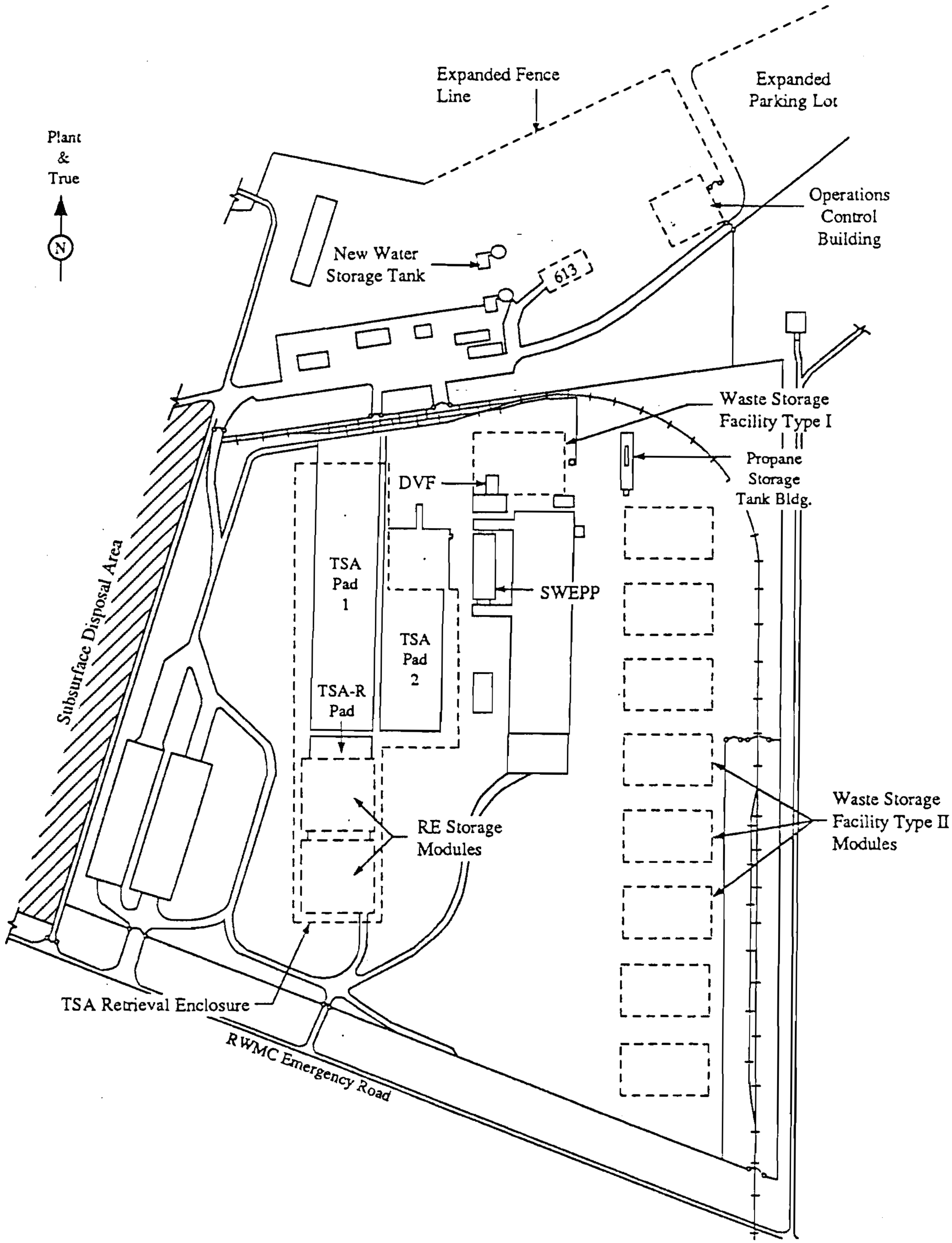


Figure 2. Location of existing (thin-line) and proposed (dashed-line) facilities within the TSA at the RWMC.

containers that would be removed, a hot staging area, an overpacking area, and a cold staging area, as shown in Figure 3. The two interior parallel walls would be periodically moved within the building as retrieval progresses.

Ducts on an air curtain attached to the movable interior wall bounding the work area on the north would collect air from the work area. Work area air collected by these ducts and others would be exhausted through a 90% efficiency portable baghouse dust filter, a 90% efficiency roughing filter, and a 99.97% efficiency High Efficiency Particulate Air (HEPA) filter. After passing through these particulate filters, the discharge air would then pass through a heat exchanger before being exhausted through an emission stack approximately 18.3 m (60 ft) or taller x 0.9 m (3 ft) in diameter. The stack would have a release velocity of approximately 12.2 m (40.0 ft) per second, with temperatures of release gases approximately 15 to 21°C (60 to 70°F).

The interior movable wall with the supply air ducts would bound the work area on the south. The volumetric flow rate differential between the supply and exhaust air walls would maintain a negative pressure in the work area.

Portable radiation detection equipment would be used to monitor the working face of the waste stack, the soil overburden, personnel in the working area, and earthmoving and retrieval equipment. Stationary radiation monitors (Remote Area Monitors and Constant Air Monitors) would be installed at appropriate locations inside the RE.

After the earth overburden has been surveyed and statistically sampled for contamination, all but approximately 0.3 m (1 ft) of the overburden depth would be removed using excavators. Part of the overburden may be removed prior to or during construction of the RE if the soil survey indicates that no contaminants are present. The remainder of the overburden will be removed by a vacuum. Contaminated overburden would be packaged into waste containers and handled thereafter as radiological or mixed waste. Plywood, canvas, and plastic sheeting covering the waste container stack would be removed after radiological surveying. Contaminated covering materials would be packaged into waste containers.

Waste containers would be visually inspected for integrity, reviewed for content code and surveyed for contamination prior to removal from the stack. Modified forklifts would then be used to transfer containers to the staging area for additional inspections and cleaning.

Intact containers would be vacuumed and wiped as necessary to remove remaining soil and debris, and surveyed for alpha and beta-gamma radiation. A smear sample would be taken from each container, a bar-code label would be attached, and information would be entered on a computer inventory. RCRA waste labels would be applied to mixed-waste containers. Waste codes would be determined from content code data bases.

Surface-contaminated containers would be decontaminated using standard wiping procedures. The waste generated as result of decontaminating surface-contaminated containers would be packaged and handled thereafter as a LLW stream. Breached and damaged containers, as well as surface-contaminated

1 Baghouse Exhaust Air Filter
2 Hot Dirt (Short Hold)
3 Hot Drum Staging
4 Overpack Container Staging Rack
5 Cold Drum Staging
6 Scanning Unit-Fork Lift/Survey Cage
7 Fork Lift
8 Poly Tarp and Plywood Overpack
9 Extendable Boom Material Handler
10 Cold Dirt Transport Trailer
11 Personnel Scanning
12 Movable Interior Wall

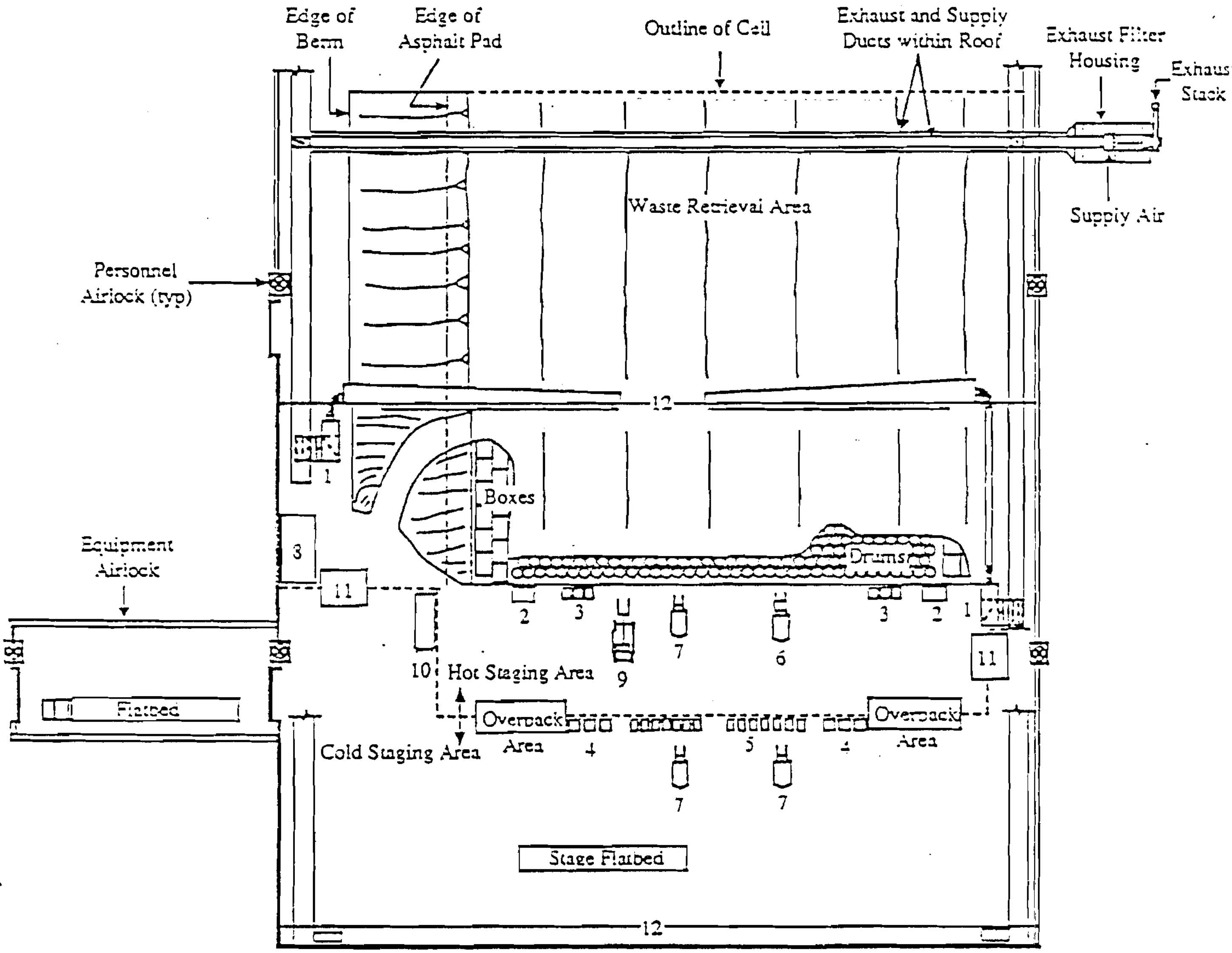


Figure 3. Diagram of the smaller work area in the proposed RE.

containers not easily decontaminated, would be overpacked into clean, intact containers. Contaminated clothing and other materials used by workers that are not easily decontaminated would be packaged into clean, intact containers. Areas containing contaminated soil, asphalt pad or other materials would be isolated from the retrieval work area with portable partitions and cleaned up using standard decontamination and removal techniques. Contaminated materials would be packaged and managed appropriately.

The waste containers ready for transport outside the RE would be loaded onto a flatbed trailer inside the RE. When the flatbed trailer is filled with containers, a semi-tractor would pull the loaded trailer out through the equipment airlock and transport the containers to the WSF.

Waste would be retrieved at a rate of approximately 2,080 $m^3$, or 10,000 drum equivalents [1 drum equivalent = 0.208 $m^3$ (7.35 $ft^3$)] per year, assuming one 10-hr shift/day, 4 days/week, for 50 weeks/yr. This throughput and/or schedule may be expanded if breached or contaminated containers are not encountered in numbers assumed for the purpose of analyses (e.g., the assumption that 10% of containers would be breached). Should greater numbers of breached or contaminated containers be encountered, the retrieval rate of 10,000 drum equivalents/yr would not be exceeded.

### 2.2.2 Waste Re-storage and the Waste Storage Facility

The WSF would consist of a series of storage modules. The two types of modules, as shown in Figure 4, are designed for the following types of waste:

Type I: Interim storage for aspirating drums and heated storage for drums and boxes awaiting examination in the Stored Waste Examination Pilot Plant (SWEPP).

Type II: Interim storage of waste awaiting future management.

One Type I and up to ten Type II modules could be eventually constructed. The Type I storage module would be approximately 46 m wide x 82 m long (150 ft x 270 ft). A portion of the type I module would be heated to approximately 21°C (70°F) for thawing waste prior to examination at the SWEPP, and another area heated to approximately 4°C (40°F), for year-round drum aspiration after venting at the Drum Venting Facility (DVF). The existing DVF would be enclosed within this module to reduce waste transportation requirements. The remainder of the type I module would be unheated.

Eight of the type II storage modules would be individual steel buildings approximately 36 m wide x 72 m long x 8 m high eaves (120 ft x 240 ft x 26 ft). The remaining two type II modules would be developed by modifying a portion of the RE after retrieval operations. Modifications would include decontamination of the asphalt pad and structural changes related to compliance with RCRA.

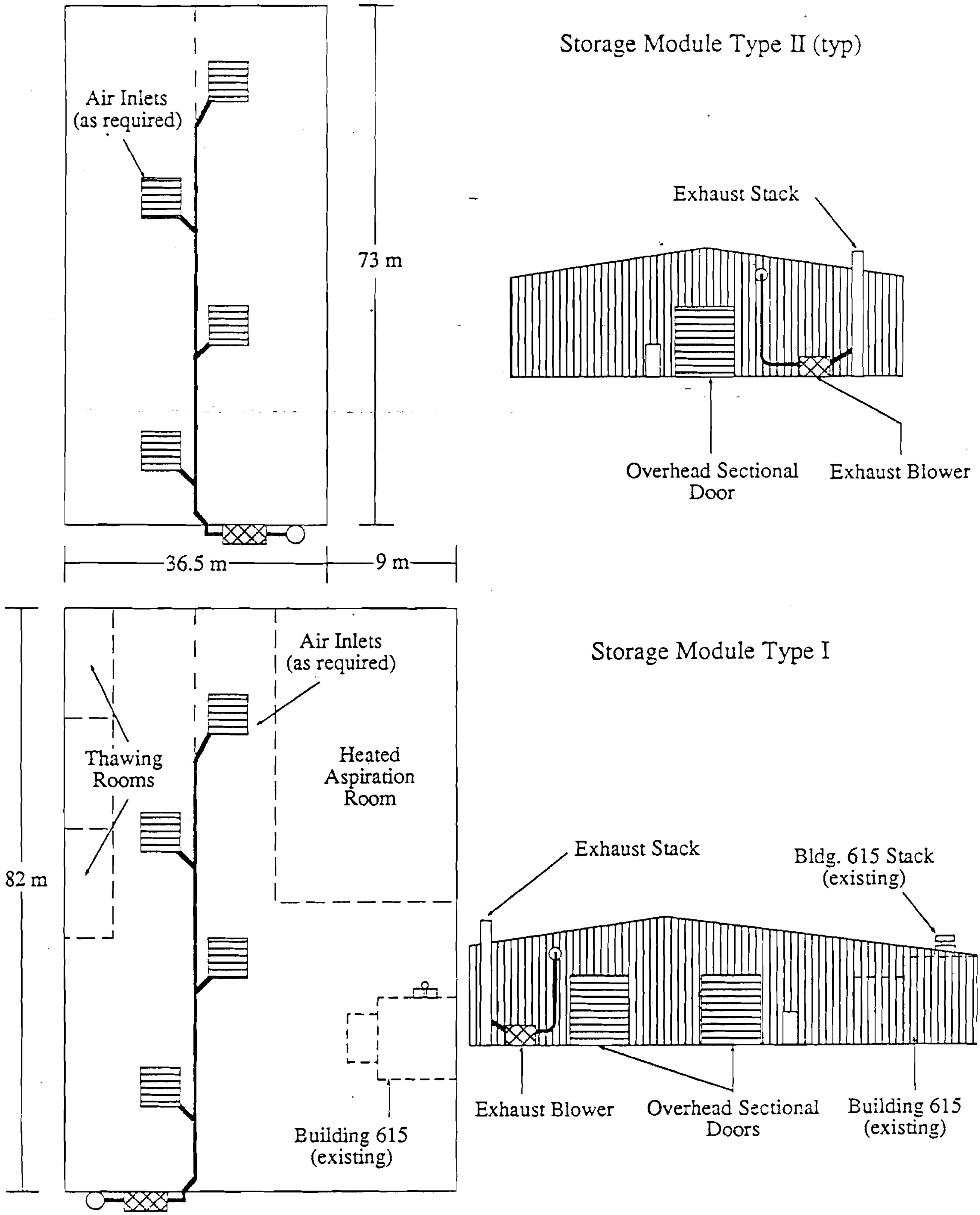


Figure 4. Diagram of storage modules for the proposed WSF.

Storage modules would be ventilated by drawing air into the modules through wall louvers and then exhausting it from the modules through a single point exhaust stack in each module. HEPA filtration would not be used in the WSF because radioactive particulate emissions are not expected from the WSF. Constant air radiation monitors and hand held contamination survey instruments would be provided inside each storage module at appropriate locations.

The maximum storage capacity of the WSF would be approximately 40,000 $m^3$ (1.4 million $ft^3$). The anticipated retrieval and re-storage rate would be 2,080 $m^3$ (10,000 drum equivalents) per year. Proposed WSF modules would have capacity to support proposed retrieval operations for approximately 19 years. It is assumed that WIPP or other approved disposal facilities will become available within those 19 years such that waste shipments would provide the required re-storage capacity to support continued retrieval operations. If anticipated disposal facilities do not become available, additional Type II storage modules would be required.

### 2.2.3 Operations Control Building

The operations control building would be a metal building approximately 2,230 $m^2$ (24,000 $ft^2$) in size, located north of the TSA near the existing administrative facilities, as shown in Figure 2. It would provide space for office support operations, a conference room for up to 60 people, health physics and industrial hygiene testing equipment, site entry/exit security, emergency communications center, lunchroom, and showers, and would function as the primary entrance to and exit from the RWMC. The facility would be ventilated and air conditioned through packaged air conditioning units. Space and water heat would be supplied by propane-fired systems. Approximately 50 office workers would be assigned to the facility.

The operations control building would be the entrance/exit contamination survey point for personnel at the RWMC. Health physics equipment would include beta-gamma walk through stations, and hand-held alpha scan instruments.

### 2.2.4 Utility Upgrades, Modifications, and Site Development

Site development would include clearing, grading, and utility connections for the proposed facilities. The construction of a paved access road from the present entrance road to the operations control building and from it to other RWMC facilities would be required. A parking area for an estimated 80 personal cars, 15 government vehicles, and eight evacuation buses would be constructed. Dike structures that control local surface water runoff would constructed around the TSA to supplement existing structures around the subsurface disposal area.

A previously disturbed area of approximately 7,000 $m^2$ (75,000 $ft^2$) south of the TSA and outside the RWMC site boundary fence would be cleared, graded, and graveled to provide space for subcontractor construction equipment during the construction phase. Electrical power would be provided from an existing

7.2 kV power line inside the RWMC boundary. An archaeological survey has been performed in the area outside the fence and no significant cultural resources were found; thus, clearance for use of this has been granted.

#### 2.2.4.1 Electrical Power

The existing 12.5 kV power line from the Central Facilities Area to the RWMC would be replaced with a larger cable. The total capacity of the line would be increased from approximately one megawatt to approximately 5.5 megawatts. This action would take place within an existing utility corridor and use the existing power poles.

In addition, the distribution system within the RWMC would be expanded. The power would be distributed throughout the administrative area and the operational area through a series of manholes or above-ground pedestals, connected by new underground concrete encased ductbanks. The new line would connect to the existing 12.5 kV line west of SWEPP forming a loop that could be fed from either direction. One or more additional diesel-fueled stand-by generators would be added to the distribution system to ensure continued electrical supply in the event of power outages.

#### 2.2.4.2 Fire Water/Potable Water

A new firewater storage tank holding approximately 2.8 million liters (750,000 gal) would be constructed and operated to supplement the existing 946,250-liter (250,000-gal) storage tank.

Both tanks would be supplied with water from the existing well. A new 7,570-l/min (2,000-gpm) diesel firewater pump would be installed with the new tank to pump water into the existing firewater distribution system and new service loops.

The existing and proposed administrative areas would be serviced through a new 25-cm (10-inch) looped firewater main, replacing the existing Waste Management Facility-613 (WMF-613) firewater line. This new main would service the TSA and be connected to the proposed facilities.

#### 2.2.4.3 Communications and Alarms

A series of manholes or above-ground pedestals and concrete encased ductbanks would be emplaced to provide a communication and alarm system network to the facilities. The network would follow the route of the electrical power system. The existing communication and alarm network at the RWMC would be used if retrieval and storage operations proceed prior to operation of the new network.

#### 2.2.4.4 Sewage System

A sewage lagoon (stabilization pond) would be constructed and operated near but outside the RWMC site boundary to support RWMC operations. A treatment facility was considered but rejected in favor of the sewage lagoon because the volume of sewage expected to be generated is insufficient to cost-effectively operate a treatment facility. Two candidate sites for the sewage lagoon, one to the north-northeast of the RWMC and one to the south of the TSA, are being evaluated based on cost-effectiveness, because the environmental impact of using either site would be the same or similar. The proposed sewage system would include a low-pressure pumped system from each facility to a main line, and then to the 1.2-hectare (3-acre) lagoon. The main line would be buried about 1.5 m (5 ft) below the surface. Approximately 400 total personnel could be accommodated by this system.

#### 2.2.4.5 Fence Boundary

The RWMC site boundary fence would be extended at the northeast corner, encompassing up to 0.8 additional hectares (2.0 acres) of land presently outside the boundary (Figure 2). In addition, fencing within the existing site boundary would be constructed around: 1) the proposed WSF modules to control access of workers; 2) the TSA pads; 3) the SWEPP and associated air-supported buildings; and 4) the intermediate level transuranic storage facility west of the TSA-R within the TSA, for the purpose of radiological control.

### 2.2.5 Schedule

Construction of the RE, WSF, Operations Control Building and utilities would begin during the 1992 construction season and would last approximately 24 months. Up to four waste storage modules would be constructed during 1992/1993. Additional modules would be developed at the rate of two per year or, as needed to support RWMC waste storage requirements. All construction activities would be conducted using standard industry earth moving and construction equipment and practices. Operations within the RE and WSF would begin approximately 3 months after completion of construction. Proposed retrieval and re-storage operations would require 20 to 30 years.

## 2.3 Relationship to Other Facilities

All waste drums would be vented of flammable concentrations of hydrogen gas in the existing DVF. Both drums and boxes would then be examined at SWEPP using ultrasonic scanning and real time radiography to determine waste container integrity and waste form prior to re-storage in the WSF. Radionuclide content of containers would be determined using passive and active neutron assay.

Past waste characterization studies determined that flammable concentrations of hydrogen may exist in approximately 5% of the unvented waste drums. In addition, nonflammable concentrations of various volatile organic chemicals have been detected in the headspace gas of some sampled drums. The existing remotely-operated drum venting process involves puncturing the drums with a nonsparking tool and installing a carbon composite filter in the drum lid. This process aspirates any pressurized gas into the DVF containment where it is immediately diluted. The DVF is exhausted through HEPA filters to the atmosphere. The trace concentrations of hydrogen and VOCs in the exhaust gas pose no known hazard requiring treatment or routine monitoring. Since one of the proposed storage modules will encompass the existing DVF, risks associated with the venting process and hazardous chemical emissions will be evaluated in detail in safety documents for the WSF: The potential for worker exposure to organic vapors or radionuclides from the drum venting process, is included in the cumulative impact analysis in Section 4.9.

Under separate NEPA review, DOE is considering construction and operation of a Waste Characterization Facility (WCF) at the RWMC in which a sample of the retrieved waste could be characterized. Although the WCF was once combined with the WSF (excluding the RE) for appropriation purposes, the WCF is only in the early stages of design. Construction of the WCF would follow the RE and WSF by approximately one year. The WCF would perform different functions and have different benefits than the proposed RE and WSF. Specifically, the WCF would perform waste container content verification and waste characterization activities, in contrast to the RCRA-compliant storage and contamination-prevention functions of the RE and WSF.

The RE and WSF could rationally proceed without the WCF proposal and vice-versa. Proceeding with the RE and WSF activities would neither trigger nor prejudice any future WCF proposal. Moreover, the RE and WSF would have significant usefulness and justification independent of the WCF (i.e., it is prudent to proceed to retrieve the TRU waste from current storage as soon as possible to reduce the potential for soil and groundwater contamination and to comply with RCRA requirements).

Preliminary evaluations are underway to identify waste characterization requirements and processes for a WCF. If developed, the WCF would be used to perform examination and analysis of wastes from the TSA, Environmental Restoration, and other DOE programs through visual inspections and sampling for radionuclide and RCRA hazardous constituent analysis. Information gathered in the WCF would supplement existing data bases on waste forms and composition and aid in identifying requirements for waste labeling, packaging, treatment storage and disposal. Potential environmental impacts of the WCF would be similar to those from the proposed waste retrieval and re-storage action; i.e. construction related impacts to soils, land use, water, air and socioeconomics; and operational radiological and nonradiological impacts to workers and the public. Cumulative impacts of existing RWMC waste storage and venting operations, the proposed retrieval and re-storage action and the waste characterization facility are presented in Section 4.9.

Interim environmental restoration demonstration activities, including possible waste exhumation and treatment, may be performed at Pit 9 of the SDA concurrent with the proposed retrieval, and re-storage action. The restoration activities are being planned in accordance with a proposed *Action Plan for Implementation of the Federal Facilities Agreement and Consent Order* that establishes a procedural framework and schedule for developing, prioritizing, implementing, and monitoring appropriate response actions at the INEL in accordance with the Comprehensive, Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). The action plan is part of an interagency agreement between DOE, EPA and the State. Wastes from demonstration activities may require characterization in the WCF and/or storage in WSF modules. No specific demonstration proposals have been developed at this time and little information is available regarding the volumes and characteristics of waste that may be generated. As planning proceeds, proposals will be subject to appropriate CERCLA investigations and studies and future NEPA reviews.

## 2.4 No Action Alternative

A No Action alternative would result in the continued storage of "as is" stored TRU waste at the TSA. The cover of plywood, canvas, and polyvinyl sheeting and the earth overburden would be maintained on the earth-covered pads. The present inspections, environmental surveys, and monitoring program would continue and probably be expanded. Newly-generated TRU waste would continue to be emplaced and stored in the air-supported buildings in the TSA. Upon receipt, waste would continue to be identified, visually inspected to assess container integrity, and surveyed for contamination prior to storage. As a result of no action, an increased percentage of older waste containers on TSA-1, TSA-2, and TSA-R would probably degrade and the condition of presently breached containers would continue to deteriorate. The waste presently stored in the existing air support-covered TSA storage facilities would probably remain in existing storage conditions under the No Action alternative.

The purpose of the proposed facilities and upgrades, as described in Sections 1 and 2, is to improve TSA waste storage conditions, reduce the rate of container degradation and associated environmental contamination risks, and to bring the storage conditions into compliance with RCRA. Without the proposed new facilities and upgrades, these objectives could not be achieved. The retrieval enclosure is needed for confinement, year round operations, and for re-storage of waste. Storage modules would provide additional RCRA-compliant space for reconfigured waste storage.

A No Action alternative would result in the operations control building not being built and none of the proposed electrical, fire water/potable water, communication, alarm, and sewage system upgrades being performed. This alternative would result in none of the proposed road and parking area developments being undertaken. It would also prevent the construction of the proposed dike structures around the TSA to control local water runoff. The present operations center (WMF-613) would continue to be used to house operations equipment and management personnel. Similarly, the current electrical, fire water/potable water, communication, alarm, and sewage systems would continue to be used in supporting TSA waste management operations. Without the proposed facilities and upgrades, waste management at the RWMC could be impacted to the point of delaying or preventing waste retrieval, storage operations, and other RWMC remediation activities.

## 2.5 Retrieval Without an Enclosure

If the Retrieval Without an Enclosure alternative is adopted, retrieval would proceed as described in Section 2.1 in the open air without the RE in place. Once retrieval was accomplished, one of the re-storage alternatives would be employed to store the waste. This alternative would restrict retrieval operations during winter and inclement or windy weather. Retrieval interruptions for severe weather would result in significant extension of the retrieval schedule. Thus, retrieval without an enclosure would require longer than the projected 20 to 30-year enclosed retrieval schedule. An increased percentage of waste containers would probably degrade and the condition of presently breached containers would continue to deteriorate because the retrieval schedule would be delayed and the TSA would continue to be exposed to the weather during the delays and extended schedule.

Alternative environmental and health and safety precautions would be employed in an attempt to mitigate the lack of a controlled retrieval environment. Such measures may include the use of fugitive dust suppression equipment, respirators and anti-C clothing for workers, and portable particulate filtering systems. Hazardous chemical and radiation detection monitors would be located at appropriate points. The potential for radiological and hazardous chemical emissions during retrieval without an enclosure would be higher than those expected for the proposed action, but would still be within acceptable release limits.

## 2.6 Storage Without an Enclosure

If this alternative was adopted, storage at the RWMC without an enclosure would proceed as described in Section 2.2 without the WSF in place. Alternative environmental and health and safety precautions would be employed in an attempt to mitigate the lack of a WSF. Such measures may include overpacking all retrieved waste containers in new containers to retard deterioration of the original containers.

This alternative would necessitate structural features other than enclosure that would meet spill containment and other requirements of RCRA regulations regarding storage of mixed wastes (40 CFR 260-270). Such alternatives would likely have a greater possibility than the preferred alternative of environmental damage in the event of any one of a variety of accidents.

## 2.7 Retrieval but Transportation and Storage Elsewhere

Transportation and enclosed storage of retrieved TSA waste elsewhere could entail either storage at other sites within the INEL or offsite at other DOE facilities. Offsite transportation and storage would not be a reasonable alternative because the Department of Transportation criteria would require the repackaging of much of the TRU waste prior to transportation. Facilities that could repackage stored INEL waste are not now present at the INEL. Such facilities could not be constructed and operating in time to meet the objectives of the proposed action. Also, the INEL is a designated interim storage site for mixed TRU waste, under 40 CFR 265 regulations.

TSA waste transportation and storage within an enclosure at other facilities within the INEL would not be a reasonable alternative. Storage facilities that meet the requirements of RCRA and the HWMA and can handle the expected mixed TRU waste volume, or could handle it with reasonable modifications, do not presently exist at other INEL facilities. Due to these limitations, the Transport and Storage Elsewhere alternative is not considered to be reasonable.

# 3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

## 3.1 Physical Environment

The INEL site is in southeastern Idaho at the foot of the Lost River, Lemhi, and Beaverhead mountain ranges along the edge of the Eastern Snake River Plain.

The RWMC, in the southwestern quadrant of the INEL, is in a depression circumscribed by basaltic and lava ridges. The ground surface is relatively flat, with an elevation of approximately 1,525 m (5,000 ft).

The Big Lost River is 3 km (2 mi) northwest of the RWMC at its nearest point. Earth-filled embankments were constructed in 1958 to divert high water flows away from the INEL facilities to four spreading areas, located near the RWMC. Presently, the diversion system should contain floods of 297 $m^3$/sec [1.05E+04 cfs (1.04 x $10^4$ cfs)] from the Big Lost River. The modeling results of four different Mackay Dam failure scenarios upriver from the RWMC on the Big Lost River suggest that the RWMC would not be flooded due to a dam failure. The RWMC is not located within a 100-yr floodplain.

Parts of the RWMC have been flooded three times in the last 30 years as a result of unusually rapid local snow melt. Floodwaters came in contact with buried TRU and other waste in partly filled trenches and pits in the SDA. The TSA is situated at a slightly higher elevation than the SDA and is generally outside the natural drainage system. Therefore, waste stored in the TSA was unaffected by these floodwaters. A diking system has been developed around the perimeter of the SDA to allow surface flow out of drainage channels and prevent entry of outside water. In 1985 and 1986, the Subsurface Disposal Area was recontoured to improve drainage and reduce ponding. The SDA outlet presently includes a pumping station and gravity outflow structure. As part of the preferred alternative, dike structures to further control local surface water runoff would be constructed around the TSA. These structures would supplement the existing structures around the SDA.

A summary description of the geology, soils, seismology, hydrology and water resources, air quality, meteorology, and climate of the area, with particular reference to the RWMC, can be found in Berry and Petty (1990).

Of particular interest with respect to this EA are INEL seismology and air quality. In brief, the INEL lies outside the Idaho Seismic Zone, an area of seismic activity within the Intermountain Seismic Belt. Historically, most earthquakes have not occurred on the Eastern Snake River Plain. However, in 1983 an earthquake with a Richter magnitude of 0.7 was centered 6-8 km (4-5 mi) east of the Naval Reactor Facility (see Figure 1); no damage was reported from this earthquake. Also in 1983, an earthquake with a Richter magnitude 7.3 was centered approximately 64 km (40 mi) northwest of Arco (Figure 1). No structural or safety related damage was discovered at the INEL as a result of the quake; however, new settling and hair-line cracks were located. No structural failures or waste spills occurred at the RWMC. In 1959, an earthquake with a Richter magnitude 7.1 occurred at Hebgen Lake, approximately 160 km (100 mi) from the INEL, but caused no damage at the INEL (Berry and Petty, 1990).

The area surrounding the INEL is classified as a Prevention of Significant Deterioration (PSD) Class II area, designated under the Clean Air Act, as an area with reasonably or moderately good air quality protection while still allowing moderate industrial growth. Craters of the Moon, a National Monument 31 km (19 mi) from the INEL, is classified as a PSD Class I area, where additional degradation of local air quality is severely restricted. The INEL is considered to be within a PSD Class II area.

## 3.2 Ecology and Endangered and Threatened Species

The Eastern Snake River Plain is a shrub-steppe biotic community. Vegetation at the INEL is representative of a cool desert ecosystem. The Big Lost River and associated playas provide limited aquatic habitat during some years (Bowman et al., 1984). Additional details of the ecology of the region, with particular reference to the RWMC, can be found in Berry and Petty (1990).

There are no known species listed as endangered or threatened by the U.S. Fish and Wildlife Service (50 CFR 17.11, 17.12) residing year-round on the INEL and no known critical habitats (Reynolds et al., 1986; U.S. Fish and Wildlife Service, 1990).

One resident species of milkvetch (Astragalus ceramicus Sheld. var. apus Barneby) that was being reviewed for endangered or threatened federal status was discovered on the northern INEL (Cholewa and Henderson, 1984). Since then, this species has been removed from candidate status (Moseley and Groves, 1990). Oxytheca (Oxytheca dendroidea Nutt.), found at the Central Facilities Area and to the northeast, but not known to occur near the RWMC (Cholewa and Henderson, 1984), is currently listed by the State of Idaho as imperiled (Moseley and Groves, 1990).

The bald eagle (Haliaeetus leucocephalus) is the only animal observed on the INEL that are classified by the U.S. Fish and Wildlife Service as endangered (U.S. Fish and Wildlife Service, 1990). Bald eagles winter on or near the INEL. The ferruginous hawk (Buteo regalis), long-billed curlew (Numenius americanus), and Townsend's big-eared bat (Plecotus townsendi) are candidate species for the list of threatened and endangered species that appear on the INEL (U.S. Fish and Wildlife Service, 1990). In addition, the merlin (Falco columbarius), which is considered a rare breeding and year-round resident species (Reynolds et al., 1986), is listed as a species of special concern in Idaho (Moseley and Groves, 1990).

## 3.3 Socioeconomics and Cultural Resources

There are no permanent residents at the INEL. The cities and counties nearest to the INEL are shown in Figure 1. Idaho Falls, Blackfoot, Pocatello, Arco, and Atomic City contained populations in 1988 of approximately 44,250, 10,450, 43,520, 990, and 40, respectively (Idaho Department of Employment, 1990).

The work force at the INEL varies depending on the levels of construction and research being conducted at each facility. In December 1989, the INEL employed about 7,700 persons at the site. There are approximately 110 people working at the RWMC. Other INEL employees work at the other site facilities and/or in Idaho Falls, for a total work force of approximately 12,000.

The archaeological sensitivity of the area within and near the RWMC site boundary is well documented and significant archaeological resources are known to occur. Should operation activities of the proposed action appear to threaten any resource, either historic or prehistoric, it is the DOE policy to stop activities, determine the significance of the resource, and, based on the potential significance of the resource, consult with the State Historic Preservation Office to determine a suitable mitigation plan. Additional details of the archaeology of the area, with particular reference to the RWMC, can be found in Berry and Petty (1990).

## 3.4 Land Use

The INEL is mostly in Butte County, but also extends into Bingham, Bonneville, Jefferson, and Clark counties and consists of approximately 2,305 $km^2$ (890 $mi^2$). The RWMC lies entirely within Butte County. Additional details on land use can be found in Berry and Petty (1990).

## 3.5 Summary of Background Radiation

Radiation in the vicinity of the INEL consists of natural background radiation from cosmic, terrestrial, and internal body sources. Additional background sources of radiation are medical and dental diagnosis, nuclear weapons test fallout, consumer and industrial products, air travel, and building materials. These sources result in an estimated total effective dose equivalent (EDE) to an average member of the public residing in the vicinity of the INEL of 3.5E+02 mrem/yr (DOE, 1989a; DOE, 1990b). The INEL added a potential 7.0E-03 mrem/yr to the total background EDE (0.002%), calculated using the MESODIF model for a maximum individual (DOE, 1990b). The background collective EDE (population dose) within an 80-km (50-mi) radius of the operations center of the INEL is approximately 4.24E+04 person-rem/yr (DOE, 1990b). INEL operations added a calculated 4.0E-02 person-rem/yr in 1989 (0.00009%) to the estimated total collective EDE (DOE, 1990b).

# 4. ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION AND THE ALTERNATIVES

It is expected that a net positive environmental impact would result from the proposed action because the potential for soil and water contamination by radionuclides and hazardous materials in the waste would decrease.

Negative environmental impacts resulting from the proposed action would be minimal because: 1) most of the proposed facilities would be located within or adjacent to the existing RWMC site where soil and vegetation are currently disturbed; 2) no endangered species, critical habitats, environmentally sensitive areas, or significant biological or archaeological resources are expected to be encountered; and 3) no significant negative impacts to air quality or to the health and safety of workers or members of the public would result from air emissions associated with construction or normal operations.

The following subsections provide further details and justification for these expectations.

## 4.1 Impacts to Geology, Soils, and Land Use

Approximately 2 hectares (5 acres) of relatively undisturbed soil and vegetation would be impacted due to the construction of the administration facilities, parking lot, access road, sewage lagoon and main sewage line. The impact of construction and operation of the sewage lagoon would be the same or similar at either of the two candidate sites. Erosion control measures would prevent the loss of a significant amount of soil. Soil and vegetation at the site of the proposed sewage lagoon would be displaced and the terrestrial environment would be replaced by a sewage lagoon. These disturbances would impact an insignificant percentage (approximately $\leq$0.001%) of the relatively undisturbed soil and vegetation at the INEL.

No significant negative impacts due to operations of the proposed action would occur to the geology, soils, or land use of the area. Minor amounts of soil would be continuously disturbed as a result of vehicle traffic associated with the project. It is expected that the potential for soil contamination by radionuclides and hazardous materials due to breached waste containers at the TSA would decrease as a result of the proposed waste retrieval, overpacking, and storage operations. Contaminated soil encountered during retrieval would be packaged and handled thereafter as waste.

## 4.2 Impacts to Water Resources

Water requirements of RWMC operations would increase by up to 49,210 liters/day (13,000 gal/day), as a result of the proposed action, resulting in a maximum estimated total RWMC usage of 94,635 liters/day (25,000 gal/day). This increase is within the existing capacity of the RWMC water supply and would not conflict with existing INEL water rights.

No significant negative impacts to the quality of the surface and/or subsurface water resources of the RWMC and/or the INEL are expected as a result of the proposed action. The potential for groundwater contamination by radionuclides and hazardous materials due to breached waste containers at the TSA would decrease as a result of the proposed action because of the retrieval and overpacking of breached containers.

### 4.3 Impacts to Biological and Archaeological Resources

No significant negative impacts to biological resources, either plant or animal populations, are expected from the proposed action. Habitat loss [approximately 2 hectares (5 acres)] as a result of the proposed sewage lagoon, sewage line, and RWMC site boundary extension would not significantly impact populations of animals or plants found at the RWMC. The proposed action would not affect bald eagles, an endangered species known to winter on the INEL, nor any of the candidate species. The sewage lagoon may attract vertebrate species, but no negative impacts to populations would be expected because no radiological or hazardous waste would be deposited in the sewage waste water. No critical habitats or environmentally sensitive areas occur at or near the RWMC.

The archaeological sensitivity of the RWMC area is well documented and significant archaeological resources are known to occur in the vicinity of the proposed fence extension and sewage lagoon. The identified resources generally consist of isolated scatters of lithic debris and occasional projectile points/tool fragments. Additional evaluations are being performed to determine the significance of the artifacts. The evaluation will include consultation with the State Historians Office regarding appropriate data recovery procedures.

### 4.4 Impacts to Socioeconomics

The preferred alternative could employ up to 150 construction workers at the peak of construction. Most of this work force is expected to come from within a local commuting distance, however, some immigration of highly skilled workers may occur. Temporary housing may be difficult to obtain in some localities, however, a reasonable supply of temporary housing units exists throughout the region (Bannock, Bingham, Bonneville, Butte, Jefferson, and Madison counties). It is assumed that most of the immigration construction work force would leave families behind, because of the short duration of the construction tasks associated with this proposed action, and that workers would seek available housing with the local commuting distance. Therefore, the construction work force is not expected to have a significant impact on the local economy.

The proposed action could employ approximately 40 people during the operation phase. Most of these employees would be relocated from other INEL facilities that are experiencing or anticipating reductions to work forces and the remainder of the required work force would be expected to immigrate to the area. Typically, Bonneville County is more impacted by employment changes at the INEL than any other county in the region, based upon previous studies of employee distribution and regional economics (Idaho State University, 1988).

The work force immigrating during the operational phase of the proposed action is within the normal annual fluctuation of the INEL and would result in a very small increase in the area population and the number of school age children. School construction currently in progress in Bonneville and Bingham Counties would insure adequate capacity for the small increase of students (which would be greatest in these two counties). Overall vacancy rates for housing in Bonneville County (where most new employees would reside) have been around two to three percent in 1990, with limited availability in some price ranges. New housing construction has been increasing steadily in the Idaho Falls area and would be able to accommodate the increased need for housing, assuming no other large projects are anticipated at the same time. No other significant impacts to the regional economy or public services are anticipated.

Noise levels at and near the RWMC would increase during the construction phase of the proposed action. However, the impact would be temporary and no offsite increase in noise levels are expected.

### 4.5 Impacts of Decontamination and Decommissioning

The RE and WSF would be designed to minimize the complexity and expense of eventual decontamination and decommissioning after the facilities reach design life under DOE 5820.2A. RCRA closure requirements defined in 40 CFR 264 would also be met after the facilities reached design life.

RCRA clean-closure of the ASB-2 and C&S and those portions of the RE that may be used as part of the WSF would occur. Closure of these units under interim status standards of 40 CFR 265 would involve verification sampling and analysis of the units and ancillary equipment for radiological contamination and RCRA-regulated contaminants. Depending upon the results of sampling and analysis, site characterization activities as defined by 55 FR 37174 may be required. Should site characterization indicate a release of radiological or RCRA contaminants, removal-type actions (55 FR 37174) would be undertaken. Both site characterization activities and removal-type actions, as discussed above, are currently categorically excluded (normally do not require an EA or EIS) pursuant to 55 FR 37174.

Successful verification that all RCRA-regulated waste residues are absent or have been removed to levels below predetermined cleanup levels, would result in a determination of clean-closure by the Idaho Department of Health and Welfare, Hazardous Materials Bureau. Should clean-closure not be achievable, an appropriate post-closure plan would be developed and implemented. Extensive operational radiological surveys of waste storage units to date indicate that they are free of radiological and RCRA constituent contamination.

### 4.6 Impacts to Air Quality

Air emissions of radioactive and hazardous materials from the RE may occur during retrieval operations due to the presence of breached waste containers, but they are expected to be below applicable standards. Emissions of hazardous materials and/or radionuclides would not occur from the other proposed facilities.

Impacts to air quality due to vehicle and equipment emissions during construction of the facilities are expected to be minimal. Fugitive dust during construction of the proposed facilities may temporarily affect air quality; however, dust suppression techniques would be employed and no long-term or offsite effects from fugitive dust are expected.

Impacts to air quality due to vehicle and equipment emissions during normal operations are also expected to be minimal. Conservative estimates of maximum emissions from the operation of vehicles and equipment used during operations of the RE and WSF would be below allowable State of Idaho's Permit To Construct/Prevention of Significant Deterioration (PSD) limits. Fugitive dust produced during overburden removal in the RE would be suppressed as necessary using such techniques as nonhazardous soil fixants, misting methods, dust suppression agents, and vacuum systems. Routine operations would release combustion products from propane-fired boilers and from periodic testing of stand-by generators and the firewater pump. The releases would result in a small incremental increase in total RWMC emissions and would not affect compliance with ambient air quality standards. State of Idaho air quality permits to construct will be obtained, where required for the proposed new emission sources.

The biological oxygen demand of the estimated 13.6 million liters (11.0 acre-ft/yr or 3.5 million gal/yr) of sewage generated per year during full operations is expected to be approximately 16.2 kg/day (35.8 lb/day). A 1.2-hectare lagoon would result in a loading of approximately 13.52 kg/ha (11.95 lb/acre) per day. This is a light loading and would result in a pond operating in the aerobic range without significant odors most of the time.

### 4.6.1 Nonradiological Impacts

Air emissions from the RE and air concentrations of the hazardous constituents of the waste as a result of air emissions were calculated and compared to applicable standards to determine the impact of routine operations on air quality. Concentrations at three locations were calculated: 1) WMF-613, an administrative facility approximately 137 m (450 ft) northeast of the TSA (Figure 2); 2) Experimental Breeder Reactor-I (EBR-I), a facility visited by the public 2,900 m (1.8 mi) northeast of the TSA (Figure 1); and 3) the INEL boundary where the maximum particulate air concentrations were calculated to occur, approximately 6,000 m (3.7 mi) southwest of the TSA.

For the purpose of estimating normal nonradiological air emissions a number of simplifying but conservative assumptions were made. Hazardous constituents of the waste were assumed to be those identified by Clements (1982). Hazardous constituents that would not become airborne under normal conditions, and were thus not considered here, include mercury, lithium, nitric acid, nitrates, and polychlorinated biphenyls (PCBs). Any PCBs that are present in the waste are in heavy solidified oils and would not become airborne.

Additional toxic air pollutants, as defined by Idaho's Air Quality Bureau (1989) and which are possibly in the CH TRU waste, include aluminum, aluminum oxide, asphalt fumes, copper, magnesium oxide, oxalic acid, sodium hydroxide, sulfuric acid, zirconium, and oil. With the exception of solidified oil, these chemicals are estimated to contribute a negligible fraction (< 0.00009%) to the total amount of hazardous/toxic chemicals in the TSA waste and are thus not considered further. Oil is present in sludge waste, and the percentage of total waste weight that oil makes up is estimated to be 3.4%. Oil would not become airborne under normal operations of the RE and thus is not considered further.

It was conservatively assumed that 90% of the waste containers would be retrieved intact and that no air emissions would result from intact containers. It was conservatively assumed that 10% of the containers would be breached [based on data from TSA cell penetrations in 1978, 1979, and 1984 and drum corrosion rate studies and modeling (Maughan, 1990; Berglund, 1991)] and that 0.01% of the hazardous volatile constituents and 0.0001% of the hazardous particulates (0.00005% for asbestos) that are present in intact containers would still be present, be released, and become airborne from breached containers during retrieval operations.

In reality, >99.99% of the VOCs present in breached containers would already have been released prior to retrieval operations and the release of particulates should not occur during normal operations. For conservatism, the particulate release and resuspension fraction assumed here is a factor of ten higher than that used previously (DOE, 1980). Any breached container retrieved would be overpacked prior to transport out of the RE. No significant emissions of hazardous constituents from stored waste would occur from the WSF during normal operations.

Table 1 provides calculated emission rates of hazardous constituents from the RE due to breached waste containers. The listed values for calculated particulate emissions consider 90% efficiency baghouse filtration, 90% efficiency roughing filtration, and 99.9% HEPA filtration. The inclusion of metals in the airborne emissions is conservative because they are generally in monolithic forms that would be unavailable for airborne particulate release.

Table 1. Calculated average air emission rates (mg/sec) of hazardous constituents from the RE due to breached waste containers.

| Constituent | Emission rate |
|---|---|
| 1,1,1-trichloroethane | 2.3E-02 |
| Carbon tetrachloride | 2.5E-02 |
| 1,1,2-trichloro-1,2,2-trifluoroethane | 1.5E-02 |
| Trichloroethylene | 1.6E-02 |
| Perchloroethylene | 2.5E-03 |
| Methylene chloride | 1.6E-03 |
| Methyl alcohol | 3.0E-05 |
| Butyl alcohol | 1.0E-05 |
| Xylene | 8.0E-05 |
| Total VOCs | 8.3E-02 |

Table 1. (Continued)

| | |
|---|---|
| Lead | 3.3E-09 |
| Cadmium | 1.2E-12 |
| Beryllium | 8.4E-14 |
| Asbestos | 5.5E-10 |

Table 2 provides calculated concentrations of hazardous constituents at three locations due to emissions from the RE and applicable air quality standards. Most of these substances are regulated as Toxic Air Pollutants (TAPs) by the State of Idaho and others are subject to NAAQSs limits. National Emission Standards for Hazardous Air Pollutants (NESHAP) for beryllium and asbestos do not apply to the proposed facilities and actions. The data presented in Table 2 indicate that air concentrations of hazardous chemicals resulting from emissions from the RE would be well below applicable regulatory air quality standards.

Table 2. Calculated average annual concentrations of hazardous constituents of the waste (in $\mu g/m^3$) due to normal emissions from the RE and air quality standards.[a]

| Constituent | WMF-613 | EBR-I | Site boundary | NAAQS | TAP[b] |
|---|---|---|---|---|---|
| 1,1,1-trichloroethane | 9.2E-04 | 8.2E-04 | 4.5E-04 | -- | 1.9E+06 |
| Carbon tetrachloride | 9.9E-04 | 8.8E-04 | 4.8E-04 | -- | 6.7E-02 |
| 1,1,2-trichloro-1,2,2-trifluoroethane | 5.9E-04 | 5.2E-04 | 2.8E-04 | -- | -- |
| Trichloroethylene | 6.2E-04 | 5.5E-04 | 3.0E-04 | -- | 7.7E-02 |
| Perchloroethylene | 1.0E-04 | 9.0E-05 | 5.0E-05 | -- | 2.1E+00 |
| Methylene chloride | 6.0E-05 | 6.0E-05 | 3.0E-05 | -- | 2.4E-01 |
| Methyl alcohol | 1.0E-06 | 1.0E-06 | 6.0E-07 | -- | 2.6E+05 |
| Butyl alcohol | 5.0E-07 | 4.0E-07 | 2.0E-07 | -- | 1.5E+05 |
| Xylene | 3.0E-06 | 3.0E-06 | 2.0E-06 | -- | 4.4E+05 |
| Lead | 1.3E-10 | 1.2E-10 | 6.3E-11 | 1.5E+00[c] | |
| Cadmium | 4.8E-14 | 4.2E-14 | 2.3E-14 | -- | 5.6E-04 |
| Beryllium | 3.3E-12 | 3.0E-12 | 1.6E-12 | -- | 4.2E-03 |
| Asbestos | 2.2E-11 | 2.0E-11 | 1.1E-11 | -- | -- |

[a] Concentrations were obtained by multiplying the calculated emission rates from Table 1 by the appropriate air dispersion value ($\chi/Q'$), obtained from the EPA computer model SCREEN (Brodie, 1988). The $\chi/Q'$ values (in $sec/m^3$) for emissions from the RE to WMF-613, EBR-I, and the INEL boundary are 3.9627E-05, 3.521E-05, and 1.9194E-05, respectively.
[b] State of Idaho Toxic Air Pollutants Emission Limits.
[c] National Ambient Air Quality Standards (NAAQS).

Although emissions of VOCs through the mechanical filters may result from vented and aspirated drums stored in the WSF, these would be negligible. The evidence for this is that combined emissions from the venting of drums at the

DVF and storage of vented drums in the existing C&S and ASB-2, both filled to maximum capacity (201,632 drums total), were calculated and shown to be well below applicable NAAQS (DOE, 1991). Because the capacity of the WSF, assuming an approximate 70:30 split of drums and boxes, is less than the maximum capacity of the ASB-2 and C&S combined and because the drums have already been vented, emissions from the WSF will be significantly less than those from the DVF and ASB-2 and C&S combined. Combining emissions from the DVF, ASB-2, and C&S (DOE, 1991) with those from the RE results in VOC air concentrations at EBR-I and the INEL boundary that are the same as those listed in Table 2. Thus, the addition of emissions of VOCs from the WSF would not change the results reported here.

4.6.2 Radiological Impacts

Normal releases of radionuclides from the RE were determined using the following assumptions and the CAP-88 (EPA, 1989a) model. The waste was assumed to contain 0.16 Ci/ft$^3$ and 1% of the radionuclide content of the waste was assumed to be released into the soil from the breached drums. A resuspension factor of 1.0E-04 was assumed. The source term for routine radiological emissions from the RE is provided in Table 3. The listed values consider baghouse, roughing, and HEPA filtration.

Table 3. Calculated radionuclide releases due to normal RE operations.

| Radionuclide | Release (Ci/yr) |
|---|---|
| Pu-238 | 3.87E-09 |
| Pu-239 | 2.54E-09 |
| Pu-240 | 5.84E-10 |
| Pu-241 | 1.00E-08 |
| Am-241 | 6.00E-09 |

The 0.16 Ci/ft$^3$ source term is based on the total Curie content, as modified by decay and ingrowth of daughter products, of waste stored at the TSA. Values from INEL Radioactive Waste Management Information System database were used to obtain the total number of Curies per radionuclide received each year and the ORIGEN2 code (Croff, 1980) was used to decay the radionuclides to the year 1991 and account for ingrowth of daughter products. The TSA waste inventory data base included 106 radionuclides (including 21 transuranics, 8 uranics, 34 daughters, 14 actinides, 10 fission products, 16 activation products, and 3 other natural radionuclides) that resulted in a total source term of 3.624E+05 Ci. The 3.624E+05 Ci was divided by the waste volume (2.3 million ft$^3$) to obtain an average radionuclide concentration of 0.16 Ci/ft$^3$. The radionuclide inventory was ranked based on the contribution of individual nuclides to the total inhalation dose. To perform the ranking, each nuclide Curie content was multiplied by it's respective inhalation dose conversion factor and those nuclides contributing less than 1% of the total dose were eliminated. The ranking eliminated all but the five nuclides presented in Table 3 which represent 99.7% of the total dose. The five radionuclides release fractions were then adjusted to reflect the total Curie inventory.

The 1% release of the total radionuclide content in a breached drum was assumed to conservatively bound releases of radioactive material from the containers. This is based on an assumption supported by limited inspections of containers stored for 10-12 years (Martin and Wilkins, 1992) that the containers will remain essentially intact. Holes may develop in drums and boxes, but the waste is contained in multiple barriers (i.e. container wall, poly liner, and plastic bags) and is expected to remain in the containers. In addition, most of the radioactive material is adhered to the waste (i.e., rags, concrete, pipes, etc.).

## 4.7 Health and Safety

All aspects of the proposed action addressed in this EA are designed to protect project, RWMC, and INEL personnel and members of the public. Construction and normal operational activities would proceed according to Occupational Safety and Health Act regulations (29 CFR 1900-1999). Worker exposures to hazardous and/or toxic materials would be limited and in compliance with DOE and all other applicable occupational health and safety requirements. Worker exposure to radioactivity would be as low as reasonably achievable and below the DOE radiation protection standards for occupationally related external and internal exposures. Project operating personnel would be qualified hazardous material and radiation workers.

The proposed construction and operations would be monitored by health physics and industrial hygiene personnel to ensure compliance with health and safety requirements. These personnel would participate in establishing safety and health requirements and to support planning, designs, modifications, and operations, and in the preparation of safety and health documents and detailed operating procedures. All project plans, operating procedures, and environmental and safety documentation must be approved by independent safety and health professionals in oversight organizations. During construction and operations, RWMC health physics and industrial hygiene personnel would review activity plans, prescribe safe and healthful work practices, protective equipment requirements, and engineering constraints.

### 4.7.1 Nonradiological Impacts

For the purpose of estimating the health and safety impacts of nonradiological emissions two methods were used:

1. A hazard index (HI) was calculated by summing individual hazard quotients (HQs) (EPA, 1989b). Each HQ was calculated using one of two methods, depending upon the receptor. For workers inside the RE and at WMF-613 the ambient concentrations of hazardous constituents in Table 2 were divided by appropriate American Conference of Governmental Industrial Hygienists (1989) time-weighted threshold limit values (TLVs) for long-term exposure (8-hour workday, 40-hour workweek) to airborne contaminants (EPA, 1989b). TLV's are accepted by the EPA (1989b) as appropriate standards for developing HQs. Their use is consistent with DOE Order 5480.4 and individual TLV values are generally equal to or more conservative than comparable OSHA standards. For members of the public visiting EBR-I and the

INEL boundary the ambient concentrations of nonradiological hazardous constituents in Table 2 were divided by one-hundredth of the appropriate TLV, a guideline that the State of Idaho has recently set for granting permits to construct, modify, or operate air pollution sources (Idaho Air Quality Bureau, 1989). An HI ≥1E+00 implies that the ambient concentration would result in a health risk to workers or members of the general public at the exposure point (EPA, 1989b).

2. A total nonradiological carcinogenic risk was calculated. This estimates the incremental (above background) probability of an individual developing cancer over a lifetime as a result of exposure to potential carcinogens, and is calculated by summing carcinogenic risks due to individual waste constituents (EPA, 1989b). Individual constituent risks are the product of the chronic daily intake of a constituent and the slope factor (EPA, 1989b, 1989c). Slope factors represent an upper 95th percentile confidence limit of the probability of carcinogenic response based on experimental data used in a linear multistage model (EPA, 1989c).

Table 4 presents calculated HIs and cancer risks for workers and members of the public due to emissions from the RE. HIs are at least two orders of magnitude below one; thus, noncarcinogenic health risks are not expected to be significant due to air emissions from the RE. With respect to cancer risks, EPA (1986, 1989b) states that remedial actions at Comprehensive Environmental Response, Compensation, Liability Act sites should reduce the ambient chemical

Table 4. Calculated hazard indices (HIs) and cancer risks for workers at the RE and WMF-613 and for members of the public at EBR-I and the INEL boundary.

| | Workers | | Public | |
|---|---|---|---|---|
| | RE[a] | WMF-613 | EBR-I | INEL boundary |
| Hazard Index[b,c] | 1E-03 | 4E-08 | 3E-06 | 2E-06 |
| Cancer Risk[d] | 4E-05 | 2E-08 | 4E-08 | 2E-08 |

[a] For the concentration in the RE, a simple open compartment kinetic model was used; $mg/m^3$ = [emission rate (mg/sec) from Table 1] x [an assumed air exchange rate of 1 exchange/3600 sec (1 hr)] x [1/37,260 $m^3$, the volume of the work area inside the RE].
[b] To calculate the HQ for asbestos, the TLV of 0.2 fibers/cc was converted to $mg/m^3$ by conservative assumptions and calculations of the mass of the lightest asbestos fiber (4.5E-08 mg/fiber).
[c] An HI <1E+00 implies that a health risk is not present.
[d] Excluding the carcinogenic risk due to possible lead emissions because a published slope factor for lead is unavailable (EPA, 1989c).

concentrations at sites to levels associated with a carcinogenic risk in the range of 1 in 10,000 (1E-04) to 1 in 10,000,000 (1E-07). As shown in Table 4, cancer risks are expected to be within or below this range.

4.7.2 Radiological Impacts

In 1987, the EPA determined that the specific organ dose and "whole body dose" methodology was no longer consistent with current practices of radiation protection. The effective dose equivalent (EDE) is more closely related to risk and is now in use by EPA.

EDEs were determined for the maximally exposed individual located at 100 m, at EBR-I (2,900 m), and at the INEL boundary (6,000 m) where the maximum radionuclide air concentrations were determined to occur using the EPA code CAP-88 (EPA, 1989a). Five-year (1981 to 1985) frequency meteorological data collected from the RWMC meteorological tower at the 10 m level were used to model atmospheric dispersion. In addition, the EDE received by the population within 80 km of the RWMC was determined using 1989 population data.

The EDEs for the maximum individuals and population are shown in Table 5. The EDE of 3.2E-07 mrem/yr at the maximum site boundary falls well below 1% of the 10 mrem/yr National Emission Standards for Hazardous Air Pollutants (NESHAP) promulgated by EPA (54 FR 51654) as the threshold of regulatory concern.

Increases in lifetime latent cancer fatality risks from doses reported in Table 5 would be 2E-12 for the maximally exposed individual member of the public at the INEL boundary and 9E-11 for the exposed population residing within 80-km (50 mi) of the RWMC. These latest cancer fatality risks were calculated using cancer rates in the EPA RADRISK database of CAP-88 (EPA, 1989a).

Table 5. Calculated dose consequences and latent cancer fatalities of routine releases from the RE.

| Receptor | Effective dose equivalent | Latent cancer fatalities |
|---|---|---|
| Worker at 100 m (mrem/yr) (at WMF-613) | 2.0E-06 | 1E-11 |
| Public member at EBR-I (2900 m) (mrem/yr) | 2.4E-07 | 2E-12 |
| Public member at Maximum INEL Boundary (6000 m) (mrem/yr) | 3.2E-07 | 2E-12 |
| Population within 80 km (person-rem/yr) | 2.1E-07 | 9E-11 |

4.7.3 External Irradiation

Screening calculations were made to estimate the change in external exposure to workers as a result of storing waste in the WSF modules. The current average annual occupational exposure to workers at the SWEPP office, calculated using 90-day exposures corrected for external background radiation, is 16 mrem/yr. The SWEPP office is approximately 30 m (100 ft) from the C&S and ASB-2 waste storage facilities. These facilities currently store approximately 25,000 drums and 3000 boxes of stored TRU waste. WSF Type II modules would be approximately 152 m (500 ft) or further from SWEPP and the WSF Type I module would be approximately 46 m (150 ft) from SWEPP. If we assume that each of the eleven WSF modules contributes the same exposure to a SWEPP office worker as do the C&S and ASB-2 currently, then the dose to a worker at SWEPP (the nearest office) from the WSF filled to maximum capacity is: 11 x 16 mrem/y = 176 mrem/yr. Actual doses would be considerably less because: 1) the calculation does not account for the greater distances between the SWEPP office and WSF Type II modules; 2) the storage capacity of each WSF module is less than the inventory that is currently stored in the C&S and ASB-2 combined (35,000 drum equivalents in the C&S and ASB-2 combined compared with 16,000 drums in each WSF module); and 3) the calculation does not account for the additional shielding that would be provided by the metal storage modules and air space. This bounding annual occupational dose of 176 mrem/yr is below the DOE 5.0 rem/yr limit for radiation workers and below the 1.5 rem/yr ALARA (as low as reasonably achievable) goal at the RWMC. Additionally, it is below the DOE Order 6430.1A shielding design limit of 1 rem/yr; thus, additional shielding from the WSF would not be required.

## 4.8 Potential Impacts of Accidents

Impacts associated with many accident scenarios for existing RWMC facilities are presented in the Supplemental Environmental Impact Statement, Waste Isolation Pilot Plant (DOE, 1990a), and in draft Preliminary Safety Assessments for the RE (Riedesel, 1991) and WSF (Riedesel, 1991a). Evaluated accident scenarios include the following:

- tornado, with an estimated probability of 1E-07 events/yr;
- earthquake, with an estimated probability of 2E-04 events/yr:
- volcano, with an estimated probability of less than 1E-06 events/yr;
- flooding, with an estimated probability of 4E-05 events/yr;
- fire in air-supported storage facilities, with an estimated probability of 1E-03 events/yr;
- breached container, with an estimated probability of 6E-04 events/yr;
- explosion, with an estimated probability of 1E-04 events per year;
- lightning strike, with an estimated probability of 4E-06 events/yr; and
- spills, with an estimated probability of 1.2E-02 events/yr.

A summary of the impacts of the bounding accident scenarios from these documents follows: the maximum exposure to an individual member of the public was calculated to be 2E-02 rem committed whole body dose equivalent (maximum annual dose equivalent) during the evaluated tornado accident scenario. The highest population exposure is also associated with the tornado scenario and results in a collective dose equivalent of 1 person-rem. The excess risk to the total exposed population would be 2.8E-04 latent cancer fatalities per person-rem. The highest exposure to the maximally exposed worker was calculated to be 7.0E-01 rem, resulting from a postulated fire in the air-supported building. The highest risk of excess cancer to maximally exposed individuals and average members of the public were calculated for the postulated tornado to be 6E-06 and 2E-09, respectively. The highest calculated risk of excess cancer to maximally exposed workers was 2E-04 for a postulated fire in the air-supported buildings.

Two additional accident scenarios as well as the severe tornado scenario are presented here to evaluate the impacts of high probability-low consequence accidents and a low probability-high consequence accident for facilities associated with the preferred alternative:

- a dropped and breached waste box inside the WSF (1.2E-01 events/yr);
- a dropped and breached waste box outside between facilities (1.2E-01 events/yr); and
- severe tornado (< 1.0E-07 events/yr).

The first accident scenario was a dropped waste box containing 3.17 $m^3$ (112 $ft^3$) of waste. The probability of dropping a waste container during retrieval and storage operations was estimated at 1.2E-01 events/yr. To evaluate impacts to workers and members of the public, two accident scenarios involving a dropped box were evaluated. The first was a box assumed to be dropped inside the WSF and the second was a box assumed to be dropped between the RE and WSF. The former scenario would bound the consequences of a box dropped inside the RE, which was not evaluated in detail, because fewer contaminant controls would be used inside the WSF. Thus, the potential for contaminant releases and associated impacts to workers and members of the public as a result of a box dropped inside the WSF would be larger than those resulting from a box dropped inside the RE.

It was assumed that 10% of the material in the box would be spilled. An estimated release fraction of 1.0E-04 of the spilled radioactive and nonvolatile hazardous materials in the breached waste box was assumed to become airborne when the drop occurred. These spill and release fractions are comparable to those used in DOE (1990) for similar scenarios. It was assumed that 100% of the VOCs would become airborne. The total amount of radioactive material released would be 1.8E-04 Ci.

The third accident scenario was a severe tornado, with an assumed probability of 1.0E-07 events/yr, that would result in the failure of one WSF module filled to capacity and the breaching of 100% of the waste boxes and 10% of the drums in a module (576 boxes and 1,440 drums). Boxes were assumed to contain 3.17 $m^3$ (112 $ft^3$) of waste and drums were assumed to contain 2.23 $m^3$ (7.35 $ft^3$) of waste. An estimated release fraction of 1.0E-04 of the total contained radioactive and nonvolatile hazardous materials in the breached waste containers was assumed to be released to the environment. It is assumed that 100% of the VOCs would be released to the environment. The total amount of radioactive material released to the atmosphere would be 1.2E+00 Ci. This scenario would bound the consequences of a failed RE as a result of a maximum design basis tornado because a larger inventory of waste would be available for release.

### 4.8.1 Nonradiological Impacts

The hazardous chemicals that were modeled for the accident releases are presented in Tables 6 and 7. Perchloroethylene was not considered because it is present only in the waste from one year. Butyl alcohol, methyl alcohol, and xylene were not considered because they contribute very small fractions to

Table 6. Average container headspace concentrations[a] and airborne releases for VOCs for the dropped box accident scenarios and the maximum design basis tornado accident scenario.

| VOC | Average concentration[a] (g/L) | Airborne Release (g) Dropped Box[b] | Tornado[c] |
|---|---|---|---|
| Carbon tetrachloride | 1.9E-03 | 5.70E+00 | 3.87E+03 |
| Methylene chloride | 5.0E-04 | 1.51E+00 | 1.02E+03 |
| 1,1,1-trichloroethane | 1.3E-02 | 3.93E+00 | 2.65E+04 |
| 1,1,2-trichloro-1,2,2-trifluoroethane | 1.2E-03 | 3.62E+00 | 2.45E+03 |
| Trichloroethylene | 7.0E-04 | 2.11E+00 | 1.43E+03 |

[a] Clements and Kudera, 1985.
[b] Based on 100% release of VOC gas concentrations within the entire volume of the waste box (1.2 m x 1.2 m x 2.1 m = 3020 liters).
[c] Based on 100% release of VOC gas concentrations within 576 boxes (100% breached) and 1440 drums (10% breached) in the WSF.

the total VOCs (Table 1). The assumption that every container has an average headspace concentration of VOCs within its entire volume is very conservative (Clements and Kudera, 1985).

The inclusion of the metals in the release source term is conservative because they are generally in monolithic forms that are unavailable for airborne particulate release. Hazardous constituents of the waste that were not considered to become airborne, and were thus not considered here, include mercury, lithium, nitric acid, nitrates, and PCBs.

To model the maximum WSF worker intake of dispersed chemicals in a dropped box accident a source compartment kinetic model was used to determine the reduction in air concentration with time.

Off-site exposure to hazardous chemicals from both the dropped box and the tornado accident scenarios was modeled using the Gaussian puff model (Gifford, 1968). Dispersion of the released material to receptors was modeled using the most conservative meteorological conditions for the RWMC of Stability Class F and 2 m/sec (6.5 ft/sec) wind speed.

For the maximum design basis tornado scenario, the tornado was assumed only to be an initiating event for breaching the containers. No attempt was made to determine an effective release height of the source material caused by violent air currents and funnel entrainment. An upper-bound estimate of integrated air concentrations at downwind receptors was determined by conservatively modeling air dispersion from the RWMC at ground level under unstable conditions (Stability Class A) and a wind speed of 2 m/sec.

Table 7. Average source terms and airborne releases of particulates for the dropped box accident scenarios and the maximum design basis tornado accident scenario.

| Chemical | Source Term (g) Dropped Box[a] | Source Term (g) Tornado[b] | Airborne Release (g) Dropped Box[c] | Airborne Release (g) Tornado[d] |
|---|---|---|---|---|
| Lead | 1.82E+04 | 1.22E+07 | 1.82E-01 | 1.22E+03 |
| Cadmium | 6.62E+00 | 4.44E+03 | 6.62E-05 | 4.44E-01 |
| Beryllium | 4.63E+02 | 3.10E+05 | 4.63E-03 | 3.10E+01 |
| Asbestos[e] | 3.02E+03 | 2.02E+06 | 3.02E-02 | 2.02E+02 |

[a] Average mass of chemical constituents in a waste box.
[b] Based on design basis tornado release of material from 576 boxes (100% breached) and 1,440 drums (10% breached) in the WSF.
[c] Based on 10% spill and release fraction of 1.0E-04.
[d] Based on a release fraction of 1.0E-04 from all material in 576 boxes and 1440 drums.
[e] Assumes that 50% of the waste asbestos is friable.

Table 8 presents the worker and residential health risks for exposure to the accident releases of hazardous chemicals. Estimates of worker and public exposure intakes were compared with time-weighted average TLVs (American Conference of Governmental Industrial Hygienists, 1989) and one-hundredth of average TLVs (Idaho Air Quality Bureau, 1989), respectively, to obtain hazard quotients (HQs). An HQ of <1E+00 implies that the exposure to the given chemical is acceptable.

These results indicate that exposures to hazardous chemicals for all three accidents would be below health-based reference levels. The TLV-based acceptable intake is a conservative, upper-bound reference level for an acute accident exposure, because it is based on a chronic 8 hour per day intake (EPA, 1986). A comparison of the receptor intake to other acute reference levels (e.g., immediately dangerous to life and health values) is not necessary if the TLV-based hazard quotients are <1E+00 (EPA, 1986, 1989b).

### 4.8.2 Radiological Impacts

The radionuclide releases for the dropped box and tornado accidents are presented in Table 9. The radionuclides listed in Table 9 were determined to result in 99.7% of the inhalation hazard due to the radionuclides contained in the retrievable waste.

An instantaneous puff release from a ground-level source was used to determine the radionuclide air concentrations at WMF-613, EBR-I, and the site boundary for a box dropped between the WSF and RE. The time-integrated expression of the instantaneous puff model (Gifford, 1968) was used to determine the time-integrated atmospheric dispersion factor ($\psi$/Q rather than $\chi$/Q) from which the time-integrated air concentrations were determined. The following conservative assumptions were used in the analysis: 1) the source was modeled as an instantaneous puff release at ground-level; 2) conservative "worst-case" meteorological conditions were assumed, which consisted of stable atmospheric conditions and a wind-speed of 2 m/sec; and 3) the receptor was present for the entire duration of puff passage.

Table 8. TLV-based hazard indices for hazardous chemical intakes resulting from the dropped box and tornado accident scenarios.

| | Dropped Box | | | |
|---|---|---|---|---|
| | WSF | Between Facilities | | |
| Chemical | Worker | WMF-613 | EBR-1 | Site Boundary |
| Carbon tetrachloride | 2E-03 | 7E-04 | 7E-04 | 1E-04 |
| Methylene chloride | 6E-05 | 3E-05 | 3E-05 | 6E-06 |
| 1,1,1-trichloro-ethane | 2E-05 | 7E-06 | 7E-06 | 2E-06 |
| 1,1,2-trichloro-1,2,2-trifluoroethane | 4E-06 | 2E-06 | 2E-06 | 3E-07 |
| Trichloroethylene | 6E-05 | 3E-05 | 3E-05 | 6E-06 |
| Lead | 1E-02 | 4E-03 | 4E-03 | 9E-04 |
| Cadmium | 1E-05 | 5E-06 | 5E-06 | 1E-06 |
| Beryllium | 2E-02 | 8E-03 | 8E-03 | 2E-03 |
| Asbestos | 3E-02 | 1E-02 | 1E-03 | 2E-03 |
| | | Tornado | | |
| Carbon tetrachloride | | 4E-04 | 1E-03 | 3E-04 |
| Methylene chloride | | 2E-05 | 7E-05 | 1E-05 |
| 1,1,1-trichloro-ethane | | 5E-05 | 2E-04 | 3E-05 |
| 1,1,2-trichloro-1,2,2-trifluoroethane | | 1E-06 | 4E-06 | 8E-07 |
| Trichloroethylene | | 2E-05 | 6E-05 | 1E-05 |
| Lead | | 3E-02 | 9E-02 | 2E-02 |
| Cadmium | | 3E-05 | 1E-04 | 2E-05 |
| Beryllium | | 5E-02 | 2E-01 | 4E-02 |
| Asbestos | | 8E-02 | 2E-01 | 5E-02 |

Table 9. Radionuclide releases for the box drop and tornado accident scenarios.

| Radionuclide | Box Drop (Ci/accident) | Tornado (Ci/accident) |
|---|---|---|
| Pu-238 | 3.02E-05 | 2.02E-01 |
| Pu-239 | 1.98E-05 | 1.32E-01 |
| Pu-240 | 4.55E-06 | 3.04E-02 |
| Pu-241 | 7.80E-05 | 5.22E-01 |
| Am-241 | 4.67E-05 | 3.13E-01 |
| Total | 1.79E-04 | 1.20E+00 |

The integrated puff model was also used to model the tornado impacts. The tornado was assumed to result in damage to both the RE and WSF, however, the release at the WSF was modeled to bound the impacts due to a tornado at either the RE or WSF. The tornado was assumed to initially damage the WSF and release the radionuclide inventory of 1.2 Ci. The material was conservatively assumed to be released as a puff from ground-level with the assumptions of unstable atmospheric conditions and a wind-speed of 2 m/sec. Initial dispersion parameters equal to the volume of the WSF (16,300 $m^3$) were added to account for the finite size of the initial puff.

EDE impacts were estimated for the workers and offsite maximally exposed member of the public. DOE (1988a,b,c) dose factors were used to evaluate committed EDEs.

Committed EDE impacts for the workers and public receptors are given in Table 10 for the accident scenarios. The doses presented for the tornado are conservative bounding estimates. The initial dispersion, which would take place due to the violent air currents created by the tornado, and the potential rise of the source material in the funnel were not taken into account. The increased dispersion due to unstable atmospheric conditions for a tornado was conservatively modeled using unstable atmospheric conditions and a 2 m/sec wind-speed.

Table 10. Consequences of the postulated accidents for the worker and public receptors.

| Population Group | Committed Effective Dose Equivalent (rem) |
|---|---|
| Box Drop in WSF | |
| Workers in WSF | 4.94E+00 |
| Box Drop between Facilities | |
| Workers at WMF-613 | 2.13E+00 |
| Public at EBR-I | 2.18E-02 |
| Public at the Site Boundary | 4.51E-03 |

Table 10. (Continued)

| | |
|---|---|
| Tornado | |
| Workers at WMF-613 | 1.40E+01 |
| Public at EBR-I | 4.65E-01 |
| Public at the Site Boundary | 9.65E-02 |

## 4.9 Cumulative Impacts

The relationship of the proposed action addressed in this EA to other existing and planned activities the RWMC was discussed in Section 2.3. Existing RWMC activities and proposed and foreseeable actions that are at the appropriate stage of planning for a meaningful NEPA cumulative impact analysis include the RE & WSFs, the C&S/ASB-2, and the DVF. Preliminary information and assumptions have been developed for the WCF. The cumulative environmental impacts of these facilities and the total impact of the INEL are evaluated in this section.

Annual radioactive airborne releases from routine operations of the DVF are based on venting 10,000 drums/yr and an emission control of two 99.97% HEPA filters. The estimated committed EDE for a maximally exposed individual at the maximum site boundary and the 80-km (50-mi) population dose resulting from operation of the DVF, as calculated using EPA's CAP-88, are 5.7E-07 mrem/yr and 6.6E-04 person-rem/yr, respectively.

Emissions of hazardous chemical constituents of the waste during routine operations of the DVF have been calculated and are expected to be well below applicable federal NAAQS standards. Similarly, noncarcinogenic and carcinogenic health risks due to normal operations of the DVF are expected to be insignificant, as defined in Section 4.7.1. No significant routine emissions are expected from operation of the SWEPP, the air-supported storage facilities, and the WSF.

External radiation exposures due to gamma radiation emanating from waste containers in the WSF were calculated for workers in the SWEPP office building. Detailed methodology is reported in Section 4.7.3 of this EA. Radiological and non-radiological impacts of atmospheric releases were added for all facilities for a worker at 100 m from the facilities and the maximally exposed individual (MEI) at the INEL boundary, about 6000 m south-southwest from these facilities. This is conservative for the 100 m location because that location is actually different for each facility, and therefore, the effects are not additive. Results are summarized in Tables 11 and 12. All doses, non-carcinogenic, and carcinogenic risks from airborne releases are below levels of concern. The bounding annual occupational dose of 193 mrem/yr from gamma radiation is below the DOE 5.0 rem/yr limit for radiation workers and below the 1.5 rem/yr ALARA (as low as reasonably achievable) goal at the RWMC. Additionally, it is below the DOE Order 6430.1A shielding design limit of 1 rem/yr.

The estimated EDE using the MESODIF model (Start and Wendell, 1974) to a maximally exposed member of the public resulting from all radioactive atmospheric releases from the INEL in 1989 was 7.0E-03 mrem/yr (DOE, 1990b). Individuals in southeastern Idaho received an EDE of 3.50E+02 mrem/yr in 1989 from natural background radiation sources alone (DOE, 1990b). The preferred alternative would, at a maximum add 3.2E-07 mrem/yr to the current INEL EDE. For an area with an 80-km (50-mi) radius from the operations center of the INEL, 2.1E-07 person-rem/yr due to radioactive emissions from the proposed action would, at a maximum, be added to the collective EDE of 4.0E-02 person-rem/yr from INEL activities (DOE, 1990b).

Table 11. Cumulative radiological impacts from activities related to TRU waste retrieval from the TSA at the RWMC.

| Facility | Airborne Particulate Dose (mrem/y) 100 m worker | MEI | Gamma Dose (mrem/y) SWEPP Office |
|---|---|---|---|
| DVF | 3.4E-03 | 5.7E-07 | a |
| C&S/ASB-2 | NA | NA | 16 |
| RE/WSFs | 2.0E-06[b] | 3.2E-07[b] | 176[c] |
| WCF | 9.0E-07 | 4.0E-07 | 1 |
| Total | 3.4E-03 | 1.3E-06 | 193 |

a. Included in WSF.
b. RE only.
c. WSF only.

Table 12. Cumulative non-radiological impacts from activities related to TRU waste retrieval from the TSA at the RWMC.

| Facility | Non-Carcinogenic Risk (HI) 100 m worker | MEI | Carcinogenic Risk 100 m worker | MEI |
|---|---|---|---|---|
| DVF + C&S/ASB-2 | 2E-07 | 5E-07 | 1E-07 | 5E-09 |
| RE/WSFs | 4E-08 | 2E-06 | 2E-08 | 2E-08 |
| WCF | 1E-04 | 8E-04 | 8E-05 | 8E-06 |
| Total | 1E-04 | 8E-04 | 8E-05 | 8E-06 |

Impacts of waste handling activities between the WSF, SWEPP, and the proposed Waste Characterization Facility (WCF) would be minimal because these facilities are or would be located within the RWMC near each other. Worker exposure to radioactivity would be as low as reasonably achievable (ALARA) and below the DOE radiation protection standards for occupationally related external and internal exposures. Waste handling personnel would be qualified hazardous material and radiation workers.

### 4.10 Impacts of Alternative Actions

#### 4.10.1 No Action Alternative

The No Action alternative would present a variety of environmental, programmatic, and regulatory problems. Waste containers in storage since the 1970s would continue to deteriorate and would, in the long-term, release hazardous, toxic, and/or radioactive contaminants to the soil, groundwater, and/or air. Such releases would complicate environmentally sound waste management. In the short-term, the radiological and hazardous air emissions estimated for the proposed action would not occur under the no action alternative.

Because most of the stored TRU waste was emplaced prior to RCRA, the existing storage conditions do not generally meet monitoring access, waste segregation, and spill containment provisions required by RCRA or the State of Idaho's HWMA to ensure safety and environmental protection. The No Action alternative would not support the Consent Order negotiated between DOE, EPA and the state, that requires the relocation and re-storage of mixed CH TRU and LLW in approved configuration facilities. In contrast, the proposed alternative would allow waste storage compliance with RCRA and the State's HWMA requirements.

The environmental impacts of the No Action alternative with respect to the proposed operations control building, utility upgrades, RWMC boundary extension, and sewage lagoon would be minor, because no changes in environmental quality would occur in the short-term. However, without these facilities and upgrades to the RWMC, waste management operations at the RWMC could be impacted to the point of delaying or preventing waste retrieval, storage operations, and other RWMC remediation activities.

The risk of accidents associated with the No Action alternative, where risk is here defined as probability of occurrence times consequence, is probably higher than the preferred alternative. This risk was addressed in DOE (1980) paraphrased as follows: "In the short term, the radiological consequences of no action are small. At the INEL doses to individuals of no more than 3.6E-06 rem/yr could be expected. In the long term, however, some natural events that might produce large exposures are probable."

#### 4.10.2 Retrieval Without Enclosure Alternative

Retrieval without an enclosure would result in a longer retrieval schedule due to severe weather delays and would potentially allow uncontrolled, ground-level releases of trace amounts of hazardous and radioactive constituents from the waste. The potential release of volatile organic chemicals would equal that shown in Table 1. Particulate and associated radionuclide releases would be greater than those shown in Table 3 due to the absence of emission controls. However, the expected doses to workers and the public would remain below applicable limits.

The risks and impacts of accidents associated with this alternative are probably higher than the preferred alternative because of the lack of a containment structure.

### 4.10.3 Storage Without an Enclosure Alternative

This alternative would result in an increased risk of weather-related container failures and in a higher potential risk of environmental impacts than the preferred alternative because of the lack of containment structures.

## 4.11 Summary of Impacts

A summary comparison of expected environmental impacts of alternatives for the retrieval and re-storage of TRU waste, LLW, and mixed waste at the RWMC's TSA is provided in Table 13.

Table 13. Summary comparison of environmental impacts of alternatives for TSA waste retrieval and re-storage.

| Impact | Preferred Alternative | No Action | Retrieval without RE | Re-storage without WSF |
|---|---|---|---|---|
| Geological, Soils & land use | 2 hectares soil disturbed | Possible soil contamination in future | Possible soil contamination due to fugitive dust | None |
| Vegetation | 2 hectares disturbed | None | Possible contamination due to fugitive dust | None |
| Water Requirements | Increase from 49,210 up to 94,635 l/day | No change | Similar to PA[a] | Similar to PA |
| Surface/Subsurface Water | None | Possible ground water contamination in future | None | None, unless accident |
| Archaeology | None | None | None | None |
| Wildlife | 2 hectares habitat loss | Possible contamination in long-term | Possible contamination due to fugitive dust | None |
| Endangered and Threatened Species | None | None | None | None |
| Socioeconomics | No significant impacts expected | None | Less than PA but more than NA[b] | Less than PA but more than NA |
| Air Quality | Slight increase in radiological and non-radiological emissions but below applicable standards | None presently; possible contamination in the future | Impact higher than PA but less than NA | None, unless accident |

Table 13. Summary comparison of environmental impacts of alternatives for TSA waste retrieval and re-storage. (Cont'd)

| Impact | Preferred Alternative | No Action | Retrieval without RE | Re-storage without WSF |
|---|---|---|---|---|
| Accidents | Risk higher than NA in short-term but lower than NA in long-term | Risk lower than PA in short-term but higher than PA in long-term | Risk higher than PA | Risk higher than PA |
| Health and Safety | Increase in health risk but below applicable standards or guidelines | None presently; possible future risks with environmental contamination | Same as PA | Same as PA |
| Environmental Compliance | Compliance with applicable RCRA regulations | Non-compliance | Same as PA | Same as PA |

[a] PA = preferred alternative.
[b] NA = no action alternative.

## 5. STATE AND FEDERAL REGULATIONS AND AGENCIES CONSULTED

Proposed new projects at the INEL must comply with applicable environmental protection requirements of the EPA, DOE, other federal agencies, and the State of Idaho. Table 14 summarizes applicable regulatory documents, permits, notifications, and consultation requirements.

Table 14. Environmental regulatory documents, permits, notifications, and consultation requirements for the proposed action.

| Activity, Facility or Regulation | Requirements | Lead Agency and Reference |
|---|---|---|
| Preoperational Monitoring | Characterize environmental baseline conditions/identify potential human exposure and environmental pathways | DOE, DOE Order 5480.4, |
| National Environmental Policy Act of 1969 | Environmental Assessment/ Impact Statement | DOE, 52 FR 47662 DOE Order 5440.1D 40 CFR 1500-1508 NEPA, 42 USC 4231-4347 |
| Radioactive and Nonradioactive Atmospheric Emissions | EPA approval to construct new source of radioactive emissions; intended and actual startup notifi- cations. Idaho permit to construct emission source and prevention of significant deterioration review | EPA, NESHAP 40 CFR 61, Idaho Air Quality Bureau, Rules and Regulations for the Control of Pollution in Idaho Manual, Title 1, Chap. 1 |
| Hazardous/Mixed Waste Treatment, Storage and/or Disposal | RCRA Part A<br>RCRA Part B | Idaho, Idaho has received primary responsibility for permitting and enforcement of RCRA-regulated waste, except for HSWA requirements promulgated after July 7, 1990, 40 CFR 260-270, Idaho HWMA, Title 1, Chap. 1, 54 FR 5280 |

Table 14 continued.

| Activity, Facility or Regulation | Requirement(s) | Lead Agency and Reference |
|---|---|---|
| Historic Preservation (National Historic Preservation Act and Archaeological Preservation Act | Archaeological Survey | Idaho State Historic Office, 36 CFR 800 |
| Drinking Water and Sewage Treatment Systems | Submit plans to State; Land Application Permit Approval by DOE-ID | District 6 Health Dept. for drinking water, Idaho Regulations for Public Drinking water systems, July 1985, and Idaho rules and Regulations for Individual Sewage Disposal Systems, October, 1985, Idaho Health & Welfare Division of Environment submit plans for lagoon treatment Idaho Water Quality Standards and Waste-water Treatment Requirements, Jan. 1985; DOE-ID for Land Application Permit Approval. |
| Bald and Golden Eagle Protection Act | Consultation with U.S. Fish and Wildlife Service included in NEPA process | U.S. Fish & Wildlife Service, 16 USC 668-668d |
| Endangered Species Act | Consultation with U.S. Fish & Wildlife Service included in NEPA process | U.S. Fish & Wildlife Service, 16 USC 1531 et seq. |
| Migratory Bird Treaty | Consultation with U.S. Fish & Wildlife Service included in NEPA process | U.S. Fish & Wildlife Service, 16 USC 703 et seq. |
| Floodplain/Wetlands Assessments | Floodplain/wetlands impact assessment included in NEPA process | DOE E.O. 11988, 11990 44 FR 12594, 10 CFR 1022 |

A NESHAP approval to construct application for the proposed action has been prepared. Emissions from the proposed action fall well below 1% of the 10 mrem/yr NESHAP limit promulgated by EPA (54 FR 51654), and thus do not require EPA approval. An Idaho Permit To Construct/Prevention of Significant Deterioration permit application has been prepared for the proposed RE. Appropriate permits will be obtained for building heating and stand-by generators prior to construction.

The DOE-Idaho Field Office has submitted a RCRA Part A application to EPA Region 10 for continued operation of INEL hazardous and mixed waste management facilities. The proposed RE and WSF facilities are included in the application. These facilities have interim status.

The State of Idaho has received primary responsibility for permitting and enforcement of RCRA-regulated waste in April, 1990. Mixed waste storage, treatment and disposal activities at the RWMC must comply with RCRA and State HWMA requirements. The EPA retained authority for the Hazardous and Solid Waste Amendments of 1984 (HWSA) requirements promulgated after July 7, 1990. Therefore, Idaho does not have EPA authorization for primary enforcement of California List and "thirds" land disposal restrictions in lieu of EPA.

It is DOE's policy to operate INEL waste water treatment systems in compliance with applicable federal and state requirements and to provide information on INEL water supply systems to the Idaho Department of Health and Welfare for their review. The proposed lagoon system would meet EPA and the state regulations, and would conform to best practicable current technology.

## 6. LIST OF PREPARERS

This environmental assessment has been prepared by DOE with the contractual assistance from EG&G Idaho, Inc. The following EG&G personnel contributed to the preparation of this document.

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FINDING OF NO SIGNIFICANT IMPACT
RETRIEVAL AND RE-STORAGE OF TRANSURANIC STORAGE AREA WASTE
AT THE IDAHO NATIONAL ENGINEERING LABORATORY

**AGENCY:** Department of Energy

**ACTION:** Finding of No Significant Impact

**SUMMARY:** The Department of Energy (DOE) has prepared an environmental assessment (EA), DOE/EA-0692, for the proposed action of retrieving and re-storing Transuranic Storage Area (TSA) waste at the Idaho National Engineering Laboratory (INEL). TSA waste includes contact-handled (CH) transuranic (TRU) waste, low-level waste (LLW), mixed (containing hazardous waste as designated in 40 CFR Part 261) TRU waste, and mixed LLW. The proposed action includes construction and operation of a retrieval enclosure (RE), waste storage facility (WSF), support facilities, and upgrades to associated utilities. Based on the analyses in the EA, DOE has determined that the proposed action is not a major Federal action significantly affecting the quality of the human environment, within the meaning of the National Environmental Policy Act (NEPA) of 1969. Therefore, the preparation of an environmental impact statement (EIS) is not required and DOE is issuing this finding of no significant impact.

**COPIES OF THE EA ARE AVAILABLE FROM:**

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**BACKGROUND:** The INEL lies in southeastern Idaho and consists of approximately 2,305 $km^2$ (890 $mi^2$) of Federal lands administered by DOE. The towns and cities nearest the INEL include Idaho Falls, Blackfoot, Pocatello, Arco, and Atomic City. The Radioactive Waste Management Complex (RWMC), 5.6 km (3.5 mi) from the nearest INEL site boundary in the southwestern quadrant of the INEL, is devoted to solid waste management, including waste storage, examination, and certification. Currently, 58 hectares (144 acres) of the RWMC are used for the actual disposal and storage of solid waste.

Since 1970, DOE defense-generated and other CH TRU waste has been placed in 20-year retrievable storage at the TSA. Presently, approximately 65,000 $m^3$ (2.3 million $ft^3$) of CH TRU waste are stored in drums and boxes that are stacked on three asphalt pads (TSA-1, TSA-2, TSA-R) at the TSA. Approximately 70 percent of the waste is covered with 1 to 1.5 m (3 to 4 ft) of soil or with a fabric tarpaulin. The remaining 30 percent of the waste is stored in two nearby air-supported buildings.

Approximately 95 percent of the waste stored at the TSA is assumed to be contaminated with chemically hazardous substances regulated under the Resource Conservation and Recovery Act and the State of Idaho's Hazardous Waste Management Act (RCRA/HWMA) (mixed waste) or the Toxic Substances Control Act.

Approximately 43 percent (28,000 $m^3$, or 1 million $ft^3$) of the 65,000 $m^3$ (2.3 million $ft^3$) of TSA waste is expected to be reclassified as LLW or mixed LLW. LLW is now defined as including waste containing <100 nCi/g of TRU nuclides. The remaining 57 percent (37,000 $m^3$, or 1.3 million $ft^3$) of the TSA waste is expected to remain classified as TRU waste or mixed TRU waste. DOE's strategy for long-term management of stored TRU waste at the INEL and other DOE facilities is to provide appropriate treatment, packaging, and transport to the Waste Isolation Pilot Plant (WIPP). Until WIPP is available for disposal, TRU waste or mixed TRU waste must remain in storage. Available data does not now support proposals or meaningful NEPA analysis for treatment or disposal of the reclassified mixed LLW. Preliminary studies are under way to identify alternatives, and appropriate NEPA documentation will be prepared as proposals are developed. The reclassified LLW must remain in storage until appropriate treatment and disposal facilities become available.

Because retrievable storage of TSA waste began in 1970 at the RWMC, some of the waste containers have been stored for over 20 years. It has been conservatively estimated, based on limited container integrity inspections and deterioration studies, that up to 10 percent of the TSA waste containers may be breached. This possibility of breached waste containers presents the problem of potential radiological and hazardous chemical contamination of the environment unless retrieval and re-storage occurs.

The TSA waste containers in the air-supported buildings are arranged in a dense pack configuration, which does not comply with RCRA storage regulations that require the maintenance of appropriate aisles to facilitate container inspections for deterioration and leakage and unobstructed movement of personnel or emergency equipment. Storage configuration is needed to balance the goals of RCRA inspections and emergency response and minimize radiation exposure to operations personnel.

**PROPOSED ACTION:** The proposed action is to retrieve and re-store TSA waste at the INEL's RWMC by constructing and operating the RE (over TSA Pads 1, 2, and R), the WSF, support facilities (including an Operations Control Building), and upgrades to the RWMC firewater, potable water, power, fencing, and sewage utilities.

The purpose of the proposed action is to: 1) prevent or delay possible deterioration of TSA waste containers to decrease the probability of future environmental contamination; and 2) bring the TSA waste storage facilities into compliance with RCRA and the State of Idaho's HWMA requirements.

TSA Waste Retrieval and the RE. The proposed RE would be a metal building approximately 61 m wide x 358 m long x 14 m high (200 ft x 1,175 ft x 46 ft) over TSA-R and TSA-1, with an adjacent 61 m wide x 105 m long x 14 m high (200 ft x 350 ft x 46 ft) appendage over TSA-2. Exhaust air from the enclosure would pass through a 90 percent efficiency portable baghouse dust filter, a 90 percent efficiency roughing filter, a 99.97 percent efficiency High Efficiency Particulate Air (HEPA) filter, a heat exchanger, and then be exhausted from a 18 m (60 ft) tall stack.

The retrieval process would consist of four steps: 1) removing and disposing of the soil covering the waste; 2) removing the waste containers from the air-supported buildings and from TSA pads 1, 2, and R; 3) surveying the containers for contamination and integrity and decontaminating or overpacking the containers, if necessary; and 4) re-storing the waste in a weather-protected, RCRA permitted facility, the WSF. Waste would be retrieved at a rate of approximately 2,080 $m^3$, or 10,000 drum equivalents [1 drum equivalent = 0.208 $m^3$ (7.35 $ft^3$)], per year. The proposed action would continue, therefore, for up to 30 years. This throughput may be expanded if breached or contaminated containers are encountered at a lower rate (10 percent) than was assumed for the purpose of analysis. Should greater numbers of breached or contaminated containers be encountered, the retrieval rate of 10,000 drum equivalents/yr would not be exceeded.

Waste Storage Facility. The proposed WSF would consist of a series of storage modules. Two types of modules would be designed: One storage module (Type I) would be a metal building approximately 46 m wide x 82 m long (150 ft x 270 ft), with portions of it heated for thawing waste prior to examination at the Stored Waste Examination Pilot Plant and for year-round drum aspiration. The existing drum venting facility would be enclosed within this module. Up to eight Type II storage modules would be individual metal buildings approximately 36 m wide x 72 m long x 8 m high (120 ft x 240 ft x 26 ft), with individual 9-m x 15-m (30-ft x 50-ft) storage cells. Two other Type II storage modules would be developed by modifying a portion of the RE after retrieval operations. The modifications would be performed to meet the requirements of RCRA and HWMA. The maximum storage capacity of the WSF, including the modified RE, would be approximately 40,000 $m^3$ (1.4 million $ft^3$) capacity to support proposed retrieval actions for about 19 years. If approved disposal facilities for the waste do not become available, additional Type II modules would be needed and subject to further NEPA review. Type II modules would store waste awaiting shipment to the WIPP, to a LLW or mixed LLW disposal facility, or to future waste characterization or treatment facilities.

Support Facilities and Utility Upgrades. Support facilities would consist of the Operations Control Building and additional facilities related to site development and utility upgrades. The Operations Control Building would be a metal building approximately 2,230 $m^3$ (79,000 $ft^3$) in size. It would provide space for office support operations and function as the primary entrance/exit contamination survey point for RWMC personnel.

Site development activities would include clearing, grading, and utility connections for the proposed facilities. A paved access road and parking area would be constructed, and a previously disturbed area of approximately 7,000 $m^2$ (75,000 $ft^2$) south of the TSA and outside the RWMC site boundary fence would be set aside to provide space for construction equipment during the construction phase.

The existing power distribution system within the RWMC would be expanded, through a series of manholes or above-ground pedestals connected by new underground concrete encased ductbanks, to provide electrical power and a communications and alarm system network throughout the administrative and operational areas.

A new firewater storage tank would be constructed and operated to supplement the existing RWMC water storage tank, and a 1.2-hectare (3-acre) sewage lagoon (stabilization pond) would be constructed and operated near but outside the RWMC site boundary to support RWMC operations. Two candidate sites are currently being evaluated. Finally, the RWMC site boundary fence would be extended at the northeast corner, encompassing an additional 0.8 hectares (2.0 acres) of land presently outside the boundary; additional fencing within the existing site boundary would also be constructed around the proposed facilities.

**ENVIRONMENTAL IMPACTS:** Most of the proposed facilities and activities would be located within the existing RWMC site boundary where soil and vegetation are currently disturbed. No impacts to endangered and threatened species and their habitats or archaeological resources are expected as a result of the proposed action. If archaeological resources are found during the construction phase, DOE will evaluate the significance of the resources in consultation with the State Historic Preservation Officer.

Air Quality and Health and Safety Risks. Radioactive and hazardous substance emissions may occur from the RE during normal waste retrieval operations due to the presence of breached waste containers. Calculated emission rates of hazardous pollutants from normal operations would be below applicable National Ambient Air Quality Standards and State of Idaho Toxic Air Pollutant Emissions Limits. Estimates of air concentrations of hazardous substances for three locations away from the RE (e.g., one location 137 m (450 ft) northeast) were also below applicable regulatory standards. The risk of a fatal cancer for workers at the RE is estimated to be 4 x $10^{-5}$ and for a maximally exposed member of the general public at the INEL boundary is estimated to be 2 x $10^{-8}$.

Estimates of radionuclide (Pu and Am isotopes) emissions from normal operations of the RE ranged from 5.84 x $10^{-10}$ to 1.00 X $10^{-8}$ Ci/yr. Effective dose equivalents (EDEs) for the maximally exposed individual at the INEL boundary were estimated to fall well below the EPA National Emission Standards for Hazardous Air Pollutants (NESHAP, 54 FR 51654) and would represent at a maximum a 0.007 percent increase in the site-wide INEL EDE to a maximally exposed individual. The EDE received by the population within 80 km (50 mi) of the RWMC was calculated to be 2.1 x $10^{-07}$ person-rem, which would represent an incremental lifetime risk of 9 x $10^{-11}$ fatal cancers. Worker exposure at the RE would be kept as low as reasonably achievable, in accordance with the DOE radiation protection standards for occupationally related external and internal exposures. Worker exposure at the nearest facility (100 meters away) was estimated to be 2 x $10^{-6}$ EDE, which would represent a incremental lifetime risk of 1 x $10^{-11}$ fatal cancers.

Air emissions of hazardous constituents and radionuclides from normal operations of the other proposed facilities would not occur or would be negligible.

The impacts on the public and workers were analyzed for 12 accident scenarios. A tornado, with an estimated probability of $1 \times 10^{-7}$ events per year, was the bounding accident scenario for the public, with a risk of excess fatal cancer from radiation exposure to the maximally exposed individual of $6 \times 10^{-6}$ and to members of the general population of $2 \times 10^{-9}$. A dropped and breached waste box inside the WSF, with an estimated probability of $1.2 \times 10^{-1}$ events per year, was the bounding accident scenario for workers, with a committed effective dose equivalent of about 5 rem.

Other Impacts. Water requirements of INEL waste operations would double, but the increase would be within the existing capacity of the water supply and would not conflict with existing INEL water rights. Noise levels at and near the RWMC would increase during the construction phase of the proposed action; however, the impact would be temporary and no increase in offsite noise levels are expected. A beneficial environmental impact is expected to result from the proposed action because the potential for soil and water contamination by radionuclides and hazardous materials would decrease as a result of retrieval and improved re-storage conditions.

Cumulative Impacts. Cumulative impacts of existing air-supported waste storage and drum venting facilities, the proposed retrieval and re-storage facilities, and a potential future waste characterization facility (for which NEPA documentation is in the planning stages) were evaluated. Cumulative exposures to radiological and nonradiological airborne releases from routine operations were analyzed for workers, the maximally exposed individual at the INEL boundary, and the population within 80 km (50 mi), and were shown to be well within standards.

**ALTERNATIVES CONSIDERED:** Four alternatives to the proposed action have been considered: 1) no action, 2) retrieval without an enclosure, 3) storage without an enclosure, and 4) retrieval, but transportation and storage elsewhere.

The no action alternate would result in the continued "as is" storage of waste at the TSA. Existing storage conditions would continue in conflict with RCRA and HWMA monitoring access, waste segregation, and soil containment requirements. Newly-generated TRU waste would be emplaced and stored in the air-supported buildings in the TSA. As a result of no action, an increased percentage of older waste containers on TSA-1, TSA-2, and TSA-R would probably degrade and the condition of presently breached containers would continue to deteriorate.

The alternative of retrieval without enclosure would result in a seasonal retrieval process that would lengthen the total time of the proposed action and would result in emissions of hazardous and radioactive constituents of the TSA waste greater than those expected for the proposed action. Alternative environmental and health and safety precautions would be employed in an attempt to mitigate the lack of a controlled retrieval environment. The potential for radiological and hazardous chemical emissions during retrieval without an enclosure would be higher than those expected for the proposed action.

The alternative of storage without an enclosure would require alternate environmental and health and safety precautions to mitigate the lack of an enclosed storage area. Such measures may include overpacking all retrieved waste to retard deterioration of the original containers. The potential for environmental damage would be greater than under the preferred alternative in the event of any of the accidents considered for the proposed action.

The alternative of retrieval but transportation and storage elsewhere would require either storage at other sites within the INEL or offsite at other DOE facilities. Adequate storage facilities that meet the requirements of RWMC and the HWMA do not presently exist at the INEL. Offsite transportation and storage would require the repackaging of much of the TRU waste to meet DOT criteria for TRU waste packaging, and facilities are not present at the INEL to repackage waste. In addition, adequate RCRA storage facilities do not presently exist at other DOE facilities. Therefore, this alternative would require construction of adequate storage facilities elsewhere and, for offsite storage, would pose repackaging and transportation risks that would not exist under the proposed action.

**DETERMINATION:** The proposed retrieval and re-storage of TSA waste at INEL, including the proposed RE, WSF, support facilities, and associated upgrades to utilities, does not constitute a major Federal action significantly affecting the quality of the human environment within the meaning of NEPA. This finding is based on the analyses in the EA. Therefore, an EIS is not required.

Issued at Washington, D.C., on May 18, 1992.

for Paul L. Ziemer, Ph.D.
Assistant Secretary
Environment, Safety and Health