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Superfund Record of Decision:

Mountain Home Air Force Base, ID

50272-101

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15. Supplementary Notes

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16. Abstract (Limit: 200 words)

The 130-acre B-Street Landfill is part of the Mountain Home Air Force Base located approximately 10 miles southwest of Mountain Home, Elmore County, Idaho. Land use in the area is predominantly residential and agricultural with approximately 7,000 people residing on the Base. Ground water is the source of drinking water and is also a source of irrigation and drinking water for nearby farm residents. The B-Street Landfill is located in the northwest corner of the base in an industrial area that is situated close to the runway and other industrial/occupational facilities. Between 1956 and 1969, the landfill served as the main disposal area for municipal solid waste at the base. It also served as a disposal site for miscellaneous construction debris, rubble, empty drums, and coal ash until 1990, when the majority of landfilling activity ceased. Occasionally asbestos-containing material was disposed in one of the trenches. The landfill consists of five areas: a trench area, consisting of five trenches that received general refuse, empty cans and drums, including empty pesticide drums, and industrial wastes such as petroleum, oil and lubricant (POL) wastes, oils, solvents, jet fuels, and tank cleaning sludge; a drum disposal area that was used for surface storage of drums containing solvents, waste fuels, other petroleum products, and pesticides; an ash disposal area where approximately 924,000 ft^3 of ash from the

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Mountain Home Air Force Base, ID
Second Remedial Action
Contaminated Medium: None
Key Contaminants: None

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 96
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(See ANSI-Z39.18) *See Instructions on Reverse* OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

Abstract (Continued)

coal-firing power plant were disposed; a rubble area that comprises more than half of the landfill and contains surface deposits of debris, such as concrete, asphalt, and ash; and a burn area that was used to burn trash including roots, wood, and other combustible items. Additionally, up to 20 drums of DDT may have also been placed in the trenches, however, this has not been verified by historical records. In 1982, the U.S. Air Force (USAF) began conducting environmental assessments at the base and identified areas with the greatest potential for environmental impact, one of which was the B-Street Landfill. A 1992 ROD addressed onsite soil at the Fire Training Area, as OU4. Future RODs will address ground water contamination and other source areas. This ROD provides a final remedy for the onsite soil, as OU2. Subsequent investigations have determined that chemical concentrations in the soil at the landfill pose no unacceptable risk to human health or the environment and that no further remedial action is necessary; therefore, there are no contaminants of concern at the site.

The selected remedial action for this site is no further action. Based on the results of the human health risk assessment, the USAF, EPA, and the State have determined that the chemicals concentrations in the soil pose no unacceptable risks to human health or the environment. There are no costs associated with this no action remedy.

PERFORMANCE STANDARDS OR GOALS:

Not applicable.

MOUNTAIN HOME AIR FORCE BASE, MOUNTAIN HOME, IDAHO
DECLARATION FOR THE RECORD OF DECISION
LANDFILL NO. 2, OPERABLE UNIT 2

SITE NAME AND LOCATION

Mountain Home Air Force Base, LF-02
Landfill No. 2 (B Street Landfill), Operable Unit 2
Mountain Home, Elmore County, Idaho

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected final remedial action for Landfill No. 2 (B Street Landfill, LF-02) at Mountain Home Air Force Base in Mountain Home, Idaho. The selected remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA or Superfund), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record for this site.

The lead agency for this decision is the U.S. Air Force (USAF). The U.S. Environmental Protection Agency (EPA) approves of this decision and, along with the State of Idaho Department of Health and Welfare (IDHW), has participated in the scoping of the site investigation and evaluation of remedial investigation report. The State of Idaho concurs with the selected remedy.

DESCRIPTION OF THE SELECTED REMEDY

USAF, EPA, and IDHW have determined that no remedial action is necessary under CERCLA at the B Street Landfill to ensure protection of human health and the environment. This decision is based on the results of the Remedial Investigation (RI) and baseline human health risk assessment and ecological evaluation. The risk assessment determined that hazardous substances remaining in the soil pose no unacceptable risks to human health or the environment under current and probable future use scenarios. Because there are uncertainties associated with the assumptions used in the groundwater model, the Operable Unit 3 (OU 3) base-wide groundwater investigation and verification will address whether monitoring is needed at B Street Landfill.

DECLARATION STATEMENT

The no action remedy is protective of human health and the environment. However, there are uncertainties associated with the assumptions in the risk assessment at the Trench Area due to the number of samples collected and the heterogeneous nature of the wastes. Additionally, there is the possibility of trench disposal in the Rubble Area. For these reasons, the no action remedy may result in hazardous substances remaining on-site that do not allow for unlimited use and unrestricted exposure. Therefore, a statutory 5 year review will apply to this site.

Signature sheet for the foregoing Landfill No. 2 Record of Decision between the U.S. Air Force and the U.S. Environmental Protection Agency, with concurrence by the Idaho Department of Health and Welfare.

Dana A Rasmussen — 5/24/93

Dana A. Rasmussen
Regional Administrator, Region 10
U.S. Environmental Protection Agency

Date

Signature sheet for the foregoing Landfill No. 2 Record of Decision between the U.S. Air Force and the U.S. Environmental Protection Agency, with concurrence by the Idaho Department of Health and Welfare.

WSHinton — 28 May 93

WILLIAM S. HINTON, JR.
Brigadier General, USAF
Commander, 366th Wing

Date

Signature sheet for the foregoing Landfill No. 2 Record of Decision between the U.S. Air Force and the U.S. Environmental Protection Agency, with concurrence by the Idaho Department of Health and Welfare.

Jerry L. Harris 6/15/93
Date
Jerry L. Harris
Director
Idaho Department of Health and Welfare

MOUNTAIN HOME AIR FORCE BASE
B STREET LANDFILL
MOUNTAIN HOME, ELMORE COUNTY, IDAHO

INTRODUCTION

Mountain Home Air Force Base (the Base), near Mountain Home, Idaho, was listed on the National Priorities List (NPL) in August 1990, under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA, or Superfund), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA).

In 1992, the United States Air Force (USAF) performed a Remedial Investigation (RI) and baseline human health risk assessment for Landfill 2 (LF-02), also known as the B Street Landfill, which is included in Operable Unit 2 (OU2). The RI was performed in accordance with Executive Order 12580 (Superfund Implementation) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The RI characterized the nature and extent of contamination in soils for the B Street Landfill and evaluated potential effects on groundwater, using a computer model. The USAF also conducted a baseline human health risk assessment for the B Street Landfill to evaluate potential effects of the landfill contaminants on human health. Potential environmental risks were also evaluated in the risk assessment.

This document is a Record of Decision (ROD) that presents the selected no action remedy for the B Street Landfill and provides the rationale for that selection, in accordance with the NCP.

I. SITE NAME, LOCATION, AND DESCRIPTION

Mountain Home AFB is located in a rural agricultural area about 10 miles southwest of Mountain Home in Elmore County, Idaho (Figure 1). The Base occupies an area of 9 square miles. The total resident population of Mountain Home AFB is about 7,000 people.

The Snake River is about 2.5 miles south of the Base, but no permanent streams exist on or near the Base. Groundwater is found at approximately 350 feet below ground surface (bgs).

Groundwater is the source of drinking water at the Base and is a source of irrigation and drinking water for nearby farm residents. The Base has nine Base Production Wells (BPWs); the closest production well to the B Street Landfill is BPW No. 2, which is located approximately two-thirds mile southeast of the B Street Landfill (Figure 4).

B Street Landfill is located in the northwest corner of the Base in an industrial area within close proximity to the runway and other industrial and occupational facilities. The nearest residence to the B Street Landfill is on the Base, approximately one mile to the southeast of the landfill. Off the Base, land use adjacent to the B Street Landfill is agricultural.

The B Street Landfill encompasses approximately 130 acres and consists of a Trench Area, Drum Disposal Area, Ash Disposal Area, Rubble Area, and Burn Area (Figure 2). All areas of the B Street Landfill have been closed since 1990, with the exception of Trench 3. Trench 3 continues to receive asbestos waste on a periodic basis and is regulated by the Toxic Substance Control Act (TSCA).

The Trench Area contains five trenches. Four of the trenches are located in the southwest part of B Street Landfill. The fifth trench is located approximately 1,000 feet to the north. Trench 3, the asbestos waste trench, was not included as part of the OU2 investigation because it is regulated under TSCA rules. The Drum Disposal Area, once used to store drums, is a small site (80 feet to 100 feet diameter) located in the north part of B Street Landfill. Although the volume of material in the drums stored at the Drum Disposal Area is not known, sample results indicate low levels of contamination in the soil. The Ash Disposal Area is approximately 1,000 feet by 1,000 feet, where discrete piles of coal ash from the coal-firing power plant were disposed. The Rubble Area comprises more than 50 percent of the landfill and primarily consists of runway debris and other concrete rubble placed on the land surface. An interview with a former employee indicated that additional trenches may be present underneath a portion of the Rubble Area, although this has not been verified in available records. In addition, a subsequent interview with the same former employee did not corroborate the existence of the trenches. The Burn Area consists of a site about 20 feet by 20 feet where trash such as wood, roots, and other miscellaneous items were burned.

II. SITE HISTORY, RESPONSE HISTORY, AND ENFORCEMENT ACTIVITIES

A. SITE HISTORY

The B-Street Landfill served as the main Base sanitary landfill between 1956 and 1969. It also served as a disposal site for construction debris, rubble, empty drums and coal ash until 1990, when all landfilling activity ceased except for occasional disposal of asbestos waste in Trench 3, which is regulated by TSCA. B Street Landfill consists of a Trench Area, Drum Disposal Area, Ash Disposal Area, Rubble Area, and Burn Area. Each area is described below.

1. Trench Area

The Trench Area served as the main Base sanitary landfill between 1956 and 1969. A total of five trenches were excavated. Excavation of the first trench began in 1955. By 1969, five trenches had been excavated and one trench was filled. Photographs taken in 1977 and 1988 show little or no change from photographs taken in 1969. Locations of the trenches are shown on Figure 2.

Trenches 1, 2, and 4 are about 50 feet in width by 400 feet in length; Trench 5 is about 40 feet by 100 feet. The depths of the trenches, as shown by the field investigation, ranged from 6 to 17 feet for Trench 1, from 6 to 9 feet for Trench 2, and from zero to 4 feet for Trench 4. Trench 5 is a surface scrape with bedrock at a depth of less than 1 foot. The trenches are covered by native soil with thicknesses ranging between 1 to 5 feet. As stated earlier, Trench 3 is not included in this investigation of the B Street Landfill.

The following materials are believed to have been disposed of in the trenches (excluding Trench No. 3, the asbestos trench): general refuse; garbage; empty cans and drums, including empty pesticide drums; and industrial wastes such as petroleum, oil, and lubricant (POL) wastes, oils, solvents, jet fuels, and tank cleaning sludge (oil/water separator sludge). Up to 20 drums of DDT may have been placed in the trenches. However, this has not been verified by historical records, interviews, or field investigations.

Wastes were reportedly routinely burned and covered with native soils on a weekly basis after disposal in the trenches. General refuse and industrial wastes appear to have been randomly disposed together in the trenches.

2. Drum Disposal Area

The Drum Disposal Area was once used to store drums on the soil surface. No burial of drums occurred. Drums once stored at the site may have contained solvents, waste fuels, other petroleum products, pesticides, or herbicides. Although the volume of material in the drums stored at the Drum Disposal Area is not known, sample results indicate low levels of contamination in the soil. The soil layer above the bedrock is shallow (0.5 to 1 foot thick), although thicker piles of soil, ash, and other debris are present.

The Drum Disposal Area is roughly round and about 80 to 100 feet in diameter, with an oval-shaped depression about 20 feet across and 2 to 3 feet deep within the round area. Various debris, scrap metal, and several 5-gallon buckets of pavement crack sealer were observed during the field investigation. Fifty-five gallon drums were not observed during the field investigation.

3. Ash Disposal Area

Ash from the coal-firing power plant was placed in the Ash Disposal Area. The total volume of ash disposed of in this area is estimated to be approximately 924,000 cubic feet. There is no evidence of other potentially hazardous materials being placed in this area. The Ash Disposal Area is approximately 1,000 feet by 1,000 feet and lies between the Trench and Drum Disposal Areas (Figure 7).

4. Rubble Area

The Rubble Area comprises more than half of B Street Landfill. This area contains surface deposits of debris, such as concrete from runway renovation, asphalt, and ash from the coal-fired power plant. No known or suspected hazardous material disposal activities occurred on the ground surface at the Rubble Area. A former Mountain Home AFB employee has indicated that refuse trenches may underlie the Rubble Area. However, this has not been verified by aerial photographs, other historical records, or other interviews with employees.

Aerial photographs and interviews indicate that borrow pits were dug in the north and northeast areas of the landfill and on the south side of B Street road near monitoring well 5 and that these areas were not used for landfilling wastes (see Figure 4).

5. Burn Area

The Burn Area consists of a site about 20 feet by 20 feet. The area was used to burn trash, such as roots, wood, and other miscellaneous combustible items. No known or suspected hazardous material disposal activities occurred. Therefore, no sampling was conducted for the RI. In 1991, the area was observed to contain some miscellaneous debris, such as wood.

B. RESPONSE HISTORY

In 1982, the USAF began conducting environmental assessments at Mountain Home AFB under the Department of Defense (DOD)

Installation Restoration Program (IRP). The purpose of the program is to evaluate past and current use of toxic and hazardous materials and to assess the potential for off-site migration of such materials.

A Phase I Records Search was conducted that identified three sites at the Base with the greatest potential for environmental impact, one of which was the B Street Landfill. A monitoring well was installed at the B Street Landfill as part of the Phase II Stage 1 Site Investigation. During a Phase II Remedial Investigation conducted in 1987 and 1988, three additional groundwater monitoring wells were installed at the Trench Area. Soil samples were collected at the Trench Area and Drum Disposal Area. The sampling and analytical program detected little evidence of contamination in soil, except for elevated concentrations of a few semivolatile organic compounds (phthalates) and petroleum hydrocarbons in several soil samples. No evidence of groundwater contamination was detected in the monitoring wells. However, it has not been confirmed that existing wells are downgradient, and therefore, representative of possible groundwater contamination from the site.

In August 1990, Mountain Home AFB was listed on the NPL under CERCLA because of detection of halogenated methanes and other organic compounds in Base drinking water wells.

Following listing on the NPL, additional remedial investigation was undertaken at the B Street Landfill. This investigation was necessary to characterize the nature and extent of contamination at the B Street Landfill and to assess the potential for adverse effects on human health and the environment.

C. ENFORCEMENT ACTIVITIES

On January 29, 1991, USAF, EPA, and IDHW entered into a Federal Facilities Agreement (FFA). The FFA established a procedural framework and schedule for developing, implementing, and monitoring appropriate response actions conducted at Mountain Home. Under the terms of the FFA, EPA and IDHW provided oversight of subsequent RI activities and agreed on the final remedy set forth in this ROD.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

Public participation requirements under Sections 113(k)(2)(B)(i-v) and 117(a) of CERCLA, 42 U.S.C. §§ 9613(k)(2)(B)(i-v) and 9617, were satisfied during the RI process. The Mountain Home AFB Public Affairs Office has primary responsibility for conducting the community relations program. The following community relations activities were conducted during this RI:

- Creation of a Community Relations Plan as part of the overall management plan for OU2. The Community Relations Plan was designed to promote public awareness of the investigations and public involvement in the decision-making process.

- Establishment of an Administrative Record to provide the basis for the selected remedy. The Administrative Record is available for public review in the information repository at the following locations:

  Mountain Home Public Library
  790 North 10 East
  Mountain Home, Idaho 83647
  Phone: (208) 587-4716

  Mountain Home Air Force Base
  1100 Liberator
  Mountain Home, Idaho 83648-5426
  Phone: (208) 828-2750

- Creation and distribution of a Proposed Plan for the no action alternative at the B Street Landfill. The purpose of the Proposed Plan was to provide the public and other interested parties with the information that was used to come to the no action determination and to announce the public comment period and public meeting dates.

- Distribution of periodic news releases and fact sheets announcing various on-site activities, results of investigations, and explanations of the investigative process. These included:

  1. A news release on January 22, 1993, to the list of contacts and interested parties noted in the Community Relations Plan and to various local newspapers, radio stations, and television stations advertising the public meeting for B Street Landfill at the Mountain Home High School on February 11, 1993.

  2. A paid advertisement in the Mountain Home and Idaho Statesman newspapers was run on January 27, 1993, and February 9 to February 11, 1993, respectively, announcing the public meeting at the Mountain Home High School.

- Development of a mailing list composed of persons interested in the project and public officials.

- Commencement of a public comment period on the no action alternative from January 27, 1993, to February 25, 1993.

- Discussion of the no action alternative and receipt of public comments at the public meeting held on February 11, 1993, at the Mountain Home High School, Mountain Home, Idaho.

- Consideration of oral and written comments in selection of the no action alternative. The comments and responses are summarized in the Responsiveness Summary section of this ROD.

- Preparation of a responsiveness summary that addressed comments and questions received during the public comment period on the RI and Proposed Plan and inclusion in this ROD.

Public interest in the B Street Landfill site has been low throughout the history of site investigative activities. No public concerns or issues were raised during the investigation.

IV. SCOPE AND ROLE OF OPERABLE UNIT AND RESPONSE ACTION

There are several sites at the Base which may contain hazardous substances that pose a threat to human health and the environment. A site is a specific location where a hazardous substance may have been stored or disposed. These sites are divided into manageable operable units (OUs) consisting of one site or a group of sites, which can logically be investigated as part of one unit. Currently, the Base is divided into six OUs. These OUs and their status are:

- OU 1 - A Limited Field Investigation (LFI) was performed on 21 sites and has been completed.

- OU 2 - A RI and baseline human health risk assessment and ecological evaluation on the B Street Landfill and the Lagoon Landfill sites were performed. The RI, which includes the risk assessment at the B Street Landfill site, is the subject of this ROD.

- OU 3 - A Base-wide Groundwater Remedial Investigation/Feasibility Study and baseline human health risk assessment (RI/FS), a base-wide ecological risk assessment and a RI/FS at source areas SS-11, RW-14, ST-13, ST-31, ST-32, ST-34 and ST-35 are currently being performed. This OU is planned to be the final OU at the Base.

- OU 4 - An RI with a baseline human health risk assessment at Fire Training Area 8 was completed. It was determined that the site does not pose an unacceptable risk to human health and the environment, and a no action ROD was signed in June 1992.

- OU 5 - A removal action at the Low-Level Radioactive Material Burial Site was completed.

- OU 6 - A RI/FS is currently being performed at the Entomology Shop, Former Auto Hobby Shop, Flight Line Storm Drain, and Vehicle Wash Rack sites. A LFI is also being performed at the Munitions Disposal/Popping Furnace, Drum Accumulation Pad, and Fire Training Area 8 Underground Storage Tank sites. OU 6 is scheduled to be completed prior to OU 3.

OU 2 Response Action Determination

The results of the RI at the Lagoon Landfill indicate that additional data on groundwater is needed to make a decision on remedial action. Additional data needs and the remedial action decision at the Lagoon Landfill site will be addressed as part of OU 3.

For the B Street Landfill, the RI and baseline human health risk assessment evaluated the nature and extent of soil contamination through soil sampling and analysis. A computer model was used to evaluate the potential for leaching of contaminants to groundwater. The baseline human health risk assessment quantitatively assessed potential health risks from exposure to chemicals of concern at the landfill by soil, air, and groundwater exposure pathways and qualitatively assessed the potential for significant adverse environmental impacts. A base-wide ecological assessment is being conducted in a separate operable unit (OU 3). In addition, because there are uncertainties associated with the assumptions used in the groundwater model, the OU 3 base-wide groundwater investigation and verification will address whether monitoring is necessary at B Street Landfill.

Based on the results of the RI and baseline human health risk assessment and ecological evaluation, no remedial action under CERCLA is necessary to ensure protection of human health or the environment under current and probable future use scenarios. However, because there are uncertainties associated with the risk assessment at the Trench Area (due to the number of samples collected, the heterogenous nature of the wastes, and the possibility of trench disposal in the Rubble Area), the no action remedy may result in hazardous substances remaining on-site that do not allow for unlimited use and unrestricted exposure. Therefore, a statutory 5-year review of the site will apply.

V. SUMMARY OF SITE CHARACTERISTICS

A. TOPOGRAPHY, SURFACE FEATURES, AND CLIMATE

Mountain Home AFB is located on the Mountain Home Plateau, a rolling upland plain covered primarily with lava and windblown sediment. Scattered shield volcanoes and cinder cones rise several hundred feet above the plain. The plateau slopes gently downward toward the north, west, and southwest. Elevations range from 2,700 to 3,200 feet above mean sea level (MSL). The topography at the B Street Landfill is essentially flat, with an average elevation of 3,020 feet MSL over most of the site, including some depressions and small topographic highs.

The Snake River forms the southern and southwestern boundary of the Mountain Home Plateau. The plateau is drained by a series of intermittent streams that discharge to the Snake River during rainy periods.

The climate at Mountain Home AFB is arid. The area receives about 8 inches of precipitation annually. Evapotranspiration (ET) has been calculated by Mundorff at 5 to 9 inches per year. This results in an annual net precipitation of about +3 inches to -1 inch. The 100-year, 24-hour storm event results in 2 inches of precipitation. The 25-year, 24-hour storm event results in 1.6 inches of precipitation.

Area wind directions are highly variable, arising predominantly from the northwest during the spring and summer and from the east and east-southeast during the fall and winter.

B. REGIONAL AND SITE GEOLOGY

1. Regional Geology

The Mountain Home Plateau, on which Mountain Home AFB is located, is underlain by over 10,000 feet of volcanic and sedimentary rocks. The principal geologic formations of interest are the Glenns Ferry Formation, the Bruneau Formation of the Idaho Group, and the Snake River Group, which is the uppermost bedrock unit. The Snake River Group, which is 550 feet thick, consists of several basalt flows and unconsolidated alluvial deposits. The basalt originated from volcanic sources as much as 60 miles east of Mountain Home AFB. The Snake River Group forms the bedrock at Mountain Home AFB and elsewhere in the Mountain Home Plateau.

Wind-blown and alluvial deposits overlie the Snake River Group. These deposits consist of a layer of unconsolidated silt and sand ranging in thickness from several inches to approximately 30 feet.

2. Site Geology

Four monitoring wells (MW-2, MW-3, MW-4, and MW-5) were drilled at the B Street Landfill in 1984 and 1987 (Figure 2). Basalt was encountered in all four monitoring well borings at 18, 7, and 4 feet below ground surface (bgs), respectively, and continued to the boring completion depths. Some shale zones were noted at various depths within the basalt. Overlying the basalt is a deposit of wind-blown silt and sand containing some caliche (calcium carbonate). A cross-section of local geology at the B Street Landfill is shown in Figure 3.

C. SOILS

Soils at Mountain Home AFB are typical of the entire plateau, consisting mostly of wind-blown silt and sand.

Soil at B Street Landfill consists of 0.5 to approximately 20 feet of wind-deposited silt and sand with some caliche cemented zones. Disturbed areas contain varying amounts of refuse mixed in with the soils, and several localized areas are overlain by large quantities of coal combustion ash from the coal-fired plant on the Base.

D. HYDROGEOLOGY

The regional aquifer is in the Glenns Ferry Formation and the Bruneau Formation. Groundwater occurs in the sedimentary deposits and basalt flows of the formations. Wells in the Glenns Ferry Formation yield up to 350 gallons per minute (gpm). Wells in the Bruneau Formation yield from 10 to 3,100 gpm.

In the vicinity of Mountain Home AFB, regional groundwater flows in a southerly direction toward the Snake River at a gradient of about 1 foot per 200 feet. The principal recharge area for the aquifer underlying the Mountain Home Plateau is in the mountains north of the plateau where precipitation infiltrates directly into rock outcrops. A small amount of recharge is probably provided by deep percolation of intermittent stream flow and excess irrigation water.

Drinking water at Mountain Home AFB is obtained from nine Base production wells completed in the Bruneau Formation (Figure 4). The Base production wells range in depth from 379 feet to 610 feet bgs. The water table at the Base occurs at a depth of about 350 feet bgs. Calculations of aquifer transmissivities (rate of water movement through the aquifer) for the Base production wells result in values ranging from 65,000 to 650,000 gallons per day per foot. An average yield of 1,094 gpm was calculated in 1987 from available well production data.

Within a 2-mile radius of the Base, about 35 private wells have been drilled, ranging from 300 to 700 feet in depth. Several wells are downgradient (south) of the Base.

Halls Ferry Springs and Weatherby Springs are both located about 2.5 miles south of the Base along the north canyon wall of the Snake River. Both springs are discharge points for the regional aquifer.

E. SURFACE WATER HYDROLOGY

The topography at the B Street Landfill is essentially flat, exhibiting a maximum of approximately 20 feet of relief between the shallow depressions and small topographic highs on the site. These topographic features appear to be a result of site trenching and dumping activities. Overall, the site is topographically highest in the center and slopes off gently to the east and southwest. No natural or man-made drainage features are present at B-Street Landfill site, and precipitation either infiltrates site soils or accumulates on the surface with subsequent evaporation or infiltration. No sediments associated with surface runoff are present at or adjacent to the landfill.

Most surface runoff on the Base drains via a series of ditches to the wastewater lagoons on the west side of the Base. During heavy rainfall, some excess stormwater may be pumped to Canyon Creek. However, surface runoff from the B Street Landfill site does not enter this drainage system.

F. NATURE AND EXTENT OF CONTAMINATION

To identify the nature and extent of soil contamination at the B Street Landfill, surface and subsurface soil samples were collected and analyzed during the RI field investigation. Soil samples were collected at the Trench Area and Drum Disposal Area. Samples at the Drum Disposal Area included ash and were used to characterize the Ash Disposal Area.

Surface soil samples were not collected at the Rubble Area and Burn Area because hazardous material disposal activities are not suspected at these areas.

The results of the soil sampling are provided below. All metals detected above background levels, and all organic compounds with the exceptions noted in Section VI A. that are discussed below and in associated tables are included in the human health risk characterization. The risk assessment evaluated whether the concentration of contaminants found at the disposal areas pose a human health risk and are of concern.

1. Trench Area

Suspected sources of contamination at the Trench Area are industrial wastes, such as waste oils, solvents, or pesticides that were probably poured over solid wastes in the landfill trenches. General refuse was also placed in the trenches. The wastes were reportedly burned prior to covering with soil on a weekly basis, so that liquid wastes may have been partially or completely combusted.

Nineteen soil samples were collected from nine test pits excavated through Trenches 1, 2, 4, and 5. Prior to excavation, surface soil samples were collected at each planned test pit location. The pits were excavated across the width of the trench and were dug to bedrock, to native soil beneath the rubbish zone, or to the maximum reach of the backhoe (approximately 16 feet). The samples were analyzed for volatile organic compounds (VOCs), semivolatile organics, total recoverable petroleum hydrocarbons (TRPH), pesticides/PCBs, chlorinated herbicides, and total metals. Chemical analytical summary tables showing detected compounds are summarized in Tables 1 through 4. Sample locations are shown in Figure 5.

Generally low levels of contamination were found in soil samples from the trenches. Eight VOCs were detected in low concentrations (< 50 $\mu g/kg$) in most soil samples. Maximum concentrations of the eight VOCs are methylene chloride (49 $\mu g/kg$), toluene (14 $\mu g/kg$), xylenes (8 $\mu g/kg$), trichloroethane (5 $\mu g/kg$), 2-butanone (4 $\mu g/kg$), tetrachloroethane (2 $\mu g/kg$), ethylbenzene (2 $\mu g/kg$), and styrene (1 $\mu g/kg$). Toluene, trichloroethane, and xylenes were detected most frequently. Frequency of detection and concentration ranges are listed in Table 9.

Semivolatiles were detected in seven of the nineteen soil samples. They were found more frequently in subsurface soils, and particularly in the 8.5-foot-deep sample from test pit 5 (Trench 2). This sample contained several polycyclic aromatic hydrocarbons (PAHs) up to 2900 $\mu g/kg$, which may be evidence of past burning of trash in the trench. Two other samples contained one PAH in a concentration above 2000 μg/kg. In the remaining samples, semivolatiles were either detected at 410 μg/kg or less (that is, at or below sample reporting limits), or were not detected. Frequency of detection and concentration ranges are listed in Table 10.

Total recoverable petroleum hydrocarbons (TRPH) were detected in three of ten surface samples at concentrations between 104 and 155 mg/kg. The three samples were from Trenches 1 and 2. Three subsurface soil samples collected from Trenches 1 and 2 also contained TRPH in concentrations between 307 and 2,780 mg/kg (Trench 1 samples) and 1,710 and 19,699 mg/kg (Trench 2 samples). TRPH were not detected in soil samples from Trenches 4 or 5. TRPH data is shown in Table 2.

Pesticides/PCBs were detected in both surface and subsurface soil samples. Most results were estimated values below the sample reporting limit. Table 11 summarizes occurrences of pesticides/PCBs, along with the range of detected concentrations. Trench 1 had the most frequent occurrence of pesticides/PCBs, with the higher concentrations being detected below the ground surface at depth.

The only pesticide detected in the soils from the Trench Area was 2,4-D. It was detected in three samples in concentrations ranging from 41 μg/kg to 45,000 μg/kg.

Concentrations of metals in the surface soils at the Trench Area were within background range, except for cadmium, lead, and mercury. In subsurface soils, arsenic, cadmium, lead, mercury, and zinc were found above background levels. Table 12 summarizes metals of potential concern detected at the Trench Area.

In summary, generally low concentrations of organic compounds were found erratically in surface and subsurface soil samples from Trenches 1, 2, 4, and 5. One sample in Trench 2 contained the highest concentrations of several PAHs, which could be evidence of past burning of trash. No "hot spots" or localized areas of contamination by hazardous substances were evident, although pesticides/PCBs were detected more often in Trenches 1 and 2 than in the other trenches. Concentrations of some metals exceeded background concentrations. This pattern of contamination supports the known history of the site as a landfill for codisposal of general refuse and industrial wastes that were burned and partially or entirely combusted prior to covering with soil.

2. Drum Disposal Area

The Drum Disposal Area is small (80 to 100 feet in diameter), and the soil layer above bedrock is only about 1 foot thick, although deeper piles of ash and debris are present in spots. Suspected sources of contamination are drums that were placed on the soil surface that may have contained hazardous substances and may have leaked or spilled.

Fourteen shallow borings were drilled and sampled. Samples from some borings were mixed to produce four composite samples for analysis of semivolatiles, TRPH, pesticides/PCBs, chlorinated herbicides, and metals. Six other samples were retained as discrete samples for analysis of VOCs. Chemical analytical summary tables showing detected compounds are summarized in Tables 5 through 8. Sample locations are shown in Figure 6.

Analytical results from soil samples collected at the Drum Disposal Area are summarized in Tables 5 through 8; sample locations are shown in Figure 6. Bedrock is found at approximately 1 foot below the native soil surface, and all samples were collected at a depth of 0.5 to 1 foot below surface. The soil samples collected contained approximately one-third identifiable coal combustion ash that had been placed in the area.

Five VOCs were detected in low concentrations (<40 μg/kg) (Table 5). Most reported results were estimated concentrations below the sample reporting limit. Maximum concentrations of each are methylene chloride (39 μg/kg), toluene (33 μg/kg), xylenes (8 μg/kg), trichloroethane (8 μg/kg), and tetrachloroethene (1 μg/kg).

Several semivolatile compounds, mostly PAHs, were detected in the four composite samples (Table 6). Reported concentrations ranged from 40 μg/kg (benzo(b)fluoranthene) to 1100 μg/kg (fluoranthene and benzo(b)fluoranthene). TRPH were detected in samples from the center and southwest edge of the Drum Disposal Area.

The pesticides DDE and DDT were detected in the four composite samples in concentrations ranging from 4 μg/kg to 1300 μg/kg, and the PCB Aroclor 1254 was detected in two of four samples at 85 μg/kg and 240 μg/kg (Table 7). These results may be evidence of past storage of used drums at this site. No herbicides were detected in Drum Disposal Area soils.

Several metals exceeded background concentrations. These are arsenic, beryllium, cadmium, chromium, lead, mercury, and zinc. The elevated metals concentrations probably result primarily from the presence of coal combustion ash at the site, but some metals such as lead, mercury, and zinc could result from past storage of used containers with residues of industrial products such as POL waste. Data are shown in Table 8.

3. Ash Disposal Area

The Ash Disposal Area is approximately 1000 feet by 1000 feet and contains both coal combustion ash and exposed soil (Figure 7). Total volume of ash is estimated to be approximately 924,000 cubic feet, assuming an average depth of approximately 2 feet. The ash was not directly sampled during the field investigation. However, the soil samples collected at the Drum Disposal Area were comprised of approximately one-third coal combustion ash. Therefore, metals concentrations detected at the Drum Disposal Area (Table 8) are considered representative of a soil/ash mixture as is generally found throughout the Ash Disposal Area.

Supplemental samples of ash were collected after completion of the RI by IDHW in January 1993. The results showed that metal concentrations were approximately ten times lower than the metal concentrations from the Drum Disposal Area that were used in the RI to represent the Ash Disposal Area (Table 33).

G. POTENTIAL ROUTES OF MIGRATION

Potential routes of off-site migration of contaminants from source areas in the B Street Landfill are wind carrying particulate matter from surface soils to off-site locations and leaching of chemicals in surface and subsurface soils to groundwater. People working at or visiting the landfill could possibly be exposed to surface soils and wind-blown particulate matter. There are no permanent surface water features or low areas where water pools at the site. Normally, precipitation either infiltrates or evaporates; therefore, surface runoff is not considered a significant migration route.

H. POTENTIALLY EXPOSED POPULATION

Mountain Home AFB is likely to remain a military installation in the near future. The Base is undergoing a significant expansion and is the first wing that will be assigned fighter, tanker, and bomber aircraft. The B Street Landfill site will most likely remain an industrial area while the Base is in operation and in the event the Base closes. The B Street Landfill site would probably not attract residential development for the following reasons: the presence of landfill trenches, the close proximity to the runway and other industrial facilities, and the large amount of solid debris (rubble), which would have to be removed prior to construction on top of the landfill. The rubble is expected to remain on-site at Base closure because there are no State or Federal laws that require USAF to remove the rubble at Base closure. Therefore, occupational/worker exposures under an industrial scenario are an appropriate guide to potential risks at the landfill under current or future use scenarios.

Under current use conditions, the landfill is inactive and off-limits to all but authorized personnel. The workplaces nearest the landfill are the Auto Hobby Shop, roughly 2,500 feet southeast of the Trench Area; and the Munitions Storage Area, roughly 500 feet east of the Rubble Area. The nearest residence is on the Base, approximately 1 mile southeast of the landfill. The landfill site is not fenced within the Base. Off the Base, adjacent land use is agricultural. The landfill is fenced adjacent to farmland. The nearest off-Base resident is several miles away. Therefore, exposure to contaminants from the B Street Landfill would be limited to trespassers to the landfill (assumed to be Base employees or other workers) and nearby workers or residents, who might be exposed by the air or groundwater pathways.

In the future, the landfill will probably remain an inactive industrial site while the Base is in operation and in the event the Base closes. Commercial, residential, or agricultural development is highly unlikely because of the proximity to the main runway, the presence of the trenches, the large amounts of rubble, and the availability of other land for development. In addition, it is not likely that landfilling activities will resume because of the lack of available space for trench disposal. Potentially exposed populations under probable future use conditions are therefore, the same as under current use: adult trespassers (workers) and off-site workers or residents. Long-term on-site occupational or residential exposures are unlikely but are evaluated in the risk assessment to provide upper-bound estimates of potential risk.

VI. SUMMARY OF SITE RISKS

The baseline human health risk assessment in the RI report evaluated potential risks to human health associated with chemicals of concern detected in soils at the B Street Landfill, based on the assumption that no action is taken to remediate the site. Human health risks were evaluated in accordance with EPA's Risk Assessment Guidance for Superfund (RAGS) (EPA 1989a), RAGS Part B (EPA 1991), and other regional and national EPA risk assessment guidance.

The baseline human health risk assessment evaluated potential risks associated with exposure to chemicals of concern in soil by direct contact, air, and groundwater pathways at the Trench Area, Drum Disposal Area, and Ash Disposal Area. Both carcinogenic (cancer) risks and non-carcinogenic (toxic) hazards were estimated for current and hypothetical future land use.

Key steps in the risk assessment are outlined below.

A. IDENTIFICATION OF CHEMICALS OF CONCERN

Potential chemicals of concern are those contaminants that may be released to the environment from waste sources at the B Street Landfill and that may pose health risks to humans exposed to the contaminants. In this risk assessment, chemicals of concern were all organic chemicals detected in one or more soil samples and metals that exceeded background concentrations. Two semivolatile organic compounds, phenanthrene and benzo(ghi)perylene, are not included in the risk calculations because toxicity data are inadequate for quantitative risk assessment. These compounds are unlikely to contribute significantly to overall risk at the sites. Chemicals of concern for each area are listed in Table 13.

B. EXPOSURE ASSESSMENT

1. Potentially Exposed Populations

Current Use Scenario:

Base employees (occupational receptors), who are assumed to work at the landfill for 9 years or for 25 years, are the likely population who could be directly exposed to chemicals at the B Street Landfill. The average tour of duty at the Base is three years, and the B Street Landfill is not a current work place. Therefore, addressing long-term occupational exposures is a conservative approach. Trespassers and nearby residents were not evaluated because exposures and risks would be lower than for on-site workers.

Future Use Scenario:

Humans who might be directly exposed to chemicals at the B Street Landfill if landfilling or other industrial activities resume would be workers. Although future residential development of the landfill is unlikely, hypothetical on-site residential exposures to soils, air, and groundwater were also evaluated as an upper-bound estimate of risk under hypothetical maximum exposure conditions. If unacceptable risks were not shown under the residential scenario, then no exposure scenarios other than on-site occupational and residential were considered because exposures and risks would be lower for other scenarios. However, because a slight risk was shown under the upper-bound hypothetical residential scenario at the Ash Disposal Area, a trespasser, truck driver, recreational user, and landfill fenceline resident were also evaluated as possible future exposure scenarios.

Exposure pathways were evaluated for the following receptors:

Current Use Industrial Scenario:

- Worker at the landfill

Future Use Industrial, Residential and Trespasser Scenarios:

- Future worker at the landfill
- Future on-site resident living on the landfill surface
- Future resident living at the edge of the landfill boundary
- Trespasser visiting the landfill

2. Exposure Pathways

The exposure pathways for the Trench Area, Drum Disposal Area, and Ash Disposal Area are listed below.

Trench Area Soils (Current & Future On-Site Occupational and Future On-site Residential)

- Ingestion of surface soils
- Dermal contact with surface soils
- Inhalation of volatile emissions and airborne particulate matter
- Ingestion of groundwater (future on-site residential only)

Drum Disposal Area Soils (Current & Future On-Site Occupational and Future On-site Residential)

- Ingestion of soils
- Dermal contact with soils
- Inhalation of volatile emissions and airborne particulate matter
- Ingestion of groundwater (future on-site residential only)

Ash Disposal Area (Current & Future On-Site Occupational, Future On-site Residential, Future Trespasser, and Future Off-Site Residential)

- Ingestion of ash
- Inhalation of airborne particulate matter
- Ingestion of groundwater (future on-site & off-site residential only)

Ash Disposal Area (Truck Driver and Motorcyclist)

- Inhalation of airborne particulate matter disturbed by vehicle traffic

3. Exposure Point Concentrations

Soils

Tables 14, 15, and 16 summarize the arithmetic mean and reasonable maximum exposure (RME) concentrations for organic chemicals and metals of concern in Trench Area surface soils and in soils at the Drum Disposal Area and Ash Disposal Area. Mean and RME soils concentrations were calculated using the data shown in Tables 1 through 12. The RME concentration is the 95th percentile upper confidence limit on the arithmetic mean concentration. It is the reasonable maximum estimate of the chemical concentration at the site and is used in evaluating reasonable maximum risks due to exposures to soils at the site. At the Trench Area, only results from surface soil samples were used to estimate exposure concentrations for soil and air. Both surface and subsurface samples were used in estimating source concentrations for the groundwater pathway (Table 17).

Air

Mean and RME soil concentrations were used to model mean and RME exposure point concentrations of chemicals of concern in air. Modeled air concentrations from chemicals of concern in soils are shown in Tables 14, 15 and 16.

RME air concentrations of respirable dust particles (particulate matter less than 10 μm in diameter, PM_{10}) were estimated using wind erosion modeling procedures recommended in EPA 1991c. Volatilization of VOCs from surface soils and dispersion at the site were evaluated using air dispersion models recommended in EPA's Superfund Exposure Assessment Manual (SEAM, EPA 1988).

Groundwater

The hydrogeology at the Base is complex and is not fully characterized. A base-wide groundwater study is being conducted in OU 3. At this time, it is not known if the existing monitoring well network is adequate to characterize potential groundwater contamination from the landfill. OU 3 will address whether additional monitoring wells are required to evaluate potential groundwater contamination.

Therefore, a conservative chemical fate and transport model was used to estimate the potential risk to groundwater from contaminants remaining in soils at the landfill disposal areas. The model estimates concentrations of chemicals that may have leached from soils at the disposal areas and migrated down to groundwater. The model is very conservative and generally tends to overpredict rather than underpredict actual concentrations of contaminants in groundwater.

Modeled concentrations of chemicals of concern in groundwater from each source area are shown in Tables 17, 18 and 19. In these tables, modeled concentrations in groundwater are compared to health-protective risk-based concentrations (RBCs) for residential use to evaluate the potential for adverse health impacts via ingestion of groundwater. Chemicals that exceed RBCs are included in the quantitative risk assessment. Modeled concentrations of all chemicals except arsenic were below RBCs by factors of 10 to 10,000,000, and therefore, are not of concern for adverse health effects. The modeled arsenic concentrations at the Trench Area, Drum Disposal Area, and Ash Disposal Area were 0.256 μg/L, 5 μg/L, and 15 μg/L, respectively, and are evaluated in the quantitative risk assessment.

It should be noted that analysis of groundwater samples from the existing monitoring wells at the B Street Landfill and of Base drinking water wells has not detected concentrations of arsenic above background. However, these results cannot be used as conclusive evidence of the absence of landfill leaching until completion of the groundwater investigation in OU 3.

4. Chemical Intake by Exposure Pathway

Chemical intakes for each exposure pathway were calculated based on the exposure point concentrations of chemicals of concern and other exposure parameters, such as body weight, inhalation rate, soil ingestion rates, dermal absorption rates, soil matrix effects, and frequency and duration of exposure. Chemical intakes were estimated in accordance with EPA's guidance <u>Risk Assessment Guidance for Superfund</u> (EPA 1989a), <u>Exposure Factors Handbook (EPA 1989b)</u>, and Standard Default Exposure Factors (EPA 1991a). The results of this step of the risk assessment were estimates of chemical-specific intakes in terms of milligrams chemical per kilogram body weight per day (mg/kg-day).

Site-specific average (average) risk estimates were calculated using reasonable best estimates. Site-specific RME and standard default RME risk estimates were calculated using conservative (health-protective) best estimates of probable exposures at the landfill under the various exposure scenarios. Average and site-specific RME risk calculations assumed that long-term occupational or residential exposures would occur only if construction occurred at the landfill. Therefore, grading, filling, paving, landscaping, and other construction activities would reduce the amount of exposed contaminated soil by at least one-half. Average and site-specific RME occupational scenarios also assumed an exposure time of 2 to 4 hours/day, 120 or 250 days/year for 9 years or for 25 years. The average risk calculation included a soil matrix effect to account for the reduced chemical dose resulting from chemical adsorption to soil. The average risk calculation also included the effects of cold weather and snow cover that reduce time spent outside and direct contact with soil during winter. Standard default RME risk estimates were calculated using EPA Standard Default Exposure Factors (SDEFs) (EPA 1991a). SDEFs are a set of default exposures values for use in exposure assessments when site-specific exposure data are lacking. Exposure assumptions for average, site-specific RME, and standard default RME scenarios are shown in Tables 20 through 25.

C. TOXICITY ASSESSMENT

The toxicity assessment addresses the potential for a chemical of concern to cause adverse effects in exposed populations and estimates the relationship between extent of exposure and extent of toxic injury (dose-response relationship) for each chemical.

Qualitative and quantitative toxicity information for the chemicals of concern is acquired through evaluation of relevant scientific literature. The most directly relevant data come from studies in humans. However, most of the useable information on the toxic effects of chemicals comes from controlled experiments in animals. The result of toxicity assessments performed by EPA is the development of chemical-specific toxicity factors for the inhalation and oral exposure routes. These toxicity factors are published in the Integrated Risk Information System (IRIS) and the Health Effects Assessment Summary Tables (EPA 1992).

EPA toxicity factors are used to assess potential health risks resulting from the estimated chemical intakes. Toxicity factors are expressed either as Reference Doses (RfDs) for noncarcinogenic compounds or cancer slope factors (SFs) for carcinogens.

RfDs are used to estimate the potential for noncarcinogenic (toxic) effects of substances. A RfD is the daily dose of a noncarcinogen that is not likely to result in toxic effects to humans over a lifetime of exposure. RfDs are derived from human epidemiological studies or animal studies to which safety factors have been applied (e.g., to account for the use of animal data to predict effects in humans). RfDs are expressed in units of mg chemical/kg body weight/day. Estimated daily chemical doses from exposure to contaminated media are compared to the RfD to estimate the potential for toxic effects.

Slope factors (SFs) have been developed by EPA for estimating excess lifetime cancer risks associated with exposure to potential carcinogens. SFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated daily dose of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that dose level. The term "upper-bound" reflects the conservative estimate of the risks calculated from the SF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Slope factors are derived from the results of human epidemiological studies or chronic animal studies, which applies mathematical extrapolation from high doses to low doses (e.g., to account for the use of animal data to predict effects on humans). RfDs and SFs for each chemical of concern are presented in Table 26 and Table 27.

D. RISK CHARACTERIZATION

The risk characterization combines the outputs of the exposure and toxicity assessments to develop quantitative estimates of health risks associated with the site. Noncarcinogenic health risks are characterized by comparing the estimated daily chemical dose to the RfD. The ratio of the estimated dose to RfD is called a hazard index. Hazard indexes are added together for all chemicals and exposure pathways to yield a total hazard index for the combined exposures. A hazard index equal to or less than 1 indicates that no adverse noncarcinogenic health effects are expected to occur, even to sensitive individuals over a lifetime of exposure.

Carcinogenic health risks are characterized as the excess probability (for example, 1 in 1,000,000) that an individual will develop cancer due to the estimated exposure. Excess probability means the increased risk over and above the normal risk of getting cancer. Cancer risks are calculated by multiplying the estimated daily chemical intake by the chemical-specific cancer slope factor. Cancer risks are calculated separately for each carcinogen and each exposure pathway, and then added together to yield a total upper-bound estimate of cancer risk due to the combined exposures. This is a highly conservative approach, which makes underestimation of the actual cancer risk unlikely.

EPA has established an acceptable target excess cancer risk range of 1×10^{-6} to 1×10^{-4} (1 in 1,000,000 to 1 in 10,000) as guidance for protection of public health from exposure to chemicals released from hazardous waste sites (EPA 1989a). An excess lifetime cancer risk of 1×10^{-4} indicates that an individual has a one in ten thousand chance of developing cancer over a lifetime of exposure to site-related carcinogens.

Human Health Risk Characterization

1. Current and Future Use Occupational Risk Estimates

Occupational health risk estimates for the three sites at the B Street Landfill are shown in Table 28. Risk estimates are shown in this and other tables using scientific notation, e.g., 1E-06. The number 1E-06 is equivalent to 1×10^{-6} or 0.000001 (1 in 1,000,000). The greatest risks were shown for long-term exposures at the Ash Disposal Area under standard default reasonable maximum exposure (standard default RME). The total hazard index for this scenario is 0.2. A hazard index of 1 or below indicates that no adverse noncarcinogenic health effects are expected under the assumed exposure conditions. The total excess cancer risk is 3.5×10^{-5} (3.5 in 100,000), which is within EPA's target risk range of 1 in 1,000,000 to 1 in 10,000. Occupational risks estimated for exposures at the Trench Area and Drum Disposal Area are lower than those found at the Ash Disposal Area. These results show that no unacceptable health risks are expected to occur to workers from daily, long-term (25 years) exposure at any of the three sites at the B Street Landfill. The exposure assumptions are extremely conservative, and it is unlikely that the estimated risk level would be exceeded under any likely exposure conditions.

2. Future Use Residential Risk Estimates

On-site residential risks were calculated as upper-bound estimates of risk. On-site residential health risks at the three sites are shown in Table 29. These scenarios assume that a family lives in a house built on the landfill surface, which is very improbable because the Base is expected to remain an active USAF installation or industrial site. Furthermore, residential or commercial development of the landfill is unlikely because of the presence of the trenches and Rubble Area, and the proximity to the main runway. Therefore, risk estimates for residential exposures are not likely risks at the landfill.

At the Trench Area, the maximum residential hazard index is 0.8 and the maximum total cancer risk estimate is 1×10^{-5} (1 in 100,000) under the standard default RME. The hazard index below 1 indicates no adverse noncarcinogenic health effects are expected, and the cancer risk estimate is within EPA's target risk range. Therefore, no unacceptable risks are expected to occur at the Trench Area, even using highly conservative residential exposure scenarios. It is unlikely that these risk levels would be exceeded under any likely exposure conditions.

At the Drum Disposal Area, the maximum residential hazard index is 0.7. The hazard index does not exceed 1, indicating that no adverse noncarcinogenic health effects are expected to occur under residential exposure scenarios and conservative assumptions of toxicity. The total excess cancer risk estimates are 3.2×10^{-6} (average), 1.7×10^{-4} (site-specific RME), and 2.4×10^{-4} (standard default RME). The total excess cancer risk estimates under the site-specific RME and standard default RME are somewhat above the upper end of EPA's target risk range of 10^{-6} to 10^{-4}. Nearly half the estimated cancer risk estimates under site-specific RME and standard default RME exposure assumptions results from ingesting modeled concentrations of arsenic in groundwater. However, the modeled concentrations may be overpredicted and 5 to 50 times higher than actual on-site concentrations because of the conservative assumptions used in the groundwater model (see Table 32). In addition, on-site residential cancer risk estimates and hazard indexes are not considered representative of potential exposures and risks at this site for the following reasons: many exposure and toxicity factors used in the risk estimate tend to overpredict risk; residential development is unlikely; and the Drum Disposal Area is small, with very shallow bedrock that would not be suitable for construction. The assumed exposure conditions are very conservative, and it is unlikely that these risk levels would be exceeded under any likely exposure conditions.

At the Ash Disposal Area, where chemicals of concern are certain metals, residential hazard indexes are 0.05 (average), 0.8 (site-specific RME), and 1.6 (standard default RME). Only the standard default RME hazard index exceeds 1, indicating a potential cause for concern for noncarcinogenic health effects. However, the standard default RME hazard index overestimates the potential hazard, because it assumes that low doses of chemicals that are not toxic in themselves produce a toxic effect in combination. The assumption that the chemicals produce a toxic effect in combination is used as a screening tool. If the combined HI is greater than 1, it is appropriate to consider the effects of each chemical on target organs separately and then determine whether they should be combined. At the Ash Disposal Area, the metals that contribute most to the noncarcinogenic hazard index are arsenic, barium, and zinc. None of the metals alone is expected to produce a toxic effect because the daily doses of each metal are below the respective RfDs. These metals may not produce a toxic effect in combination in the body because these metals affect different organs in the body. Also, the childhood ingestion rates could be lower by 2 to 5 times than those used in the risk calculations (Calabrese et al. 1989; Davis et al. 1990). Note that Calabrese's work is still under review by EPA. Therefore, the hazard indexes overpredict the potential for adverse health effects, and it is unlikely that the risk levels would be exceeded under any likely exposure conditions.

On-site residential total cancer risk estimates at the Ash Disposal Area are 1×10^{-5} (average), 5×10^{-4} (site-specific RME), and 6.5×10^{-4} (standard default RME). The site-specific RME and standard default RME cancer risk estimates exceed EPA's target risk range of 10^{-6} to 10^{-4}. At least half of the total cancer risk estimates (3.1×10^{-4}) derives from risk associated with ingestion of groundwater containing a modeled on-site concentration of arsenic of 15 parts per billion or micrograms per liter (ppb or µg/L). The estimated concentration may be overpredicted by 5 to 50 times (see Table 32). Also, there is uncertainty in the source concentration of arsenic in the ash, as indicated in Section F.3. Metal concentrations in ash could be ten times lower than the source concentration used in the risk assessment and groundwater model. The estimated modeled concentration of 15 ppb is below the Federal Drinking Water Standard, Maximum Contaminant Level (MCL) of 50 ppb. However, the MCL is currently under review by EPA and may be lowered. On-site residential cancer risk estimates and hazard indexes are highly unlikely.

3. Other Future Use Exposure Scenarios: Ash Disposal Area

On-site residential use is highly unlikely, and the B Street Landfill is likely to remain a disposal site without significant construction (and may remain inactive). Further, actual risks under a probable exposure scenario would be lower than those estimated for long-term on-site residential use. Recognizing these factors, five other more reasonable but still conservative future use exposure scenarios at the Ash Disposal Area were evaluated to support the remedial decision for this site. The five scenarios are:

- Off-site residential exposures to groundwater (landfill fenceline)
- Child trespasser (ash ingestion)

- Landfill truck driver (inhalation of airborne ash and soil)
- Recreational motorcyclist (inhalation of airborne ash and soil)
- Off-site downwind residential receptor (ingestion of ash deposited from airborne ash)

The location of the hypothetical resident at the landfill fenceline is shown in Figure 7. Risk results for these scenarios are shown in Tables 30 and 31. Table 30 shows that the risk from ingestion of groundwater with modeled concentrations of arsenic at 11 ppb at a residential well at the landfill boundary (fenceline) is 2×10^{-4}. However, the modeled concentration of arsenic at the landfill boundary may be overpredicted by 5 to 100 times (see Table 23). Further, the arsenic concentration in ash may also be overestimated (see Section F.3). If arsenic concentrations were lower by 5 to 100 times, arsenic concentrations would range from 3 to .15 ppb, and cancer risk estimates would range from 6×10^{-5} to 3×10^{-6}. In addition, estimated groundwater concentrations decrease with distance downgradient from the landfill. For example, the estimated concentration and associated risk at the downgradient Base boundary (2,500 feet southwest) is 2.6 ppb and 5×10^{-5}. The Base boundary is a more probable location for a future resident if the runway continues to be used and the rubble remains in place. Therefore, considering the conservatism of the source concentration and the groundwater model and the most probable location for a nearby resident, the cancer risk estimate is within EPA's target risk range and shows that no unacceptable risks would probably be associated with exposure to groundwater at the landfill or Base boundary.

Risks to off-site residents from inhalation are considered insignificant because on-site risks from inhalation were negligible. Soil ingestion risks to the off-site resident from airborne ash deposited in soils beyond the landfill fenceline are also insignificant. If only wind erosion (no traffic) occurs over the ash, the ash source is likely to be depleted before airborne deposits beyond the landfill would reach concentrations that could pose a risk. Even if daily heavy truck traffic occurred over the ash piles, which is highly unlikely, metals of concern would pose soil ingestion risks slightly in excess of EPA's target risk range.

Table 31 shows the risk results for the child trespasser, landfill truck driver, and recreational motorcyclist. The highest excess cancer risk estimate is 1.6 x 10^{-5} (child trespasser, 6-year exposure). This risk level is within EPA's target risk range. Risks for other scenarios were lower.

The highest hazard index shown in Table 31 is 1.1 (landfill truck driver, 25-year exposure). This value is slightly above 1 and indicates little or no cause for concern for adverse noncarcinogenic effects. Also, the magnitude of the hazard index is due entirely to chromium. The RfD used to assess chromium inhalation toxicity is derived from exposures to chromic acid fumes, rather than particulate-adhered chromium. Therefore, the RfD probably overestimates actual toxicity of chromium adhered to soil or ash particles, and the hazard index of 1.1 probably overestimates the potential for noncarcinogenic effects. In summary, there does not appear to be cause for concern for adverse noncarcinogenic health effects from exposures at the Ash Disposal Area for the following reasons: the value is not significantly different than 1; the conservative toxicity value used probably results in an overestimation of potential hazard; and the daily exposures for 25 years probably overstates likely exposure at the site.

4. Exposures to Lead

Effects of potential exposures to lead in soil were evaluated by comparing maximum lead concentrations to values recommended by EPA. Current EPA guidance recommends an interim soil lead concentration of 500 to 1,000 ppm (mg/kg) for residential sites. The maximum lead concentration measured in surface soil samples at the Trench Area was 79 mg/kg. The maximum lead concentration measured at the Drum Disposal Area was 133 mg/kg. The estimated reasonable maximum lead concentration in the ash was 383 mg/kg. These concentrations fall below the range recommended by EPA for residential exposures. Therefore, lead concentrations in soils at these sites do not pose unreasonable risk to occupational or residential receptors.

E. HUMAN HEALTH RISK CHARACTERIZATION SUMMARY

- The B Street Landfill will most likely remain as an industrial site both while the Base is in operation and if the Base closes. Therefore, industrial use is the probable current and future use of the site.

- Human health risks for long-term occupational exposures to soils and ash at the B Street Landfill do not exceed target risk levels (hazard indexes do not exceed 1 and cancer risk estimates are within EPA's target risk range of 1×10^{-4} to 1×10^{-6}).

- Other potential receptors under an industrial scenario include a hypothetical nearby resident. For the nearby resident, risks from ingestion of a modeled concentration of arsenic in groundwater at the landfill boundary is 2×10^{-4}. This risk estimate is the same order of magnitude as 1×10^{-4}. The modeled concentration of arsenic at the landfill boundary may be overpredicted by 5 to 100 times. If arsenic concentrations were 5 to 100 times lower, estimated cancer risks would range from 6×10^{-5} to 3×10^{-6}. In addition, the modeled concentration of 11 ppb at the landfill boundary is below the Federal Drinking Water Standard, MCL for arsenic of 50 ppb. However, the MCL is currently under review by the EPA and may be lowered. Estimated concentrations of arsenic continue to decrease downgradient from the landfill and the estimated risk at the Base boundary is 5×10^{-5}. The Base boundary is a more probable location for a future resident if the runway continues to be used.

- Risks posed to trespassers are also within EPA's acceptable target risk levels.

- Estimated total risks for the future on-site residential scenario, which is an unlikely scenario, are within EPA's target risk range at the Trench Area. Total risks at the Drum Disposal Area and Ash Disposal Area slightly exceed EPA's target risk range. However, the conservatism in the groundwater model and derivation of estimated metal concentrations at the Ash Disposal Area from a soil/ash mixture at the Drum Disposal Area may overpredict risk estimates.

- In conclusion, current or reasonable maximum industrial (occupational) future use of the landfill pose no unacceptable risks. Hazard indexes and cancer risks do not exceed EPA's target levels, assuming long-term on-site occupational exposures, and nearby resident at the Base fenceline and trespasser exposures.

F. UNCERTAINTY

Uncertainties in this risk assessment are associated with the estimates of exposure point concentrations and the assumptions regarding human exposure scenarios. Conservative assumptions were used so that risks would not be underestimated. Persons were assumed to be directly exposed to reasonable maximum concentrations of chemicals of concern in soil and ash for up to 30 years. Hypothetical residents were assumed to be exposed to modeled worst-case concentrations in groundwater for 30 years. The screening-level groundwater transport model results in concentrations that may overestimate actual concentrations by 5 to 50 times at the B Street Landfill and 5 to 100 times at the B Street Landfill boundary (see Table 32). Therefore, the model may overstate the concentrations to which individuals may be exposed.

Conservative assumptions were also used in the estimated concentration of arsenic at the Ash Disposal Area. Based on soil/ash samples at the Drum Disposal Area, a concentration of 106 ppm arsenic was used for the ash ingestion risk characterization, and 38 ppm was used as a soil/ash source concentration of arsenic for groundwater modeling. However, supplemental analysis of ash samples collected by the State of Idaho showed the maximum concentration of arsenic to be 6.5 ppm. Therefore, exposure point concentrations may be overpredicted.

The ingestion rates, inhalation rates, and exposure times used in estimating daily intakes were also conservatively high and are not likely to be exceeded. Toxicity factors used to assess potential human health risks were conservative because they are derived from conservative estimates of dose-response relationships observed in laboratory animals. These estimates included safety factors to account for the uncertainty in extrapolating from experimental results in laboratory animals to lifetime exposures of humans.

Some uncertainty is associated with exposure point concentrations and risk estimates for the Trench Area because a limited number of samples (19) were collected from the four trenches investigated. The sample results are assumed to be representative of contamination at the trenches. However, because the waste is heterogeneous, the sample results could underestimate or overestimate contaminant concentrations in the trenches as a whole. Therefore, risks could be underestimated or overestimated. However, other conservative features of the analysis, such as assuming long-term exposures, using reasonable maximum estimates of contaminant concentrations and health-protective toxicity factors, help offset the uncertainty in the sampling results to provide reasonable maximum estimates of risk.

There is also uncertainty about whether additional trenches are present at the Rubble Area. Historical records do not confirm their presence in the Rubble Area. However, if any refuse and hazardous wastes were disposed in the Rubble Area, it is likely to have been similar to the wastes disposed in the Trench Area.

The results of the risk assessment provide an upper-bound estimate of potential risk under long-term occupational and residential exposure conditions. The results indicate that exposures to soils, groundwater, and air at the landfill source areas are not likely to have adverse effects on health of individuals working at the landfill or to individuals residing at the landfill boundary.

G. LIKELIHOOD OF ADVERSE ECOLOGICAL EFFECTS

The B Street Landfill is a sparsely vegetated area, covered with native soil, ash, rubble, and fill material. Small mammals (coyote, rabbit, rodents) and lizards have been observed at the area. Field observations were conducted during the course of the remedial investigation and during a site reconnaissance by an ecologist in September 1992. Information on common species in the area and on federal and state protected species was gathered from literature and from state and federal agencies. The landfill does not provide significant habitat for threatened or endangered species or other species of special concern. This conclusion is based on field observations, information on federal and state protected species, and availability of alternate habitats. Therefore, the potential for adverse ecological effects is considered minimal.

Potential impacts to ecological receptors from the B-Street Landfill will be addressed in more detail as part of a base-wide ecological risk assessment in the final OU (OU 3).

VII. SELECTED REMEDY

USAF, EPA and IDHW have determined that no remedial action is necessary under CERCLA at the B Street Landfill to ensure protection of human health and the environment. This decision is based on the results of the baseline human health risk assessment and ecological evaluation, which determined that the chemical concentrations remaining in the soils at the B Street Landfill pose no unacceptable risks to human health and the environment under current and probable reasonable maximum future use scenarios. Due to uncertainties with the assumptions used in the groundwater model, the OU 3 base-wide groundwater investigation and verification will address whether monitoring is needed at the B Street Landfill.

However, the no action remedy may result in hazardous substances remaining on-site that do not allow for unlimited use and unrestricted exposure because there are uncertainties associated with the risk assessment at the Trench Area due to the number of samples collected, the heterogeneous nature of the wastes, and the possibility of trench disposal in the Rubble Area. Therefore, a statutory 5-year review of the site will apply.

The 5-year review will evaluate whether the no action remedy remains protective of human health and the environment. The 5-year review will consist of a Level I review, as described in the Structure and Components of Five-Year Reviews, by Henry L. Longest II, Director, Office of Emergency and Remedial Response, May 23, 1991, and subsequent guidance. Generally the Level I review will consist of an ARARs review for new standards or regulations, and a site visit to verify that residential development on top of the trenches is not likely and that intrusion into the trenches has not occurred.

State Acceptance

The State of Idaho concurs with the CERCLA evaluation, and the Air Force has agreed to address state solid waste laws in accordance with Air Force letter dated May 7, 1993, Subject: Submittal of Closure Plan for B Street Landfill.

VIII. EXPLANATION OF SIGNIFICANT CHANGES

The Proposed Plan for the B Street Landfill site was released for public comment on January 26, 1993. The Proposed Plan identified No Action as the selected remedy for the site. Public comments on the Proposed Plan were evaluated at the end of the 30-day comment period, and it was determined that no significant changes to the Proposed Plan were necessary.

RESPONSIVENESS SUMMARY
B STREET LANDFILL

The public comment period on the Proposed Plan was held from January 26, 1993, to February 25, 1993. A public meeting was held on February 11, 1993, to explain the Proposed Plan and solicit public comments. Several questions were asked during the public meeting. Some of these questions were also provided in writing during the public meeting and are included in Appendix B. This summary is a response to the written and verbal comments received during the public comment period.

1. **Why does the State not concur or accept the validity of the data, and why is the State asking for "action" at the site under Title 1 Chapter 6 of the Idaho Solid Waste Management Regulations and Standards Manual?**

Response:

The state of Idaho's (State) requirement for compliance with Title 1, Chapter 6 Solid Waste Management Regulations does not constitute a rejection of the RI or the data presented in the RI. Under state law, these requirements apply to all municipal solid waste landfills that were operated in Idaho from 1973 to October 1991.

2. **Is it wise to pose an unnecessary additional burden on the tax payer of $ 1.1 million to cap the site as the manual requires for current operating landfills and the State funding through the Defense State Memorandum of Agreement (DSMOA)? These burdens are assumed by the tax payer. Doesn't the evidence support "no action".**

Response:

The State requirement for Air Force compliance with Title 1, Chapter 6 does not constitute a CERCLA action. Again these requirements apply to all municipal solid waste landfills operated between 1973 and 1991. The Trench Area is not subject to this requirement because it ceased operation and closed in 1969. The State concurs with the no action decision for both the Trench Area, Drum Disposal Area and Ash Disposal Area at the B Street Landfill under CERCLA. However, it is the state's position that the state municipal landfill closure requirements are still applicable to the landfill independent of CERCLA decisions.

The closure will not be funded as a CERCLA action, therefore, the State is not eligible for DSMOA funding. In addition, the State has not received a cost estimate from the Air Force for capping the landfill at $ 1.1 million.

3. **What specific additional actions (burden on the tax payer) is the State requiring the Air Force to perform to comply with Title 1, Chapter 6 of the Idaho Solid Waste Management Regulations and Standards Manual? Is the State asking for capping of the site or installation of additional monitoring wells and groundwater monitoring beyond the OU 3 investigation and 5 year review or some other action?**

Response:

No additional action is being required at the Trench Area. The decision on the need for long term groundwater monitoring at the B Street Landfill has been deferred to OU 3. The Central District Health Department will determine which areas of the B Street Landfill will be addressed and what actions will be required under the closure plan. It is anticipated that only the Ash Disposal Area and possibly the Drum Disposal Area will be subject to the municipal landfill closure requirements. The Air Force will be required to meet the State solid waste landfill closure requirements.

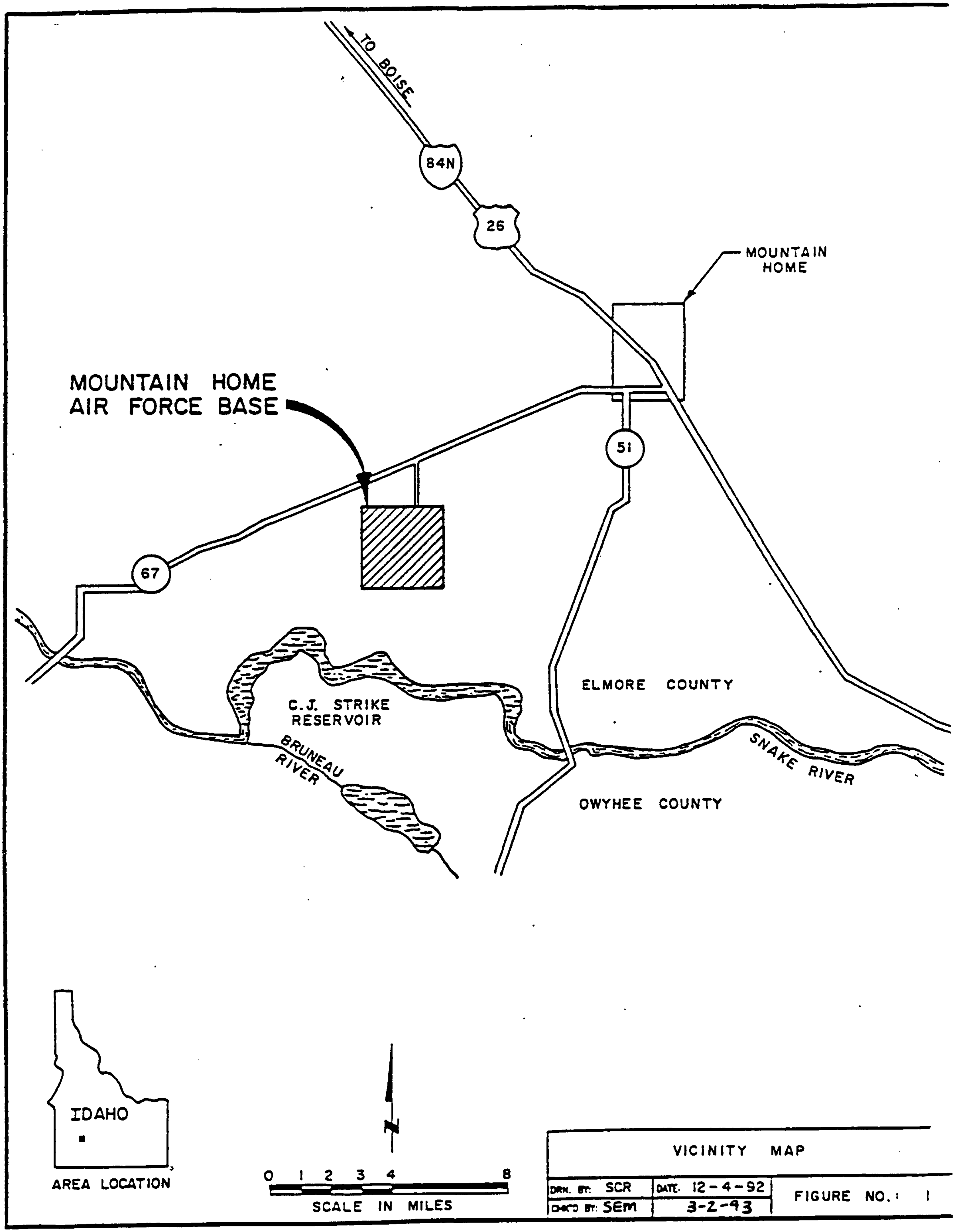
4. **One citizen commented on the difficulty of finding the room in the high school for the public meeting.**

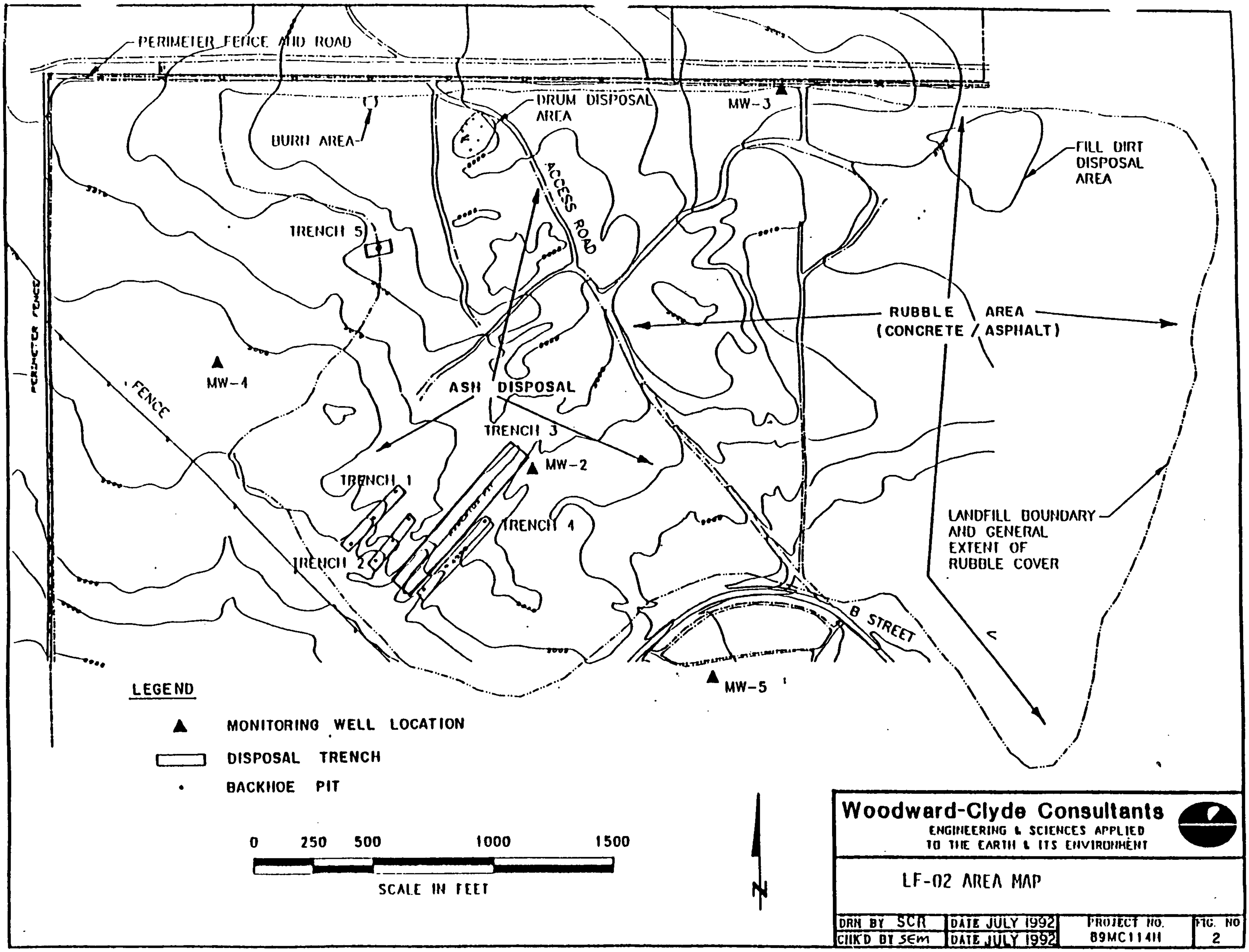
Response:

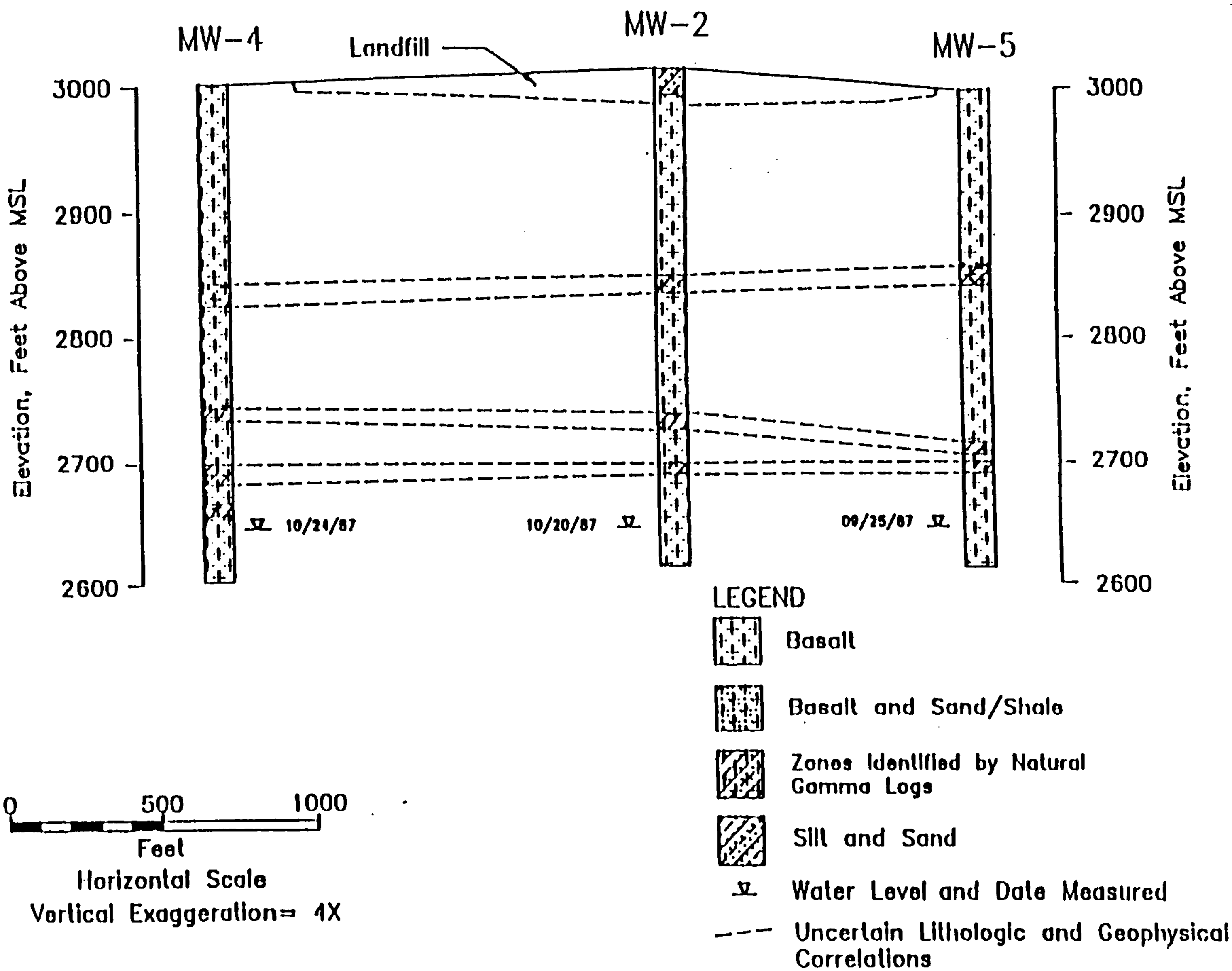
The Air Force, EPA and the State apologize for the difficulty in locating the room. A sign was posted on the gym doors identifying the room number.

APPENDIX A

FIGURES AND TABLES


TO BOISE
84N
26
MOUNTAIN HOME
MOUNTAIN HOME AIR FORCE BASE
51
67
C.J. STRIKE RESERVOIR
BRUNEAU RIVER
ELMORE COUNTY
SNAKE RIVER
OWYHEE COUNTY
IDAHO
AREA LOCATION
0 1 2 3 4 8
SCALE IN MILES
VICINITY MAP
DRN. BY: SCR
DATE: 12-4-92
CHK'D BY: SEM
3-2-93
FIGURE NO.: 1


PERIMETER FENCE AND ROAD
DRUM DISPOSAL AREA
MW-3
BURN AREA
FILL DIRT DISPOSAL AREA
ACCESS ROAD
TRENCH 5
RUBBLE AREA (CONCRETE / ASPHALT)
PERIMETER FENCE
MW-4
FENCE
ASH DISPOSAL
TRENCH 3
MW-2
TRENCH 1
TRENCH 4
TRENCH 2
LANDFILL BOUNDARY AND GENERAL EXTENT OF RUBBLE COVER
B STREET
MW-5
LEGEND
MONITORING WELL LOCATION
DISPOSAL TRENCH
BACKHOE PIT
0 250 500 1000 1500
SCALE IN FEET
N
Woodward-Clyde Consultants
ENGINEERING & SCIENCES APPLIED TO THE EARTH & ITS ENVIRONMENT
LF-02 AREA MAP
DRN BY SCR
DATE JULY 1992
CHKD BY SEM
DATE JULY 1992
PROJECT NO. 89MC114H
FIG. NO 2

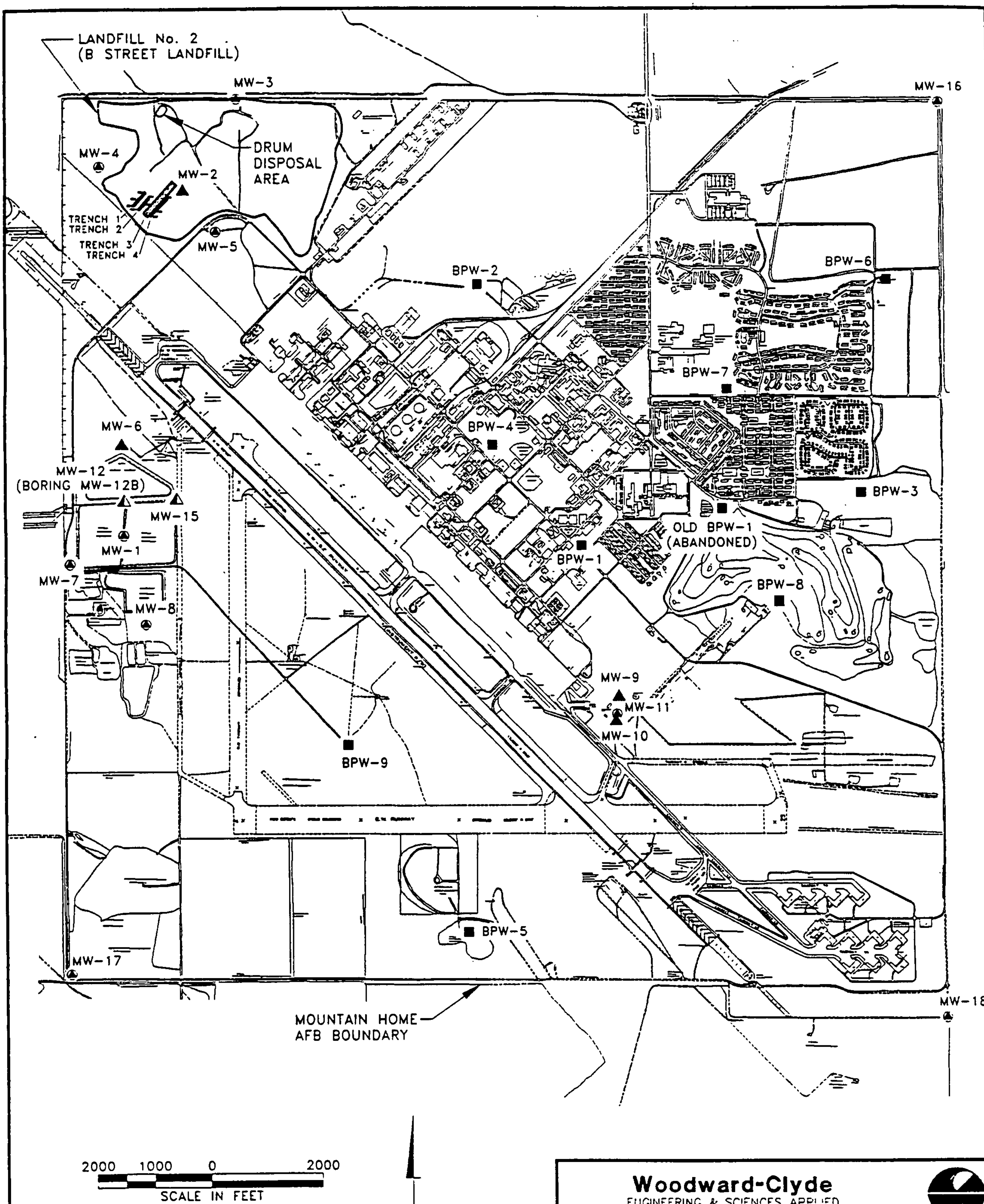


SOURCE: DAMES AND MOORE, 1990

Woodward-Clyde Consultants
ENGINEERING & SCIENCES APPLIED TO THE EARTH & ITS ENVIRONMENT

GEOLOGIC CROSS-SECTION-B STREET LANDFILL
MOUNTAIN HOME AFB, IDAHO

DRN BY	DATE APRIL 1992	PROJECT NO.	FIG. NO
CHK'D BY	DATE APRIL 1992	89MC114H	3



Woodward-Clyde
ENGINEERING & SCIENCES APPLIED
TO THE EARTH & ITS ENVIRONMENT

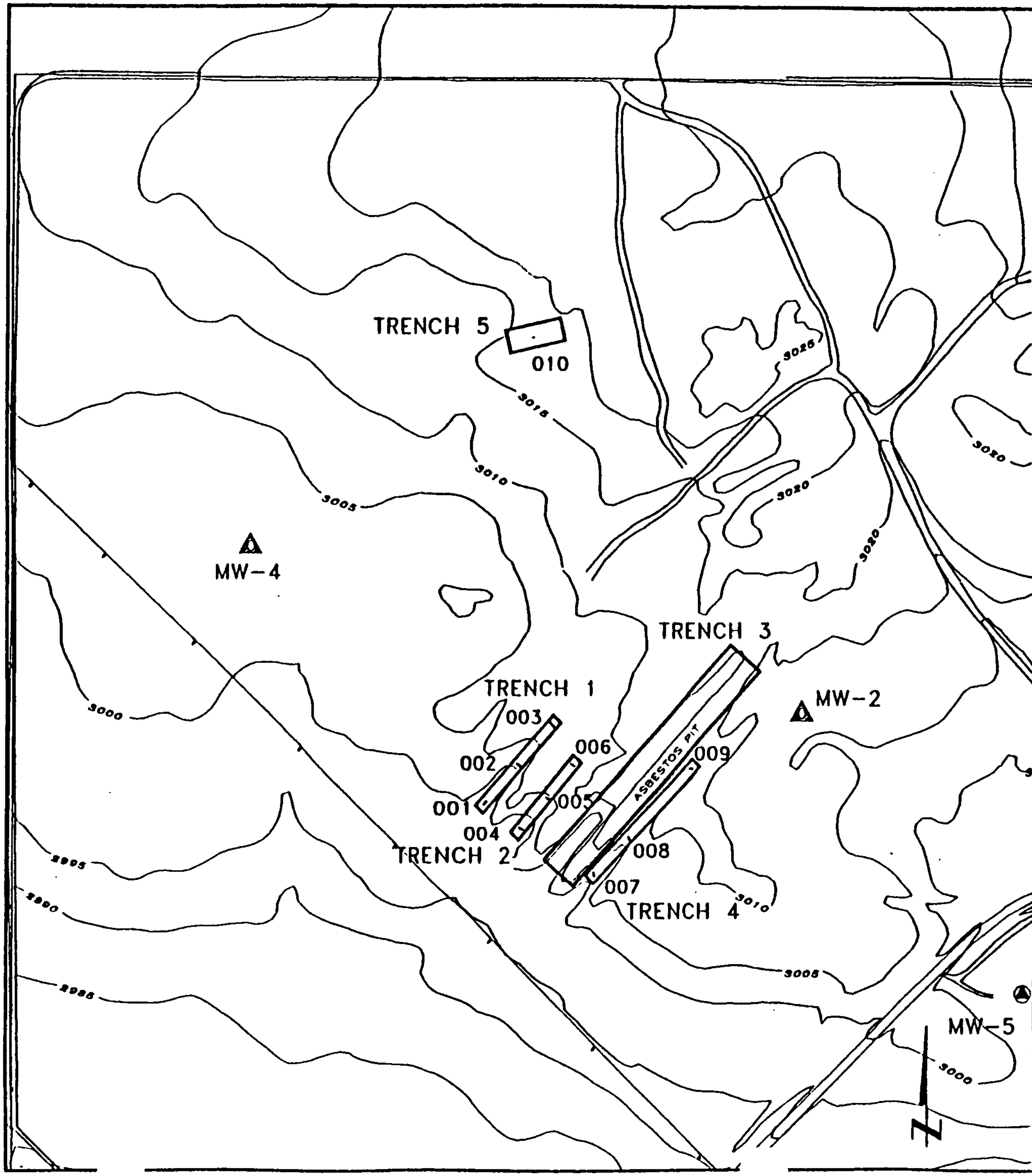
LANDFILL No. 2 AREA AND
WATER WELL LOCATION MAP
MOUNTAIN HOME AFB IDAHO

DRN BY: CJG	DATE: 03/24/93	PROJECT NO.	FIG. NO.
CHK'D BY: SEM	REVISION: 0	89MC114H	4

LEGEND
- PERCHED ZONE WELL
- MONITORING WELL WITH NO WATER LEVEL MONITORING
- BASE PRODUCTION WELL
- MONITORING WELL WITH DATALOGGER

CAD FILE: 89114H 3 (03-25-93)

CAD FILE: MHAFB-15.DWG (10-02-92)



LEGEND

- MONITORING WELL (WITH DATALOGGER)
- MONITORING WELL (WITH USGS RECORDER)
- 001 WCC TEST PIT WITH DESIGNATION No.
- 3000 SURFACE CONTOURS

400 200 0 400

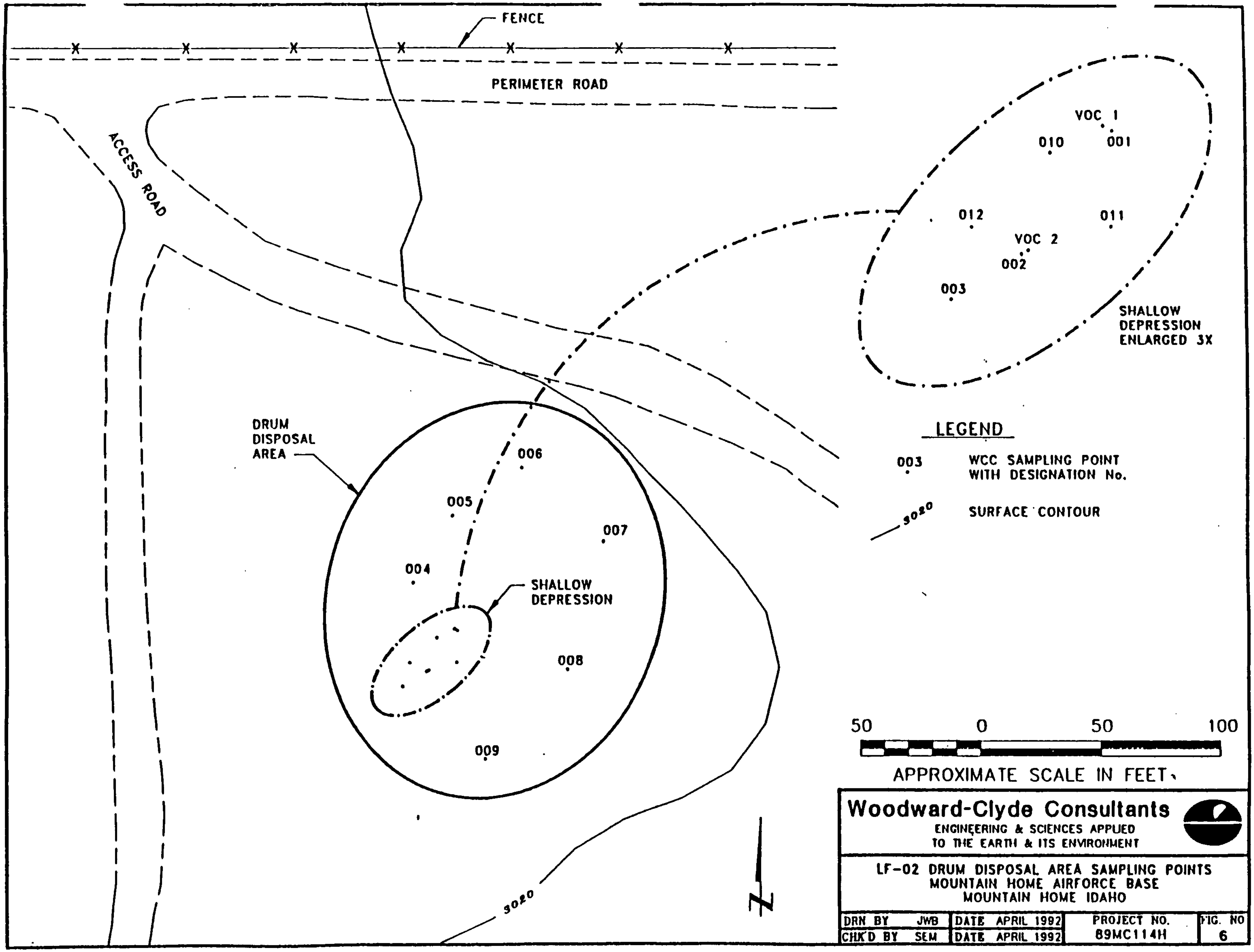
SCALE IN FEET

Woodward-Clyde Consultants

ENGINEERING & SCIENCES APPLIED
TO THE EARTH & ITS ENVIRONMENT

LF-02 TRENCH AREA SAMPLING POINTS
MOUNTAIN HOME AIR FORCE BASE
MOUNTAIN HOME IDAHO

DRN BY	CJG	DATE: 07/31/92	PROJECT NO.	FIG. NO
CHK'D BY	JLK	REVISION: 0	89M 11	5



LF-02 DRUM DISPOSAL AREA SAMPLING POINTS
MOUNTAIN HOME AIRFORCE BASE
MOUNTAIN HOME IDAHO

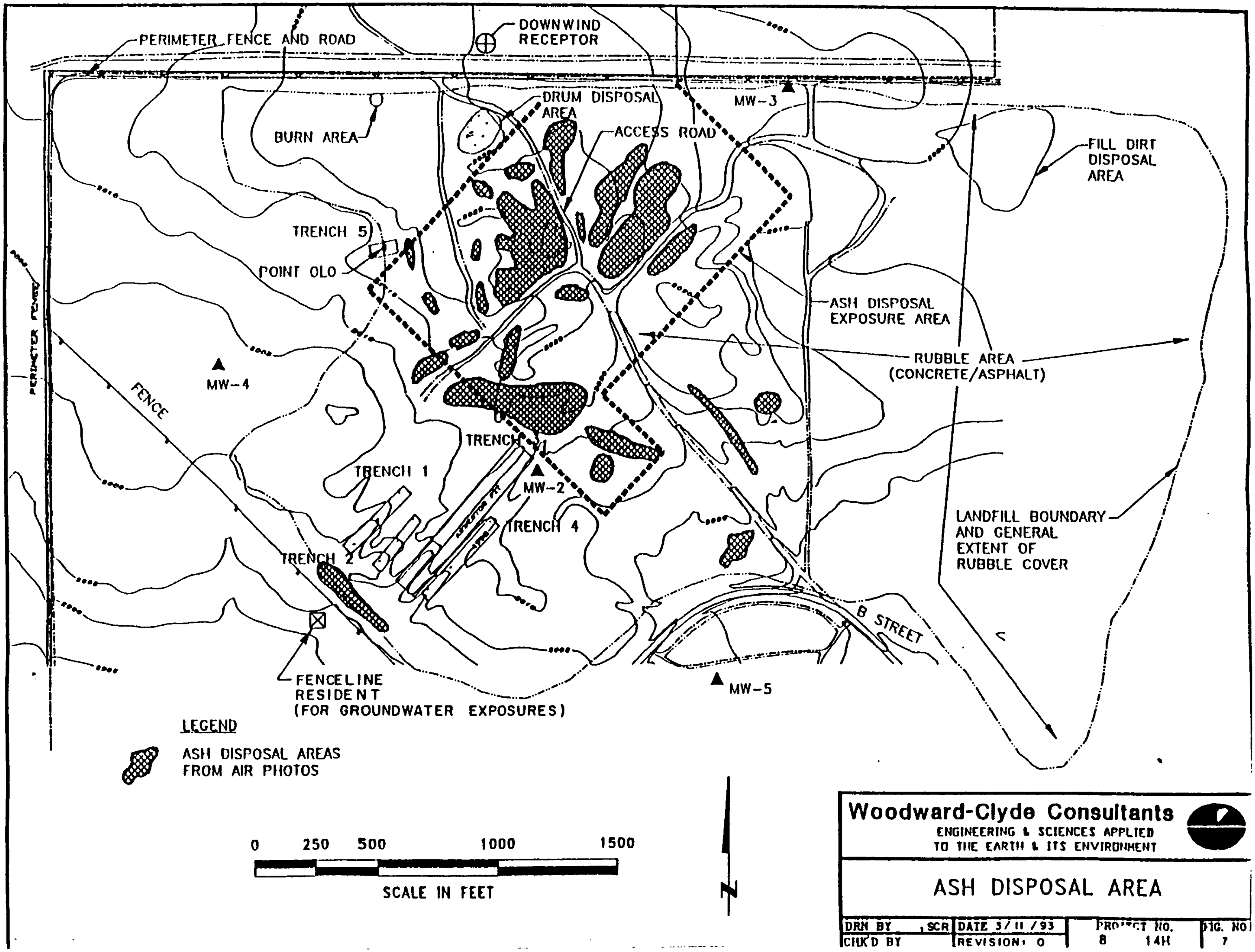

PERIMETER FENCE AND ROAD
DOWNWIND RECEPTOR
DRUM DISPOSAL AREA
MW-3
BURN AREA
ACCESS ROAD
FILL DIRT DISPOSAL AREA
TRENCH 5
POINT OLO
ASH DISPOSAL EXPOSURE AREA
PERIMETER FENCE
RUBBLE AREA (CONCRETE/ASPHALT)
MW-4
FENCE
TRENCH
TRENCH 1
MW-2
TRENCH 4
LANDFILL BOUNDARY AND GENERAL EXTENT OF RUBBLE COVER
TRENCH 2
B STREET
FENCELINE RESIDENT (FOR GROUNDWATER EXPOSURES)
MW-5
LEGEND
ASH DISPOSAL AREAS FROM AIR PHOTOS
0 250 500 1000 1500
SCALE IN FEET
N
Woodward-Clyde Consultants
ENGINEERING & SCIENCES APPLIED TO THE EARTH & ITS ENVIRONMENT
ASH DISPOSAL AREA
DRN BY SCR
DATE 3/11/93
CHK'D BY
REVISION: 0
PROJECT NO.
FIG. NO.

TABLE 2

TRENCH AREA SEMIVOLATILE ORGANICS, μg/kg AND TOTAL PETROLEUM HYDROCARBONS, mg/kg

Sample No.	1,4-Dichlorobenzene		2,4-Dichlorophenol		Naphthalene		Acenaphthene		Dibenzofuran		Diethylphthalate		Fluorene	
LF02-TR-001-SS-001	360	U	360	U	360	U	360	U	360	U	360	U	360	U
LF02-TR-002-SS-001	370	U	370	U	370	U	370	U	370	U	370	U	370	U
LF02-TR-003-SS-001	360	U	360	U	360	U	360	U	360	U	360	U	360	U
LF02-TR-004-SS-001	370	U	370	U	370	U	370	U	370	U	370	U	370	U
LF02-TR-005-SS-001	370	U	370	U	370	U	370	U	370	U	370	U	370	U
LF02-TR-006-SS-001	380	U	380	U	380	U	380	U	380	U	380	U	380	U
LF02-TR-007-SS-001	380	U	380	U	380	U	380	U	380	U	380	U	380	U
LF02-TR-008-SS-001	380	U	380	U	380	U	380	U	380	U	380	U	380	U
LF02-TR-009-SS-001	400	U	400	U	400	U	400	U	400	U	400	U	400	U
LF02-TR-010-SS-001	390	U	390	U	390	U	390	U	390	U	390	U	390	U
LF02-TR-001-DS-006	410	U	410	U	410	U	410	U	410	U	410	U	410	U
LF02-TR-013-DS-010**	2400		350	U	170	J	350	U	350	U	350	U	350	U
LF02-TR-003-DS-016	11000	U	11000	U	1100 0	U	11000	U	11000	U	11000	U	1100 0	U
LF02-TR-004-DS-006	370	U	410		370	U	370	U	370	U	370	U	370	U
LF02-TR-005-DS-8.5	170	J	370	U	50	J	80	J	44	J	86	J	94	J
LF02-TR-006-DS-007	11000	U	11000	U	1100 0	U	11000	U	11000	U	11000	U	1100 0	U
LF02-TR-007-DS-004	400	U	400	U	400	U	400	U	400	U	400	U	400	U
LF02-TR-008-DS-009	370	U	370	U	370	U	370	U	370	U	370	U	370	U
LF02-TR-009-DS-3.5	370	U	370	U	370	U	370	U	370	U	370	U	370	U

TABLE 2
(Continued)

Sample No.	Phenanthrene		Anthracene		Fluoranthene		Pyrene		Butylbenzyl Phthalate		Benzo(a) anthracene		Chrysene	
LF02-TR-001-SS-001	360	U	360	U	42	J	360	U	360	U	360	U	360	U
LF02-TR-002-SS-001	370	U	370	U	370	U	370	U	370	U	370	U	370	U
LF02-TR-003-SS-001	360	U	360	U	360	U	360	U	360	U	360	U	360	U
LF02-TR-004-SS-001	370	U	370	U	110	J	90	J	370	U	69	J	75	J
LF02-TR-005-SS-001	370	U	370	U	370	U	370	U	370	U	370	U	370	U
LF02-TR-006-SS-001	380	U	380	U	380	U	380	U	380	U	380	U	380	U
LF02-TR-007-SS-001	380	U	380	U	380	U	380	U	380	U	380	U	380	U
LF02-TR-008-SS-001	380	U	380	U	380	U	380	U	380	U	380	U	380	U
LF02-TR-009-SS-001	120	J	400	U	360	J	350	J	400	U	160	J	180	J
LF02-TR-010-SS-001	390	U	390	U	390	U	390	U	390	U	390	U	390	U
LF02-TR-001-DS-006	410	U	410	U	97	J	87	J	410	U	55	J	67	J
LF02-TR-013-DS-010	38	J	350	U	98	J	66	J	350	U	350	U	350	U
LF02-TR-003-DS-016	11000	U	11000	U	1100 0	U	11000	U	11000	U	11000	U	1100 0	U
LF02-TR-004-DS-006	370	U	370	U	370	U	370	U	370	U	370	U	370	U
LF02-TR-005-DS-8.5	2000		200	J	2900		1400		49	J	1300		1300	
LF02-TR-006-DS-007	11000	U	11000	U	1100 0	U	11000	U	11000	U	11000	U	1100 0	U
LF02-TR-007-DS-004	400	U	400	U	400	U	400	U	400	U	400	U	400	U
LF02-TR-008-DS-009	370	U	370	U	370	U	370	U	370	U	370	U	370	U
LF02-TR-009-DS-3.5	370	U	370	U	370	U	370	U	370	U	370	U	370	U

TABLE 2
(Concluded)

Sample No.	Benzo(b) fluoranthene		Benzo(k) fluoranthene		Benzo(a)pyrene		Indeno(1,2,3-cd)pyrene		Dibenz(a,h) anthracene		Benzo(g,h,i) perylene		Carbazole		TRPH	
LF02-TR-001-SS-001	360	U	360	U	360	U	360	U	360	U	360	U	360	U	154	
LF02-TR-002-SS-001	370	U	370	U	370	U	370	U	370	U	370	U	370	U	104	
LF02-TR-003-SS-001	360	U	360	U	360	U	360	U	360	U	360	U	360	U	44	U
LF02-TR-004-SS-001	87	J	46	J	50	J	370	J	370	U	370	U	370	U	155	
LF02-TR-005-SS-001	370	U	370	U	370	U	370	U	370	U	370	U	370	U	46.9	U
LF02-TR-006-SS-001	380	U	380	U	380	U	380	U	380	U	380	U	380	U	44.4	U
LF02-TR-007-SS-001	380	U	380	U	380	U	380	U	380	U	380	U	380	U	45.4	U
LF02-TR-008-SS-001	380	U	380	U	380	U	380	U	380	U	380	U	380	U	46.8	U
LF02-TR-009-SS-001	250	J	390	J	130	J	400	J	400	U	73	J	400	U	47.7	U
LF02-TR-010-SS-001	390	U	390	U	390	U	390	U	390	U	390	U	390	U	47.9	U
LF02-TR-001-DS-006	89	J	410	U	49	J	48	J	410	U	410	U	410	U	627	
LF02-TR-013-DS-010	98	J	47	J	42	J	43	J	350	U	350	U	350	U	307	
LF02-TR-003-DS-016	11000	U	11000	U	11000	U	11000	U	11000	U	2200	J	11000	U	2780*	
LF02-TR-004-DS-006	370	U	370	U	370	U	370	U	370	U	370	U	370	U	19600	
LF02-TR-005-DS-8.5	1300		580		910		610		170	J	300	J	230	J	1900	
LF02-TR-006-DS-007	11000	U	11000	U	11000	U	11000	U	11000	U	11000	U	11000	U	1710	
LF02-TR-007-DS-004	400	U	400	U	400	U	400	U	400	U	400	U	400	U	49.1	U
LF02-TR-008-DS-009	370	U	370	U	370	U	370	U	370	U	370	U	370	U	45.1	U
LF02-TR-009-DS-3.5	370	U	370	U	370	U	370	U	370	U	370	U	370	U	45.1	U

Positive results are shaded.
All others are non-detect.
*TRPH value reported is from sample LF-02-TR-002-DS-13.5
**Field duplicate for sample LF02-TR-002-DS-13.5.
U = Not detected above sample reporting limit.
UJ = Not detected above sample reporting limit. Sample reporting limit is estimated.
J = Estimated value below sample reporting limit.

TABLE 1

TRENCH AREA VOLATILE ORGANICS, µg/kg

Sample No.	Methylene Chloride	2-Butanone	Trichloroethene	Tetrachloroethene	Toluene	Ethylbenzene	Styrene	Xylenes (Total)
LF02-TR-001-SS-001	4 J	11 UJ	11 U	11 U	2 J	11 U	11 U	11 U
LF02-TR-002-SS-001	13 U	11 U	4 J	11 UJ	9 J	11 UJ	11 UJ	1 J
LF02-TR-003-SS-001	11 U	11 U	2 J	11 U	6 J	11 U	11 U	11 U
LF02-TR-004-SS-001	11 U	11 U	2 J	11 U	4 J	11 U	11 U	2 J
LF02-TR-005-SS-001	11 U	11 U	11 U	11 U	2 J	11 U	11 U	11 U
LF02-TR-006-SS-001	12 U	12 U	12 U	12 U	3 J	12 U	12 U	12 U
LF02-TR-007-SS-001	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U
LF02-TR-008-SS-001	12 U	12 U	12 U	12 U	3 J	12 U	12 U	3 J
LF02-TR-009-SS-001	12 U	12 U	2 J	12 U	2 J	12 U	12 U	12 U
LF02-TR-010-SS-001	4 J	2 J	2 J	12 U	1 J	12 U	12 U	12 U
LF02-TR-001-DS-006	49 J	12 U	5 J	2 J	12 J	2 J	12 U	5 J
LF02-TR-013-DS-010*	23 U	11 U	4 J	2 J	13	1 J	11 U	3 J
LF02-TR-003-DS-016	11 UJ	11 U	4 J	11 U	13	2 J	11 U	5 J
LF02-TR-004-DS-006	11 UJ	11 UJ	3 J	11 UJ	8 J	2 J	11 UJ	5 J
LF02-TR-005-DS-8.5	11 U	11 U	3 J	11 U	14	2 J	11 U	5 J
LF02-TR-006-DS-007	24 J	11 U	5 J	11 UJ	14 J	2 J	1 J	8 J
LF02-TR-007-DS-004	12 UJ	4 J	12 UJ	12 UJ	3 J	12 UJ	12 UJ	2 J
LF02-TR-008-DS-009	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U
LF02-TR-009-DS-3.5	11 U	11 U	11 U	11 U	2 J	11 U	11 U	11 U

Positive results are shaded. All others are non-detect.
* Field duplicate for sample LF02-TR-002-DS-13.5.
U = Not detected above sample reporting limit.
UJ = Not detected above sample reporting limit. Sample reporting limit is estimated.
J = Estimated value below sample reporting limit.
Note: Location and Sample Identification Codes; LF02-Landfill 2, TR-Trench, SS-Surface Soil, DS-Deep Soil
Example: At Landfill 02, Trench 001, a deep soil sample was collected at a depth of 6 feet (LF02-TR-001-DS-006).

TABLE 3

TRENCH AREA PESTICIDES/PCBs AND HERBICIDES, µg/kg

Sample No.	Heptachlorepoxide	Dieldrin	4,4'-DDE	4,4'-DDD	4,4'-DDT	Alpha-chlordane	Gamma-chlordane	Aroclor-1242	Aroclor-1254	Aroclor-1260	2,4-D
LF02-TR-001-SS-001	1.9 U	3.6 U	14	3.6 U	28	1.9 U	1.9 U	36 U	36 U	36 U	44 U
LF02-TR-002-SS-001	1.1 J	3.7 UJ	3 J	3.7 UJ	14 J	8.3 J	9.3 J	37 UJ	37 UJ	34 J	44 U
LF02-TR-003-SS-001	1.9 U	3.6 U	3.6 U	3.6 U	7.4	1.9 U	1.9 U	36 U	36 U	36 U	44 U
LF02-TR-004-SS-001	3.8 U	7.4 U	9.3 J	7.4 U	29	3.8 U	3.8 U	74 U	74 U	74 U	45 U
LF02-TR-005-SS-001	2 U	3.8 U	3.8 U	3.8 U	2 J	2 U	2 U	38 U	38 U	38 U	47 U
LF02-TR-006-SS-001	2 U	3.8 U	14	3.8 U	17	2 U	2 U	38 U	38 U	38 U	44 U
LF02-TR-007-SS-001	2 UJ	3.8 UJ	3.8 UJ	3.8 UJ	3.8 UJ	2 UJ	2 UJ	38 UJ	38 UJ	38 UJ	45 U
LF02-TR-008-SS-001	2 U	3.8 U	3.8 U	3.8 U	3.8 U	2 U	2 U	38 U	38 U	38 U	47 U
LF02-TR-009-SS-001	2 U	4 U	4 U	4 U	2.6 J	2 U	2 U	40 U	40 U	40 U	48 U
LF02-TR-010-SS-001	2 UJ	3.9 UJ	3.2 J	3.9 UJ	19 J	2 UJ	2 UJ	39 UJ	39 UJ	39 UJ	48 U
LF02-TR-001-DS-006	8.4 UJ	16 UJ	48 J	52 J	16 UJ	54 J	66 J	160 UJ	340 J	160 UJ	41
LF02-TR-002-DS-13.5	38 UJ	73 UJ	370J	190 J	130 J	38 UJ	38 UJ	730 UJ	730 UJ	730 UJ	44 U
LF02-TR-003-DS-016	38 U	73 U	62 J	110	68 J	38 U	38 U	730 U	620 J	730 U	45 U
LF02-TR-004-DS-006	19 U	37 U	37 U	37 U	37 U	19 U	19 U	370 U	490 J	370 U	45000
LF02-TR-005-DS-8.5	9.4 U	11 J	19 J	12 J	10 J	9.4 U	12 J	220 J	180 U	180 U	45 U
LF02-TR-006-DS-007	19 U	37 U	19 J	37 U	37 U	29 J	36	370 U	220 J	370 U	190
LF02-TR-007-DS-004	2.1 U	4 U	4 U	4 U	4 U	2.1 U	2.1 U	40 U	40 U	40 U	49 U
LF02-TR-008-DS-009	1.9 UJ	3.7 UJ	3.7 UJ	3.7 UJ	3.7 UJ	1.9 UJ	1.9 UJ	37 UJ	37 UJ	37 UJ	45 U
LF02-TR-009-DS-3.5	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	1.9 U	1.9 U	37 U	37 U	37 U	45 U

Positive results are shaded. All others are nondetect.
U = Not detected above sample reporting limit.
UJ = Not detected above sample reporting limit. Sample reporting limit is estimated.
J = Estimated value below sample reporting limit.

TABLE 4

TRENCH AREA METALS OF POTENTIAL CONCERN, mg/kg

Sample No.	Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Zinc
LF02-TR-001-SS-001	3.4 J	172 J	0.49	0.88 UJ	12.7	7.6 J	0.11UJ	37.3 J
LF02-TR-002-SS-001	3.9 J	190 J	0.56	1.4 J	16.2	79 J	1J	144 J
LF02-TR-003-SS-001	5 J	163 J	0.56	0.87 UJ	12.7	10. J	0.11UJ	38.4 J
LF02-TR-004-SS-001	2.9 J	182	0.58	0.91 U	15.2	10 J	0.11U	46.3
LF02-TR-005-SS-001	3 J	165	0.52	0.92 U	11.8	8.2 J	0.12U	38.8
LF02-TR-006-SS-001	3.1 J	174 J	0.51	0.9 UJ	13.8	8.8 J	0.13J	45.7 J
LF02-TR-007-SS-001	3.7 J	164	0.51	0.9 U	11	8.2 J	0.11U	37.6
LF02-TR-008-SS-001	3.3 J	177	0.67	0.92 U	12.8	8.2 J	0.12 U	41.8
LF02-TR-009-SS-001	5.8 J	169	0.68	0.95 U	12.5	9.6 J	0.12U	41.7
LF02-TR-010-SS-001	12.1 J	243 J	0.59	0.96 UJ	12.2	11 J	0.12UJ	42.9 J
LF02-TR-001-DS-006	24 J	179 J	0.61	0.97 UJ	12.8	24 J	0.19J	125 J
LF02-TR-002-DS-13.5	10.3 J	601 J	0.5	6.6 J	44.1	991 J	0.11UJ	7760 J
LF02-TR-003-DS-016	4.9 J	203 J	0.64	1.2 J	15.4	27.4 J	3.3J	196 J
LF02-TR-004-DS-006	4.6 J	198	0.51	0.9 UJ	13.6	28.6 J	0.11J	102 J
LF02-TR-005-DS-08.5	6.9 J	139	0.57	0.9 UJ	14.5	21.4 J	0.13J	105 J
LF02-TR-006-DS-007	3.7 J	205 J	0.5	1.2 J	14.8	22 J	0.51J	103 J
LF02-TR-007-DS-004	5.9 J	171	0.86	0.98 UJ	13.4	6.7	0.12UJ	40.4 J
LF02-TR-008-DS-009	5.6 J	285	0.64	0.9 UJ	9.5	5.3	0.11J	32.7 J
LF02-TR-009-DS-03.5	30.6 J	115	0.45 U	0.9 UJ	8.5	5.8	0.11UJ	28.8 J

U = Not detected above sample reporting limit.
UJ = Not detected above sample reporting limit. Sample reporting limit is estimated.
J = Estimated value below sample reporting limit.

TABLE 5

DRUM DISPOSAL AREA VOLATILE ORGANICS, μg/kg

Sample No.	Methylene Chloride	Trichloroethene	Tetrachloroethene	Toluene	Xylenes (Total)
LF02-DD-001-SS-0.5	20	12U	12U	12U	12U
LF02-DD-002-SS-001	34 U	8 J	27 U	33	8 J
LF02-DD-003-SS-001	39 J	11 U	11 U	2 J	11 UJ
LF02-DD-005-SS-0.5	19 U	3 J	12 U	2 J	12 U
LF02-DD-006-SS-0.5	31	4 J	1 J	1 J	11 U
LF02-DD-007-SS-0.5	12 U	2 J	12 U	1 J	12 U

Positive results are shaded. All others are non-detect.
U = Not detected above sample reporting limit.
UJ = Not detected above sample reporting limit. Sample reporting limit is estimated.
J = Estimated value below sample reporting limit.

TABLE 6

DRUM DISPOSAL AREA SEMIVOLATILES, μg/kg AND TOTAL PETROLEUM HYDROCARBONS, mg/kg

Sample No.	Phenathrene	Anthracene	Di-n-butyl phthalate	Fluor anthene	Pyrene	Benzo(a) anthracene	Chrysene
LF02-DD-001-SS-0.5	390 U	390 U	44 J	42 J	390 U	390 U	390 U
LF02-DD-002-SS-0.5	350 U	350 U	350 U	350 U	350 U	350 U	350 U
LF02-DD-003-SS-001	340 J	83 J	360 UJ	1100 J	800 J	830 J	850 J
LF02-DD-005-SS-0.5	50 J	380 U	380 U	140 J	140 J	150 J	140 J

Sample No.	Bis(2-ethylhexyl) phthalate	Benzo(b) fluoranthene	Benzo(k) fluoranthene	Benzo(a) pyrene	Indeno(1,2,3-cd)pyrene	Benzo(g,h,i) perylene	Carbazole
LFO2-DD-001-SS-0.5	390 U	40 J	390 U	390 U	390 U	390 U	390 U
LF02-DD-002-SS-0.5	350 U	350 U	350 U	350 U	350 U	350 U	350 U
LF02-DD-003-SS-001	110 J	1100 J	590 J	730 J	360 UJ	360 UJ	100 J
LF02-DD-005-SS-0.5	380 U	230 J	82 J	120 J	100 J	45 J	380

Sample No.	TRPH
LF02-DD-001-SS-00.5	47.7 U
LF02-DD-002-SS-001	1120
LF02-DD-003-SS-001	250
LF02-DD-005-SS-00.5	46.7 U

Positive results are shaded. All others are non-detect.
U = Not detected above sample reporting limit.
UJ = Not detected above sample reporting limit. Sample reporting limit is estimated.
J = Estimated value below sample reporting limit.

TABLE 7

DRUM DISPOSAL AREA PESTICIDES AND PCBs, μg/kg

Sample No.	4,4'-DDE	4,4'-DDT	Aroclor-1254
LF02-DD-001-SS-0.5	51	63	85 J
LF02-DD-002-SS-001	3.5 U	4.2	35 U
LF02-DD-003-SS-001	490	1300	1500 U
LF02-DD-005-SS-0.5	46	29 J	240 J

Positive results are shaded. All others are non-detect.
U = Not detected above sample reporting limit.
UJ = Not detected above sample reporting limit. Sample reporting limit is estimated.
J = Estimated value below sample reporting limit.

TABLE 8

DRUM DISPOSAL AREA METALS, mg/kg

Sample No.	Arsenic	Barium	Beryllium	Chromium	Lead	Mercury	Zinc	Copper	Manganese
LF02-DD-001-SS-00.5	42.7 J	244	0.92	26	127 J	0.12 U	968	95.4 J	461 J
LF02-DD-002-SS-001	22.2 J	455	1.9	15.3	66.5 J	0.11 U	77.8	106 J	278 J
LF02-DD-003-SS-001	23.9 J	267	1.3	21	65.7 J	0.71	177	30.2 J	465 J
LF02-DD-005-SS-005	24 J	221	0.75	51	133 J	0.12 U	1550	173 J	110 J

Positive results are shaded. All others are non-detect.
U = Not detected above sample reporting limit.
UJ = Not detected above sample reporting limit. Sample reporting limit is estimated.
J = Estimated value below sample reporting limit.

TABLE 9

TRENCH AREA
OCCURRENCE OF VOCs IN SOILS

Analyte	Detected Concentration Min μg/kg	Detected Concentration Max μg/kg	Frequency of Detection* Trench 1	Frequency of Detection* Trench 2	Frequency of Detection* Trench 4	Frequency of Detection* Trench 5	Sample ID Max Concentration
Methylene Chloride	4	49	1/6	1/6	0/6	1/1	LF02-TR-001-DS-006
2-Butanone	2	4	1/6	0/6	1/6	1/1	LF02-TR-007-DS-004
Trichlorethene	2	5	5/6	4/6	1/6	1/1	LF02-TR-001-DS-006 LF02-TR-006-DS-007
Tetrachloroethane	--	2	2/6	0/6	0/6	0/1	LF02-TR-001-DS-006 LF02-TR-013-DS-010**
Toluene	1	14	6/6	6/6	4/6	1/1	LF02-TR-005-DS-8.5 LF02-TR-006-DS-007
Ethylbenzene	1	2	1/6	3/6	1/6	1/1	LF02-TR-001-DS-006 LF02-TR-003-DS-016 LF02-TR-004-DS-006 LF02-TR-005-DS-8.5 LF02-TR-006-DS-007
Styrene	--	1	0/6	1/6	0/6	0/1	LF02-TR-006-DS-007
Total Xylenes	1	8	4/6	4/6	2/6	0/0	LF02-TR-006-DS-007

* Number of positive results/Number of samples

** Sample LF02-TR-013-DS-010 was collected from test pit 2 at a depth of 13.5 feet. It is the field duplicate for sample LF02-TR-002-DS-13.5.

TABLE 10

TRENCH AREA
OCCURRENCE OF SEMIVOLATILES IN SOILS

Analyte	Detected Concentration		Frequency of Detection*				Sample ID Max Concentration
	Min µg/kg	Max µg/kg	Trench 1	Trench 2	Trench 4	Trench 5	
1-4 Dichlorobenzene	170	2400	1/6	1/6	0/6	0/1	LF02-TR-013-DS-010**
2,4-Dichlorophenol	--	410	0/6	1/6	0/6	0/1	LF02-TR-004-DS-006
Naphthalene	50	170	1/6	0/6	0/6	0/6	LF02-TR-013-DS-010**
Acenaphthene	--	80	0/6	1/6	0/6	0/1	LF02-TR-005-DS-8.5
Dibenzofuran	--	44	0/6	1/6	0/6	0/1	LF02-TR-005-DS-8.5
Diethylphthalate	--	86	0/6	1/6	0/6	0/1	LF02-TR-005-DS-8.5
Fluorene	--	94	0/6	1/6	0/6	0/1	LF02-TR-005-DS-8.5
Phenanthrene	38	2000	0/6	1/6	0/6	0/1	LF02-TR-005-DS-8.5
Anthracene	--	200	0/6	1/6	0/6	0/1	LF02-TR-005-DS-8.5
Fluoranthene	42	2900	2/6	2/6	1/6	0/1	LF02-TR-005-DS-8.5
Pyrene	66	1400	1/6	2/6	1/6	0/1	LF02-TR-005-DS-8.5
Butylbenzylphthalate	--	49	0/6	1/6	0/6	0/1	LF02-TR-005-DS-8.5
Benzo(a)anthracene	55	1300	1/6	2/6	1/6	0/1	LF02-TR-005-DS-8.5
Chrysene	67	1300	1/6	2/6	1/6	0/1	LF02-TR-005-DS-8.5
Benzo(b)fluoranthene	87	1300	1/6	2/6	1/6	0/1	LF02-TR-005-DS-8.5
Benzo(k)fluoranthene	46	580	0/6	2/6	1/6	0/1	LF02-TR-005-DS-8.5

TABLE 10
(Concluded)

Analyte	Detected Concentration		Frequency of Detection*				Sample ID Max Concentration
	Min µg/kg	Max µg/kg	Trench 1	Trench 2	Trench 4	Trench 5	
Benzo(g,h,i)perylene	73	2200	1/6	2/6	1/6	0/1	LF02-TR-003-DS-016
Benzo(a)pyrene	42	910	2/6	2/6	1/6	0/1	LF02-TR-005-DS-8.5
Indeno(1,2,3-cd)pyrene	43	610	2/6	2/6	1/6	0/1	LF02-TR-005-DS-8.5
Dibenz(a,h)anthracene	--	170	0/6	1/6	0/6	0/1	LF02-TR-005-DS-8.5
Carbazole	230	230	0/6	1/6	0/6	0/1	LF02-TR-005-DS-8.5

* Number of positive results/Number of samples.
** Sample LF02-TR-013-DS-010 was collected from test pit 2 at a depth of 13.5 feet. It is the field duplicate for sample LF02-TR-002-DS-13.5.

TABLE 11

TRENCH AREA
OCCURRENCE OF PESTICIDES/PCBs AND HERBICIDES IN SOILS

Analyte	Detected Concentration		Frequency of Detection*				Sample ID Max Concentration
	Min µg/kg	Max µg/kg	Trench 1	Trench 2	Trench 4	Trench 5	
Heptachlorepoxide	--	1.1	1/6	0/6	0/6	0/1	LF02-TR-002-SS-001
4,4-DDE	3	370	5/6	4/6	0/6	1/1	LF02-TR-002-DS-13.5
4,4-DDD	52	190	6/6	2/6	0/6	1/1	LF02-TR-002-DS-13.5
4,4-DDT	2	130	5/6	4/6	1/6	1/1	LF02-TR-002-DS-13.5
Alpha chlordane	8.3	54	2/6	1/6	0/6	0/1	LF02-TR-001-DS-006
Gamma chlordane	9.3	66	2/6	2/6	0/6	0/1	LF02-TR-001-DS-006
Aroclor 1242	--	220	0/6	1/6	0/6	0/1	LF02-TR-005-DS-8.5
Aroclor 1254	220	620	2/6	2/6	0/6	0/1	LF02-TR-003-DS-016
Aroclor 1260	--	34	1/6	0/6	0/6	0/1	LF02-TR-002-SS-001
2,4-D	41	45000	1/6	2/6	0/6	0/1	LF02-TR-004-DS-006

* Number of positive results/Number of samples.

TABLE 12

TRENCH AREA
OCCURRENCE OF METALS OF POTENTIAL CONCERN IN SOILS

Analyte	Exceeds Background?	Detected Concentration Min mg/kg	Detected Concentration Max mg/kg	Frequency of Detection* Trench 1	Trench 2	Trench 4	Trench 5	Sample ID Max Concentration
Arsenic	yes	3	30.6	6/6	6/6	6/6	1/1	LF02-TR-009-DS-03.5
Barium	no	115	601	6/6	6/6	6/6	1/1	LF02-TR-002-DS-13.5
Beryllium	no	0.49	0.86	6/6	6/6	5/6	1/1	LF02-TR-007-DS-004
Cadmium	yes	1.2	6.6	3/6	1/6	0/6	0/1	LF02-TR-002-DS-13.5
Chromium	no	8.5	44.1	6/6	6/6	6/6	1/1	LF02-TR-002-DS-13.5
Lead	yes	5.3	991	6/6	6/6	6/6	1/1	LF02-TR-002-DS-13.5
Mercury	yes	0.11	3.3	3/6	4/6	1/6	0/1	LF02-TR-003-DS-016
Zinc	yes	28.8	7760	6/6	6/6	6/6	1/1	LF02-TR-002-DS-13.5

* Number of positive results/Number of samples.

TABLE 13
CHEMICALS OF CONCERN

Trench Area[1]	Drum Disposal Area	Ash Disposal Area
Carcinogens	Carcinogens	Carcinogens
Aroclor-1260	Aroclor-1254	Arsenic
Benzo(a)anthracene	Benzo(a)anthracene	Beryllium
Benzo(a)pyrene	Benzo(a)pyrene	Chromium
Benzo(b)fluoranthene	Benzo(b)fluoranthene	
Benzo(k)fluoranthene	Benzo(k)fluoranthene	
Chlordane, alpha and gamma	Bis(2-ethylhexyl)phthalate	
Chrysene	Carbazole	
4,4-DDE	Chrysene	
4,4-DDT	4,4-DDE	
Heptachlor epoxide	4,4-DDT	
Indeno(1,2,3-cd)pyrene	Indeno(1,2,3-cd)pyrene	
Methylene chloride	Methylene chloride	
Trichloroethene	Tetrachloroethene	
Arsenic	Trichlorethene	
	Arsenic	
	Beryllium	
	Chromium	
Noncarcinogens	Noncarcinogens	Noncarcinogens
2-Butanone	Anthracene	Arsenic
Chlordane, alpha and gamma	Bis(2-ethylhexyl)phthalate	Barium
4,4-DDT	4,4-DDT	Beryllium
Fluoranthene	Di-n-butylphthalate	Cadmium
Methylene chloride	Fluoranthene	Chromium
Pyrene	Methylene chloride	Lead
Toluene	Pyrene	Mercury
Xylenes	Tetrachloroethene	Zinc
Arsenic	Toluene	
Cadmium	Xylenes	
Lead	Arsenic	
Mercury	Beryllium	
Zinc	Cadmium	
	Chromium	
	Lead	
	Mercury	
	Zinc	

1. Contaminants in surface soils were used for risk assessment purposes at the Trench Area; contaminants in subsurface and surface soils were used for groundwater modeling.

TABLE 14

TRENCH AREA

SUMMARY OF SURFACE SOIL AND AIR CONCENTRATIONS FOR ON-SITE EXPOSURE

Chemical	Surface Soil mg/kg Mean	RME (1)	Modeled On-Site Air (2) mg/m3 Mean	RME (1)
Methylene chloride	0.004	0.004	8.3E-02	8.3E-02
2-Butanone	0.002	0.002	7.5E-03	7.5E-03
Trichloroethene	0.004	0.004	1.7E-02	1.7E-02
Toluene	0.004	0.005	6.5E-03	8.9E-03
Xylenes (total)	0.003	0.003	1.8E-03	1.8E-03
Fluoranthene	0.183	0.226	8.9E-08	1.1E-07
Pyrene	0.194	0.228	4.7E-08	5.5E-08
Benzo(a)anthracene	0.160	0.160		1.4E-11
Chrysene	0.175	0.195		1.4E-11
Benzo(b)fluoranthene	0.183	0.205		1.5E-11
Benzo(k)fluoranthene	0.193	0.238		1.7E-11
Benzo(a)pyrene	0.120	0.130		9.3E-12
Indeno(1,2,3-cd)pyrene	0.069	0.100		7.1E-12
Heptachlor epoxide	0.001	0.001		7.1E-14
4,4'-DDE	0.005	0.008		5.8E-13
4,4'-DDT	0.012	0.018		1.3E-12
Alpha chlordane	0.002	0.003		2.2E-13
Gamma chlordane	0.002	0.003		2.4E-13
Aroclor 1260	0.023	0.027		1.9E-12
Barium	180.0	193.0		1.4E-08
Cadmium	0.6	0.7		5.1E-11
Chromium	13.0	14.0		1.0E-09
Lead	16.0	28.0		(3)
Mercury	0.2	0.3		2.3E-11
Zinc	52.0	69.0		5.0E-09

(1) Reasonable Maximum Exposure concentration (either the maximum concentration detected or the 95 percent upper confidence limit on the arithmetic mean concentration).

(2) Air concentrations were modeled using mean and RME surface soil concentration, emission rates that were calculated using EPA recommended methods (EPA 1988, 1991), and conservative dispersion modeling. Air concentrations are expressed in scientific notation. For example, the number 1E-04 is equivalent to 0.0001.

(3) Air concentrations of lead were not modeled. Exposure to lead in soil is evaluated in Section VI.D.4.

Note: Arsenic and beryllium concentrations in surface soil samples do not exceed background levels and are therefore not evaluated in the exposure assessment.

TABLE 15

DRUM DISPOSAL AREA
SUMMARY OF SOIL AND AIR CONCENTRATIONS
FOR ON-SITE EXPOSURE

Chemical	Surface Soil mg/Kg Mean	Surface Soil mg/Kg RME[1]	Modeled On-Site Air[2] mg/m^3 Mean	Modeled On-Site Air[2] mg/m^3 RME[1]
Methylene chloride	0.020	0.030	3.1E-01	6.1E-01
Trichloroethene	0.005	0.006	1.6E-02	2.0E-02
Tetrachloroethene	0.001	0.001	1.3E-03	1.3E-03
Toluene	0.008	0.017	1.0E-02	2.2E-02
Xylenes(total)	0.004	0.005	1.8E-03	2.3E-03
Anthracene	0.083	0.083	1.2E-06	1.3E-06
Di-n-butyl phthalate	0.044	0.044		7.3E-13
Fluoranthene	0.364	0.867	1.3E-07	3.2E-07
Pyrene	0.328	0.649	6.0E-08	1.2E-07
Benzo(a)anthracene	0.338	0.673		1.1E-11
Chrysene	0.340	0.687		1.2E-11
bis(2-Ethylhexyl)phthalate	0.110	0.110		1.8E-12
Benzo(b)fluoranthene	0.386	0.878		1.5E-11
Benzo(k)fluoranthene	0.261	0.490		8.2E-12
Benzo(a)pyrene	0.305	0.595		9.9E-12
Indeno(1,2,3-cd)pyrene	0.100	0.100		1.7E-12
Carbazole	0.100	0.100		1.7E-12
4.4'-DDE	0.147	0.381		6.4E-12
4.4'-DDT	0.349	0.995		1.7E-11
Aroclor 1254	0.114	0.240		4.0E-12
Arsenic	28.0	38.0		6.4E-10
Barium	297.0	406.0		6.8E-09
Beryllium	1.0	1.7		2.8E-17
Cadmium	1.6	2.7		4.5E-11
Chromium	28.0	44.0		7.4E-10
Lead	98.0	133.0		(3)
Mercury	0.3	0.6		9.5E-12
Zinc	693.0	1403.0		2.33E-08

(1) Reasonable Maximum Exposure concentration (either the maximum concentration detected or the 95 percent upper confidence limit on the arithmetic mean concentration).

(2) Air concentrations were modeled using mean and RME surface soil concentration, emission rates that were calculated using EPA recommended methods (EPA 1988, 1991), and conservative dispersion modeling.

(3) Air concentrations of lead were not modeled. Exposure to lead in soil is evident in Section VI.D.4.

TABLE 16

ASH DISPOSAL AREA
SUMMARY OF SOIL AND AIR CONCENTRATIONS FOR ON-SITE EXPOSURES

	Drum Disposal Area Samples (Soil and Ash) (mg/kg)	Background Samples (1) (mg/kg)	Modeled On-Site Air Concentration (Soil and Ash) (2) mg/m3			Estimated Ash Concentration mg/kg (5)
			Wind Erosion	Truck	Motorcycle	
Arsenic	38	4.6	3.4E-09	5.7E-06	1.1E-04	106
Barium	406	163	3.7E-08	6.1E-05	1.2E-03	904
Beryllium	1.7	0.7	1.6E-10	2.6E-07	5.1E-06	4
Cadmium	2.7	0.6	2.4E-10	4.1E-07	8.1E-06	7
Chromium (total)	44	9.8	3.6E-09*	5.9E-06*	1.2E-04*	115
			4.0E-10**	6.6E-07**	1.3E-05**	
Mercury	0.6	9.8	5.4E-11	9.0E-08	1.8E-06	1.5
Zinc	1403	43.6	1.3E-07	2.1E-04	4.2E-03	4160

* Chromium +3

** Chromium +6

(1) Background concentrations are the 95 percent upper confidence limit on the arithmetic mean concentration determined from background soil samples collected at the Base.

(2) Calculated using Drum Disposal Area sample concentration divided by a particulate emission factor (PEF) of 1.1E + 10 m3/kg. The PEF was derived following the method of Cowherd (1985). Because the concentrations are very small, they are expressed in scientific notation, e.g., 8.3E-02. This number is equivalent to 0.0083. The number 1.1E-07 is equivalent to 0.00000011.

(3) Drum Disposal Area sample concentration x 0.15 mg/m3 PM10.

(4) Drum Disposal Area sample concentration x 3 mg/m3 PM10.

(5) Estimated Ash Concentration = (Drum Disposal Area concentration - 0.66 background concentration)/0.33. Drum Disposal Area samples contain at least one-third ash.

TABLE 17

TRENCH AREA
MODELED ON-SITE GROUNDWATER CONCENTRATIONS COMPARED TO RISK-BASED CONCENTRATIONS AND MCLs

Chemical	RME Soil Concentration (ug/kg)	Groundwater Concentration (a) (ug/L)	RBC (b) (ug/L)	Federal MCLs (ug/L) (metals only)
Methylene Chloride	13.3	7.62E-03	6	
2-Butanone	4	2.59E-03	600	
Trichloroethene	4.9	7.60E-04	3	
Tetrachloroethene	2	1.73E-04	1	
Toluene	8.3	5.93E-04	3000	
Ethyl Benzene	2	5.11E-05	2000	
Styrene	1	3.41E-05	2	
Xylenes	8	2.44E-04	800	
1,4-Dichlorobenzene	1544	2.09E-01	3	
2,4-Dichlorophenol	224	6.54E-03	100	
Naphthalene	170	3.20E-03	100	
2-Methyl Naphthalene	53	1.76E-04	NA	
Acenaphthene	80	3.83E-02	2000	
Dibenzofuran	44	1.16E-04	40	
Diethyl Phthalate	86	2.14E-02	30000	
Fluorene	94	4.94E-04	1000	
Phenanthrene	1507	2.38E-03	NA	
Anthracene	193	2.55E-04	10000	
di-n-Butyl Phthalate	79	1.48E-03	4000	
Fluoranthene	1572	1.25E-03	1000	
Pyrene	1400	5.38E-04	1000	
Butyl Benzyl Phthalate	213	2.96E-02	7000	
Benzo(a)anthracene	1300	2.46E-05	0.1 (c)	
Chrysene	1300	1.38E-04	3.2 (c)	
Benzo(b)fluoranthene	1473	7.10E-05	0.1 (c)	
Benzo(k)fluoranthene	257	1.55E-06	0.2 (c)	
Benzo(a)pyrene	283	8.53E-06	0.014 (c)	
Indeno(1,2,3-c,d)pyrene	234	2.00E-07	0.06 (c)	
Dibenzo(a,h)anthracene	170	2.65E-06	0.013 (c)	
Benzo(gh)perylene	1082	3.68E-06	NA	
Carbazole	196	1.03E-03	2	
Heptachlor epoxide	1.1	1.39E-06	0.009	
Dieldrin	11	1.39E-05	0.005	
DDE	64.6	3.43E-06	0.2	
DDD	41.8	2.54E-05	0.3	
DDT	32.4	3.30E-06	0.2	
Alpha Chlordane	13.7	1.58E-06	0.06	
Gamma Chlordane	16.2	1.87E-06	0.06	
Aroclor 1242	134	7.11E-06	0.01	
Aroclor 1254	200	1.59E-04	0.01	
Aroclor 1260	37	1.96E-06	0.01	
2,4-D	6503	1.54E+00	700	
Arsenic	1.00E+04	2.56E-01	0.05	50
Barium	2.50E+05	3.97E-01	3000	1000
Beryllium	6.10E+02	1.94E-04	0.02	1
Cadmium	1.50E+03	1.95E-02	20	5
Chromium	1.80E+04	1.09E+00	40000	100
Lead	1.60E+05	1.27E-01	NA	50
Mercury	6.20E+02	4.93E-04	10	0
Zinc	1.20E+06	5.92E+00	7000	NA

(a) Modeled groundwater concentrations are below RBCs and MCLs by factors of 100 to 10,000,000 (except 1,4-dichlorobenzene which is a factor of 14 below the RBC) for all compounds except arsenic. The modeled concentration of arsenic exceeds the RBC but does not exceed the federal MCL. The groundwater concentrations are expressed in scientific notation; for example, the number 7.62E-03 is equivalent to 0.00762.

(b) Risk-based concentrations (RBCs) for chronic residential exposures from EPA Region X (1991), based on 1E-06 excess cancer risk and Hazard Index = 1.

(c) RBCs for polycyclic aromatic hydrocarbons are derived from benzo(a)pyrene RBC = 0.014 ug/L. and relative potency factors from Table 27.

TABLE 18

DRUM DISPOSAL AREA
MODELED ON-SITE GROUNDWATER CONCENTRATIONS
COMPARED TO RISK-BASED CONCENTRATIONS AND MCLs

Chemical	RME Soil Concentration (ug/kg)	Groundwater Concentration (a) (ug/L)	RBC (b) (ug/L)	Federal MCL (metals only) (ug/l)
METHYLENE CHLORIDE	30	7.95E-02	6	
TRICHLOROETHENE	6	4.41E-03	3	
TETRACHLOROETHENE	1	4.16E-04	1	
TOLUENE	17	5.86E-03	3000	
XYLENES	5	7.41E-04	2000	
ANTHRACENE	83	5.38E-04	10000	
DI-N-BUTYL PHTHALATE	44	4.02E-03	4000	
FLUORANTHENE	867	3.38E-03	1000	
PYRENE	649	1.22E-03	1000	
BENZO(a)ANTHRACENE	673	6.25E-05	0.1 (c)	
CHRYSENE	687	3.57E-04	3.2 (c)	
BENZO(b)FLUORANTHENE	878	2.07E-04	0.1 (c)	
BENZO(k)FLUORANTHENE	490	1.45E-05	0.2 (c)	
BENZO(A)PYRENE	595	8.79E-05	0.014 (c)	
INDENO(1,2,3-C,D)PYRENE	100	4.19E-07	0.06 (c)	
BIS(2-ETHYLHEXLY)PHTHALATE	110	2.37E-03	6	
DDE	381	9.90E-05	0.2	
DDT	995	4.97E-04	0.2	
AROCLOR 1254	240	9.35E-04	0.01	
ARSENIC	3.81E+04	4.75E+00	0.05	50
BARIUM	4.06E+05	3.16E+00	3000	1000
BERYLLIUM	1.74E+03	2.71E-03	0.02	1
CADMIUM	2.68E+03	1.70E-01	20	5
CHROMIUM	4.44E+04	1.30E+01	40000	100
LEAD	1.36E+05	5.30E-01	NA	15
MERCURY	5.70E+02	2.22E-03	10	2
ZINC	1.40E+06	3.38E+01	7000	NA

(a) All modeled groundwater concentrations except arsenic are below RBCs and MCLs by factors of 100 to 10,000,000. The modeled concentration of arsenic exceeds the RBC but does not exceed the federal MCL. The groundwater concentrations are expressed in scientific notation; for example, the number 7.62E-03 is equivalent to 0.00762.

(b) Risk-based concentrations (RBCs) for chronic residential exposures from EPA Region X (1991), based on 1E-06 cancer risk and Hazard Index = 1.

(c) RBCs for polycyclic aromatic hydrocarbons are derived from benzo(a)pyrene RBC = 0.014 ug/L and relative potency factors from Table 27.

TABLE 19

ASH DISPOSAL AREA
MODELED ON-SITE GROUNDWATER CONCENTRATIONS COMPARED TO RISK-BASED CONCENTRATIONS AND MCLs

	RME Soil Concentration(a) (mg/kg)	Groundwater Concentration(b) (ug/l)	RBC(c) (ug/l)	MCL(d) (ug/l)
Arsenic	38	15.3	0.05	50
Barium	406	10.2	3000	1000
Beryllium	1.7	0.009	0.02	1
Cadmium	2.7	0.6	20	5
Chromium	44	42	40,000	100
Lead	136	1.7	NA	15*
Mercury	0.6	0.007	10	2
Zinc	1403	109	7000	NA

(a) Drum Disposal Area Samples (soil and ash).
(b) Modeled groundwater concentrations are below RBCs and MCLs by factors of 100 to 10,000,000 for all compounds except arsenic. The modeled concentration of arsenic exceeds the RBC, but does not exceed the federal MCL.
(c) Risk-based concentrations (RBCs) for chronic residential exposure are from EPA Region X (1991), based on 10[-6] or 1E-06 cancer risk and Hazard Index = 1.
(d) Federal Maximum Contaminant Level for drinking water.

TABLE 20

INHALATION INTAKE ASSUMPTIONS

Parameter	Average	Reasonable Maximum	SDEF(1)
Occupational			
Inhalation rate (m^3/hr)	1.15	1.3	2.5
Deposition factor (particulates)	0.25	0.25	1
Swallowed fraction (particulates)	0.5	0.5	-(2)
Exposure time (hrs/day)	2	4	8
Exposure frequency (days/year)	120	250	250
Exposure duration (years)	9	25	25
Body weight (kg)	70	70	70
Residential			
Inhalation rate (m^3/hr)	0.83	0.83	0.83
Deposition factor (particulates)	0.25	0.25	1
Swallowed fraction (particulates)	0.5	0.5	-(2)
Exposure time (hrs/day)	16	24	24
Exposure frequency (days/year)	270	365	350
Exposure duration (years)	9	30	30
Body weight (kg)	70	70	70

(1) EPA 1991a (SDEF).
(2) SDEF assumes 100% of inhaled particles are deposited in and absorbed in the lung. Therefore, deposition factor (fraction retained in lungs) is 1.0 and the swallowed fraction of inhaled particulate does not apply.

TABLE 21

SOIL INGESTION INTAKE ASSUMPTIONS

	Average	Reasonable Maximum	SDEF(1)
Occupational			
Ingestion rate (mg/day)	10	50	50
Fraction ingested from contaminated source	0.25	0.5	1
Matrix effect	0.5	1	1
Exposure frequency (days/year)	120	250	250
Exposure duration (years)	9	25	25
Body weight	70	70	70
Residential			
Ingestion rate (mg/day)	10 adult 100 child	100 adult 200 child	100 adult 200 child
Fraction ingested from contaminated source	0.25	0.5	1
Matrix effect	0.5	1	1
Exposure frequency (days/year)	270	365	350
Exposure duration (years)	9 adult 6 child	30 adult 6 child	30 adult 6 child
Body weight (kg)	70 adult 15 child	70 adult 15 child	70 adult 15 child

(1) EPA 1991a (SDEF).

TABLE 22

DERMAL CONTACT WITH SOIL INTAKE ASSUMPTIONS

	Average	Reasonable Maximum	SDEF(1)
Occupational			
Surface area (cm^2/day)	1,940	2,910	2,910
Absorbed fraction	0.01	0.1	0.1
Adherence factor (mg/cm^2)	0.5	1.0	1.0
Fraction contacted from contaminated source	0.25	0.5	1.0
Exposure frequency (days/year)	120	250	25
Exposure duration (years)	9	25	25
Body weight (kg)	70	70	70
Residential			
Surface area (cm^2/day)	1,940	2,910	2,910
Absorbed fraction	0.01	0.1	0.1
Adherence factor (mg/cm^2)	0.5	1.0	1.0
Fraction contacted from contaminated source	0.25	0.5	1.0
Exposure frequency (days/year)	270	365	350
Exposure duration (years)	9	30	30
Body weight (kg)	70	70	70

(1) EPA does not provide standard default exposure parameters for dermal contact. Values listed are a combination of maximum and reasonable maximum values.

TABLE 23

GROUNDWATER INGESTION INTAKE ASSUMPTIONS

Residential	SDEF(1)
Ingestion rate (L/day)	2
Exposure frequency (days/year)	350
Exposure duration (years)	30
Body weight (kg)	70

(1) EPA 1991a (SDEF)

TABLE 24

SOIL INGESTION INTAKE ASSUMPTIONS (CHILD TRESPASSER AT ASH DISPOSAL AREA)

Parameter	Average	RME
Ingestion rate (mg/day)	100	100
Fraction ingested from contaminated source	1.0	1.0
Matrix effect	0.5	1
Exposure frequency (days/year)	52	104
Exposure duration (years)	6	6
Body weight	30	30

TABLE 25

INHALATION INTAKE ASSUMPTIONS
(TRUCK DRIVER AND MOTORCYCLIST AT ASH DISPOSAL AREA)

Parameter	Truck Driver (RME)	Motorcyclist (RME)
Inhalation rate (m^3/hr)	1.2	2.5
Exposure time (hrs/day)	8	1
Exposure frequency (days/year)	250	60
Exposure duration (years)	25	6
Body weight (kg)	70	70

TABLE 26

RfDs AND SLOPE FACTORS FOR CHEMICALS OF CONCERN

Chemical	Exposure Route	Toxicity		Carcinogenicity	
		Subchronic RfD (mg/kg-day)	Chronic RfD (mg/kg-day)	Slope Factor $(mg/kg\text{-}day)^{-1}$	EPA Weight of Evidence Category
Acetone	Inhalation	--	--	--	--
	Oral	1E+00	1E-01	--	--
Aroclor	Inhalation	--	--	--	--
	Oral	--	--	7.7E+00	B2
Anthracene	Inhalation	--	--	--	--
	Oral	3E+00	3E-01	--	--
Arsenic	Inhalation	--	--	1.5E+01	A
	Oral	3E-03	3E-04	1.75E+00	A
Barium	Inhalation	1E-03	1E-04	--	--
	Oral	5E-02	5E-02	--	--
Benzo(a)anthracene (1)	Inhalation	--	--	8.4E-01	B2
	Oral	--	--	8.4E-01	B2
Benzo(a)pyrene (1)	Inhalation	--	--	5.8E+00	B2
	Oral	--	--	5.8E+00	B2
Benzo(b)fluoranthene (1)	Inhalation	--	--	8.1E-01	B2
	Oral	--	--	8.1E-01	B2
Benzo(k)fluoranthene (1)	Inhalation	--	--	3.8E-01	B2
	Oral	--	--	3.8E-01	B2
Bis(2-ethylhexyl)phthalate	Inhalation	--	--	--	B2
	Oral	2E-02	2E-02	1.4E-02	B2
2-Butanone	Inhalation	9E-01	9E-02	--	--
	Oral	5E-01	5E-02	--	--

TABLE 26
(Continued)

Chemical	Exposure Route	Toxicity: Subchronic RfD (mg/kg-day)	Toxicity: Chronic RfD (mg/kg-day)	Carcinogenicity: Slope Factor $(mg/kg\text{-}day)^{-1}$	Carcinogenicity: EPA Weight of Evidence Category
Cadmium (food)	Inhalation	--	--	6.1E+00	B1
	Oral	--	1E-03	--	--
Chlordane	Inhalation	--	--	1.3E+00	B2
	Oral	6E-05	6E-05	1.3E+00	B2
Chromium VI	Inhalation	5.7E-06	5.7E-07	4.1E+01	A
	Oral	2E-02	5E-03	--	--
Chyrsene	Inhalation	--	--	3E-02	B2
	Oral	--	--	3E-02	B2
4,4'-DDE	Inhalation	--	--	--	B2
	Oral	--	--	3.4E-01	B2
4,4'-DDT	Inhalation	--	--	3.4E-01	B2
	Oral	5E-04	5E-04	3.4E-01	B2
Di-n-butyl phthalate	Inhalation	--	--	--	--
	Oral	1E+00	1E-01	--	--
Fluoranthene	Inhalation	--	--	--	--
	Oral	4E-01	4E-02	--	--
Heptachlor epoxide	Inhalation	--	--	9.1E+00	B2
	Oral	--	--	9.1E+00	B2
Indeno(1,2,3-cd)pyrene (1)	Inhalation	--	--	1.35E+00	B2
	Oral	--	--	1.35E+00	B2
Mercury	Inhalation	8.6E-05	8.6E-05	--	--
	Oral	3E-04	3E-04	--	--

TABLE 26
(Concluded)

Chemical	Exposure Route	Toxicity: Subchronic RfD (mg/kg-day)	Toxicity: Chronic RfD (mg/kg-day)	Carcinogenicity: Slope Factor $(mg/kg\text{-}day)^{-1}$	Carcinogenicity: EPA Weight of Evidence Category
Methylene chloride	Inhalation	8.6E-01	8.6E-01	1.65E-03	B2
	Oral	6E-02	6E-02	7.5E-03	B2
Pyrene	Inhalation	--	--	--	--
	Oral	3E-01	3E-02	--	--
Tetrachloroethene	Inhalation	--	--	1.8E-03	B2
	Oral	1E-01	1E-01	5.1E-02	B2
Toluene	Inhalation	6E-01	6E-01	--	--
	Oral	2E+00	2E-01	--	--
Trichloroethene	Inhalation	--	--	6E-03	B2
	Oral	--	--	1.1E-02	B2
Xylenes	Inhalation	9E-02	9E-02	--	--
	Oral	4E+00	2E+00	--	--
Zinc	Inhalation	--	--	--	--
	Oral	2E-01	2E-01	--	--

(1) Slope factors derived in Table 27.

-- = No EPA-derived toxicity value.

Sources: EPA. 1992. Health Effects Assessment Summary Tables (HEAST).
EPA. 1992. Integrated Risk Information System (IRIS). On-line database.

TABLE 27

POTENCY-ADJUSTED SLOPE FACTORS FOR PAHs

Chemical	Slope Factor (1)	Potency Factor (2)	Potency-adjusted Slope Factor (3) $(mg/kg\text{-}day)^{-1}$
Benzo(a)pyrene	5.8	1.0	5.8
Benzo(a)anthracene		0.145	0.84
Benzo(b)fluoranthene		0.140	0.81
Benzo(j)fluoranthene		0.061	0.35
Benzo(k)fluoranthene		0.066	0.38
Chrysene		0.0044	0.03
Dibenzo(a,h)anthracene		1.11	6.44
Indeno(1,2,3-cd)pyrene		0.232	1.35

(1) EPA 1992 (HEAST).

(2) Clement Associates, Incorporated. 1988. Comparative Potency Approach for Estimating the Cancer Risk Associated with Exposure to Mixtures of Polycyclic Aromatic Hydrocarbons. Contract No. 68-02-4403.

(3) Chemical-specific potency factor x benzo(a)pyrene slope factor.

TABLE 28

SUMMARY OF HEALTH RISKS
ON-SITE OCCUPATIONAL EXPOSURES

	Site-Specific Average Exposure		Site-Specific Reasonable Maximum Exposure		Standard Default Exposure	
Receptor/Pathway	Cancer Risk	Hazard Index	Cancer Risk	Hazard Index	Cancer Risk	Hazard Index
Occupational/Trench Area						
- Ingestion of Trench Particulates(1)	7.52E-14	2.48E-09	9.84E-13	1.17E-08	--	--
- Inhalation of Trench Particulates	1.57E-12	5.11E-06	2.05E-11	2.41E-05	3.16E-10	3.70E-04
- Inhalation of Trench VOCs	3.29E-10	2.27E-06	4.39E-09	1.09E-05	1.69E-08	4.20E-05
- Ingestion of Trench Surface Soils	1.02E-09	3.12E-05	1.33E-07	1.57E-03	2.65E-07	3.15E-03
- Dermal Contact with Trench Surface Soil	1.97E-09	1.17E-06	7.72E-07	2.23E-04	1.54E-06	4.45E-04
Total	3.32E-09	3.98E-05	9.09E-07	1.83E-03	1.83E-06	4.00E-03
Occupational/Drum Area						
- Ingestion of Drum Particulates(1)	8.57E-13	1.35E-08	1.12E-11	6.34E-08	--	--
- Inhalation of Drum Particulate	1.22E-11	3.70E-06	1.60E-10	1.73E-05	2.46E-09	2.68E-04
- Ingestion of Drum VOCs	8.53E-10	4.31E-06	2.03E-08	3.90E-05	7.83E-08	1.50E-04
- Ingestion of Drum Soils	4.40E-08	6.31E-04	7.12E-06	3.67E-02	1.42E-05	7.34E-02
- Dermal Contact with Drum Soils	5.36E-09	8.25E-06	3.76E-06	2.90E-03	7.51E-06	5.81E-03
Total	5.02E-08	6.47E-04	1.09E-05	3.97E-02	2.18E-05	7.96E-02
Occupational/Ash Disposal Area(2)						
- Ingestion of Air Particulate(1)	4.62E-12	7.20E-08	6.05E-11	3.39E-07	--	--
- Inhalation of Air Particulate	6.62E-11	1.98E-05	8.66E-10	9.33E-05	1.33E-08	1.44E-03
- Ingestion of Ash	1.53E-07	2.39E-03	1.77E-05	9.96E-02	3.53E-05	1.99E-01
Total	1.53E-07	2.41E-03	1.77E-05	9.97E-02	3.53E-05	2.01E-01

(1) Equivalent to swallowed fraction of inhaled particulate matter.
(2) Only metals are of concern. Therefore inhalation of VOCs and dermal uptake are not relevant or significant pathways.

TABLE 29

SUMMARY OF HEALTH RISKS
HYPOTHETICAL ON-SITE RESIDENTIAL EXPOSURES

Receptor/Pathway	Site-Specific Average Exposure		Site-Specific Reasonable Maximum Exposure		Standard Default Exposure	
	Cancer Risk	Hazard Index	Cancer Risk	Hazard Index	Cancer Risk	Hazard Index
Adult Resident/Trench Area						
- Ingestion of Trench Particulates(1)	9.78E-13	3.23E-08	6.61E-12	6.52E-08	--	--
- Inhalation of Trench Particulates	2.04E-11	6.64E-05	1.38E-10	1.35E-04	5.28E-10	5.16E-04
- Inhalation of Trench VOCs	4.28E-09	2.95E-05	2.95E-08	6.11E-05	2.82E-08	5.86E-05
- Ingestion of Trench Surface Soils	2.29E-09	7.02E-05	4.65E-07	4.59E-03	8.91E-07	8.81E-03
- Dermal Contact with Trench S. Soils	4.44E-09	2.62E-06	1.35E-06	3.25E-04	2.59E-06	6.24E-04
- Groundwater Exposures	NA	NA	5.10E-06	ND	5.10E-06	ND
Total Adult	1.10E-08	1.69E-04	6.95E-06	5.12E-03	8.61E-06	1.00E-02
Child Resident/Trench Area						
- Ingestion of Trench S. Soils	7.12E-08	2.80E-03*	8.67E-07	3.66E-02*	1.66E-06	7.02E-02*
Total Resident/Trench Area	8.22E-08	2.97E-03	7.82E-06	4.17E-02	1.03E-05	8.02E-02
Adult Resident/Drum Area						
- Ingestion of Drum Particulates(1)	1.11E-11	1.75E-07	7.53E-11	3.54E-07	--	--
- Inhalation of Drum Particulates	1.59E-10	4.80E-05	1.07E-09	9.66E-05	4.11E-09	3.73E-04
- Inhalation of Drum VOCs	1.11E-08	5.60E-05	1.37E-07	2.18E-04	1.31E-07	2.09E-04
- Ingestion of Drum Soils	9.89E-08	1.42E-03	2.50E-05	1.07E-01	4.79E-05	2.05E-01
- Dermal Contact with Drum Soils	1.21E-08	1.86E-05	6.58E-06	4.24E-03	1.26E-05	8.13E-03
- Groundwater Exposures	NA	NA	9.50E-05	ND	9.50E-05	ND
Total Adult	1.22E-07	1.54E-03	1.27E-04	1.12E-01	1.56E-04	2.14E-01
Child Resident/Drum Area						
- Ingestion of Drum Soils	3.08E-06	1.28E-02	4.66E-05	2.15E-01*	8.93E-05	4.13E-01
Total Resident/Drum Area	3.20E-06	1.43E-02	1.73E-04	3.27E-01	2.45E-04	6.27E-01

TABLE 29
(Concluded)

Receptor/Pathway	Site-Specific Average Exposure		Site-Specific Reasonable Maximum Exposure		Standard Default Exposure	
	Cancer Risk	Hazard Index	Cancer Risk	Hazard Index	Cancer Risk	Hazard Index
Resident/Ash Disposal Area						
- Ingestion of Particulates(1)	6.01E-11	9.36E-07	4.06E-10	1.89E-06	--	--
- Inhalation of Particulates	8.60E-10	2.57E-04	5.81E-09	5.22E-04	2.23E-08	2.00E-03
- Ingestion of Ash	3.43E-07	5.38E-03	6.19E-05	2.91E-01	1.19E-04	5.58E-01
- Groundwater Exposure	NA	NA	3.10E-04	ND	3.10E-04	ND
Total Adult	3.44E-07	5.64E-03	3.72E-04	2.91E-01	4.29E-04	5.60E-01
Child Resident/Ash Disposal Area						
- Ingestion of Ash	1.07E-05	4.97E-02*	1.16E-04	5.38E-01*	2.22E-04	1.03E+00*
Total Resident/Ash Disposal Area	1.10E-05	5.53E-02	4.88E-04	8.29E-01	6.51E-04	1.59E+00

NA = Not applicable. Exposure to modeled concentrations of chemicals of concern in groundwater are hypothetical and are not included in the average exposure scenarios.
ND = Not done.
Note: Groundwater risks are calculated from results of screening-level leachate and dilution modeling using worst-case conditions.
The chemicals whose concentrations are predicted to approach groundwater RBCs by the model have not been detected in groundwater at the Base.

(1) Equivalent to swallowed fraction of inhaled particulate matter.
* Subchronic exposure.

TABLE 30

CARCINOGENIC RISKS FROM MODELED CONCENTRATIONS OF ARSENIC IN GROUNDWATER (RESIDENTIAL EXPOSURES)

	Modeled On-Site Concentration (μg/L)	Cancer Risk	Modeled Off-Site Concentration μg/L	Cancer Risk
Trench Area				
Arsenic	0.25	5×10^{-6}	---	---
Drum Disposal Area				
Arsenic	4.75	9.5×10^{-5}	---	---
Ash Disposal Area				
Arsenic	15.3	3×10^{-4}	11 μg/L(1) 3 to 0.15 μg/L(2) 2.6 μg/L(3)	2×10^{-4}(1) 6×10^{-5} 3×10^{-6}(2) 5×10^{-5}(3)

(1) Landfill boundary (fenceline).
(2) Landfill boundary taking into account that concentration may be overestimated by a factor of 5 to 100.
(3) Base boundary 2,500 feet southwest of the landfill.

Note: The federal Maximum Contaminant Level for arsenic in drinking water is 50 μg/L.

TABLE 31

SUMMARY OF HEALTH RISKS
ASH DISPOSAL AREA: TRESPASSER, TRUCK DRIVER, MOTORCYCLIST

	Average		Reasonable Maximum	
Receptor	Cancer Risk	Hazard Index	Cancer Risk	Hazard Index
Child Trespasser/Soil Ingestion	2.1E-06	9.6E-03	1.6E-05	1.5E-01
Motorcyclist/Inhalation			3.2E-06	1.5E-01(1)
Truck Driver/Inhalation			1.1E-05	1.1E+00(1)

(1) The magnitude of the hazard index is due solely to inhalation of chromium adhered to particulate matter. An inhalation toxicity value for chromium is not available in IRIS or HEAST 1992 because inhalation issues are under review by an EPA workshop. The value used is from HEAST 1991 for inhalation of chromic acid (Cr VI) fumes, 2E-06 mg/m^3, converted to units of mg/kg-day. The magnitude of the hazard index is due to the assumed toxicity of Cr III and Cr VI by the inhalation pathway. The RfD used probably overestimates actual toxicity of chromium adhered to particulate matter.

TABLE 32
MODEL PARAMETER UNCERTAINTY AND POTENTIAL IMPACTS ON PREDICTED CONCENTRATIONS

Model Input Parameters	Degree of Uncertainty	Impact
Leaching layer thickness	low	Groundwater concentrations predicted with INEL model are not impacted by thickness of leaching layer. HELP model estimated infiltration rates, however, increase slightly with increasing thickness for high initial water contents and decrease slightly with low initial water contents. Net effects on model prediction are slight overpredictions or underpredictions.
Contaminant averaging in leaching layer	high	May overpredict from 2-10 X for uneven distribution of contaminants in leaching layer. Model value assumes soil-ash ratio of 2:1. When 1:1 ratio is assured, model predictions would be underestimated by a factor of 1.3.
Initial Soil water content	moderate	Sensitivity analyses indicate that HELP model generated infiltration rates can be slightly sensitive to initial water content for 20-year simulation period. Sensitivity analyses showed mean I value of 0.0058 m/yr with variable thickness and initial water content compared to model value of 0.005 m/yr.
Leaching layer hydraulic conductivity	high	Leaching layer *K* value is mean reference value of silty ash. When upper range is used, *I* is approximately 5 times higher than model value. When low range of *K* is used. *I* values are 3 to 50 times lower than model value.
Infiltration rate	moderate	Because soil layer *K* value was used to determine *I* with HELP model, results may overpredict from 1 to 2 X. HELP model results also incorporate 20-year storm event which could result in slight (<1 X) overprediction.
Adsorption	moderate	May overpredict by up to 10 X due to neglect of adsorbtive capacity of basalt.
Aquifer thickness/ well screen length	high	May overpredict by up to 3 X.
Aquifer Hydraulic conductivity	high	Value used typical of mean value for aquifer. Could result in over or underprediction.
Aquifer dispersion	moderate	With dispersion, concentrations are reduced by a factor of from 1 to 2 with transport from source area border to fenceline.
Kd value estimation	moderate	Model value estimated from laboratory leaching tests. May overpredict.
Direction of groundwater flow	moderate	May overpredict by a factor of 2 to 3
Net impact on model predictions	high	May overpredict by a factor from 5 to 50 at point of dilution and 5 to 100 at fenceline location.

TABLE 33

IDAHO DEPARTMENT OF HEALTH AND WELFARE ASH SAMPLES
JANUARY 1993

ANALYTICAL RESULTS (mg/Kg)

Sample No.	Arsenic	Barium	Chromium	Zinc
010064[1]	3.52	455	14.1	26.5
010065	4.54	365.5	9.87	25
010066	4.19	273	15	34.1
010067	6.46	311.3	25.8	36
010068	<2	1045.2	11.1	11.2

[1] Idaho Department of Health and Welfare, Bureau of Laboratories tracking number.

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2-11-93

It appears from my review of the Proposed no Action Plan and administrative record for this operable unit and operable unit three that the Air Force, along with the EPA and state, has spent over $900,000 for this proposal, not including funding for their personal to determine the extent of potential contamination and risk to human health and the environment.

Monitoring wells, sampling of these wells and base production wells and soil samples where completed. Analysis of the results and a risk assessment has satisfied the EPA and Air Force that no action is warranted beyond the 5 year review since expectable exposures or risks to human health and the environment exist for the land fill.

In addition operable unit 3 will continue to monitor ground water quality at the land fill, cross, up and down gradient of the land fill at a cost of $1.5 million. OU threes proposed Record of Decision is due in 1995.

Having a thorough knowledge of Air Force land use procedures, conditions at the site, knowledge of Federal Facilities Agreements and responsibilities of the agencies involved and the DSMOA process for providing funding to states for DOD NPL bases. And after reading the Idaho Solid Waste Facilities Act, Chapter 74, sections 39.701 through 39.7421 and Title 1 Chapter 6 of the Idaho Solid Waste Management Regulations and Standards Manual, I have questions directed at the State of Idaho Department of Health and Welfare.

1. Why does it appear that the state does not concur with or except the validity of the data and is in reality asking for an "action" at this site under Title 1 Chapter 6 of the Idaho Solid Waste Management Regulations and Standards Manual?

2. Is it wise in today's economic climate to pose an unnecessary additional burden on the tax payer of $1.1 million to cap the site as the manual requires for "current operating land fills"? Along with this cost the State would receive funding through the DSMOA. These burdens are assumed by the tax payer in the end. Does not the evidence support "no action"?

3. What specific additional actions, burden on the tax payer, is the State requiring the Air Force assume to comply with Title 1 Chapter 6 of the Idaho Solid Waste Management Regulations and Standards Manual? If it is the capping of the site, then the cost would be approximately $1.1 million dollars, clearly not "no action". If it is additional monitoring wells, then what of the wells completed for this operable unit and operable unit 3, clearly not "no action". If it is the monitoring of ground water past the end of OU3 and its recommendations or the 5 year review period, then again a cost is incurred, clearly not "no action". Or is there some other requirement the state is asking for, again in reality clearly not "no action"?

1969 ~~the mid 1970's~~ This site stopped recieving wastes in ~~the mid 1970's~~. My review of 39.701 through 39.7421 leads me to the conclution that the requirerment applies to land fills recieving wastes after Oct. 9 1991 and Oct 1993.

The state needs to be clear in this proposal as to what they are asking the Air Force to do, so that we the taxpayer can see the dollars that are being diverted from other NPL sites and environmental issues in this state and the country. It Appears to me that the state is trying to back the Air Force into expending $1.1 million of remedial action construction dollars to continue its funding through the DSMOA process vs. finding the best solution to the problems and moving on to other more important issues. Do we not have enough federal and state agencies across the nation that are trying to perpetuate themselves rather then getting the task done they where established for and moving on.

Thomas W. Stanley