
INSTALLATION RESTORATION PROGRAM

FINAL No Further Response Action Planned (NFRAP) Decision Document

**Site 20 - Runway Joint Sealing Tar Drum Disposal Site
148th Fighter Wing
Minnesota Air National Guard, Duluth International Airport
Duluth, Minnesota**

December 1997



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Air National Guard
Installation Restoration Program
No Further Response
Action Planned (NFRAP)
Decision Document**

**Site 20 - Runway Joint Sealing Tar Drum Disposal Site
148th Fighter Wing
Minnesota Air National Guard, Duluth International Airport
Duluth, Minnesota**

Prepared for:

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Andrews Air Force Base, Maryland**

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December 1997

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LIST OF ACRONYMS AND ABBREVIATIONS

%	Percent
°F	Degrees Fahrenheit
ANG	Air National Guard
ARAR	Applicable or Relevant and Appropriate Requirement
ARI	Administrative Record Index
BGS	Below Ground Surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CRP	Community Relations Plan
DD	Decision Document
DIA	Duluth International Airport
IRP	Installation Restoration Program
IS	Industrial Soil
MDNR	Minnesota Department of Natural Resources
mg/kg	Milligrams Per Kilogram
MPCA	Minnesota Pollution Control Agency
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NFRAP	No Further Response Action Planned
NGVD	National Geodetic Vertical Datum
NOV	Notice of Violation
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PRG	Preliminary Remediation Goal
RCRA	Resource Conservation and Recovery Act
RS	Residential Soil
SARA	Superfund Amendments and Reauthorization Act of 1986
SI	Site Investigation
SNA	Sensitive Natural Area
SW-846	Test Methods for Evaluating Solid Wastes, November 1986, Third Edition
U.S. EPA	United States Environmental Protection Agency
WMA	Wildlife Management Area

Declaration

Site Name and Location

Installation Restoration Program Site
Site 20 - Runway Joint Sealing Tar Drum Disposal Site
148th Fighter Wing, Minnesota Air National Guard Base, Duluth International Airport,
Duluth, Minnesota

Statement of Basis and Purpose

This Decision Document (DD) presents the selected remedial action for Site 20 at the Minnesota Air National Guard Base at Duluth International Airport (DIA). This decision is based on the results of a drum and soil removal action conducted in August 1989 under the Installation Restoration Program (IRP) at the 148th Fighter Wing, Minnesota Air National Guard, DIA, Duluth, Minnesota.

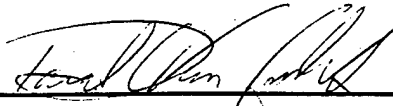
Description of the Selected Remedy

Based on the current conditions at Site 20, it has been determined that no significant risk or threat to public health or the environment exists. Therefore, no further action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), is required.


Declaration Statement

This Category II DD has been prepared in accordance with the June 1995 U.S. Air Force No Further Response Action Planned (NFRAP) Guide. The DD represents the selected action for this site developed in accordance with CERCLA, as amended, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). It also satisfies the requirements of the National Environmental Policy Act (NEPA) that apply to CERCLA response actions. It has been determined that the selected remedy of no further response action planned is protective of human health and the environment, attains federal and state requirements that are applicable or relevant and appropriate, and is cost-effective. The statutory preference for further treatment is not applicable because contaminant levels at the site have been determined to present no significant threat to human health or the environment; therefore, no further treatment is necessary.


**Concurrence Record
for the NFRAP Decision at the 148th Fighter Wing,
Minnesota Air National Guard,
Duluth International Airport, Duluth, Minnesota**




DAVID C. VAN GASBECK
Chief, Environmental Division
Civil Engineer Directorate



Date



Minnesota Pollution Control Agency (MPCA)



Date

Site 20 - Runway Joint Sealing Tar
Drum Disposal Site

Concur
 Do Not Concur (Please provide reasons.)

Decision Summary

1.0 INTRODUCTION

This Decision Document (DD) supports the no further response action planned (NFRAP) decision for Site 20 (Runway Joint Sealing Tar Drum Disposal Site) at the 148th Fighter Wing, Minnesota Air National Guard (ANG), Duluth International Airport (DIA), Duluth, Minnesota (hereafter referred to as "the base").

The base is located at the DIA in St. Louis County, northeastern Minnesota, approximately 7 miles northwest of the City of Duluth (see Figure 1-1). The purpose of this Category II DD (as specified in the June 1995 U.S. Air Force NFRAP Guide) is to summarize the existing data for the site, to evaluate the risk to human health and the environment, to describe the corrective actions that have been completed at the site, and to provide the ANG's rationale for making the NFRAP decision for this site.

The primary source of information used to derive and support the NFRAP decision for Site 20 was a September 1989 Remedial Sampling, Testing, and Protection of Barrels Containing Waste Tar Final Report (prepared by Bay West, Inc.). Environmental setting and other general information were obtained from a June 1996 Site Investigation (SI) Report for Installation Restoration Program (IRP) Sites No. 25 and No. 26. Additional supporting information was obtained from documentation generated during a drum and soil removal action that was completed at Site 20 in June 1991.

A description of Site 20 and its surrounding areas is provided in Section 1.1. Information on the history of Site 20, including enforcement actions, is presented in Section 1.2. Highlights of the base's community participation efforts are presented in Section 1.3. The scope of the response action at the base is discussed in Section 1.4. A discussion of the characteristics

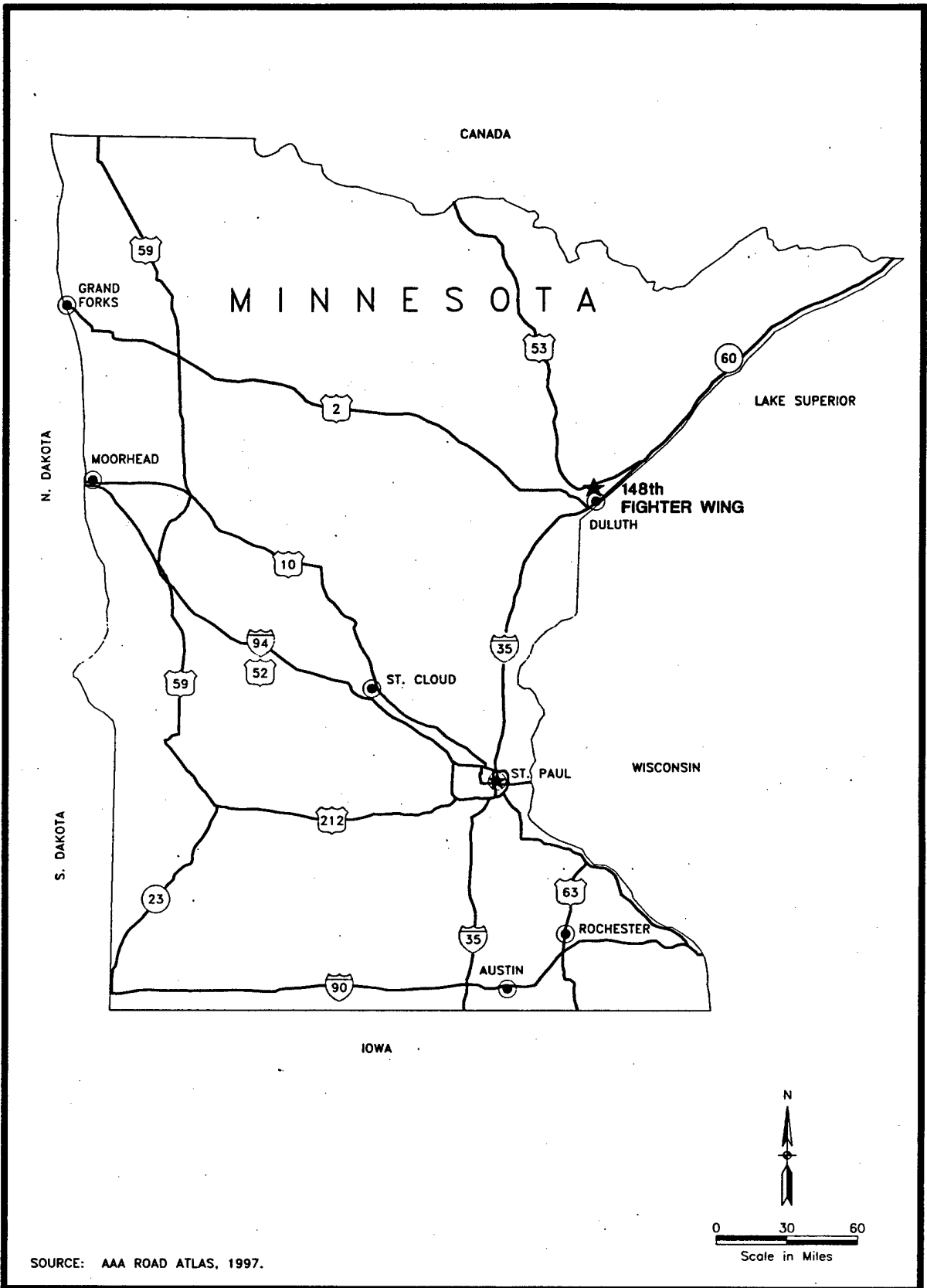


Figure 1-1. Location of the 148th Fighter Wing, Minnesota ANG, Duluth International Airport, Duluth, Minnesota

of Site 20, including information on the physiography, geologic setting, climatology, environmental media, and receptors at the site, is presented in Section 2.0. An analysis of available site-related data, as well as an evaluation of the human health risks posed by the site, are presented in Section 3.0. The NFRAP decision and the rationale for this decision are presented in Section 4.0. Appendix A provides a list of the references that were used to prepare this DD and a copy of the Administrative Record Index (ARI) for the base. Appendix B contains copies of supporting documentation for the drum and soil removal action. Appendix C provides information on background levels of polycyclic aromatic hydrocarbons (PAHs) in surface soil samples collected from urban locations.

1.1 Site Name, Location, and Description

Sections 1.1.1 through 1.1.5 present an overview of Site 20, including a description of the site; the topography of the area; and information on critical environments, adjacent land uses, and nearby populations. Sections 1.1.6 and 1.1.7 provide information on the general surface water/groundwater resources and surface/subsurface features of the area.

1.1.1 Site Description

Site 20 (Runway Joint Sealing Tar Drum Disposal Site) is a man-made, grassy drainage swale, approximately 50 feet in diameter, that is located to the north of the East-West Runway (see Figure 1-2). The drainage swale is part of the DIA's stormwater drainage system. Site 20 was identified in 1988 during an informal tour of the base conducted by the Minnesota Pollution Control Agency (MPCA). During the tour, 17 drums of runway joint sealing tar were discovered in the swale; it is not known when the drums were placed in the swale. Most of the drums had rusted, and a small amount of tar had leaked from some of the drums onto the ground. The base removed the drums, along with spilled tar residue and contaminated soil, in August

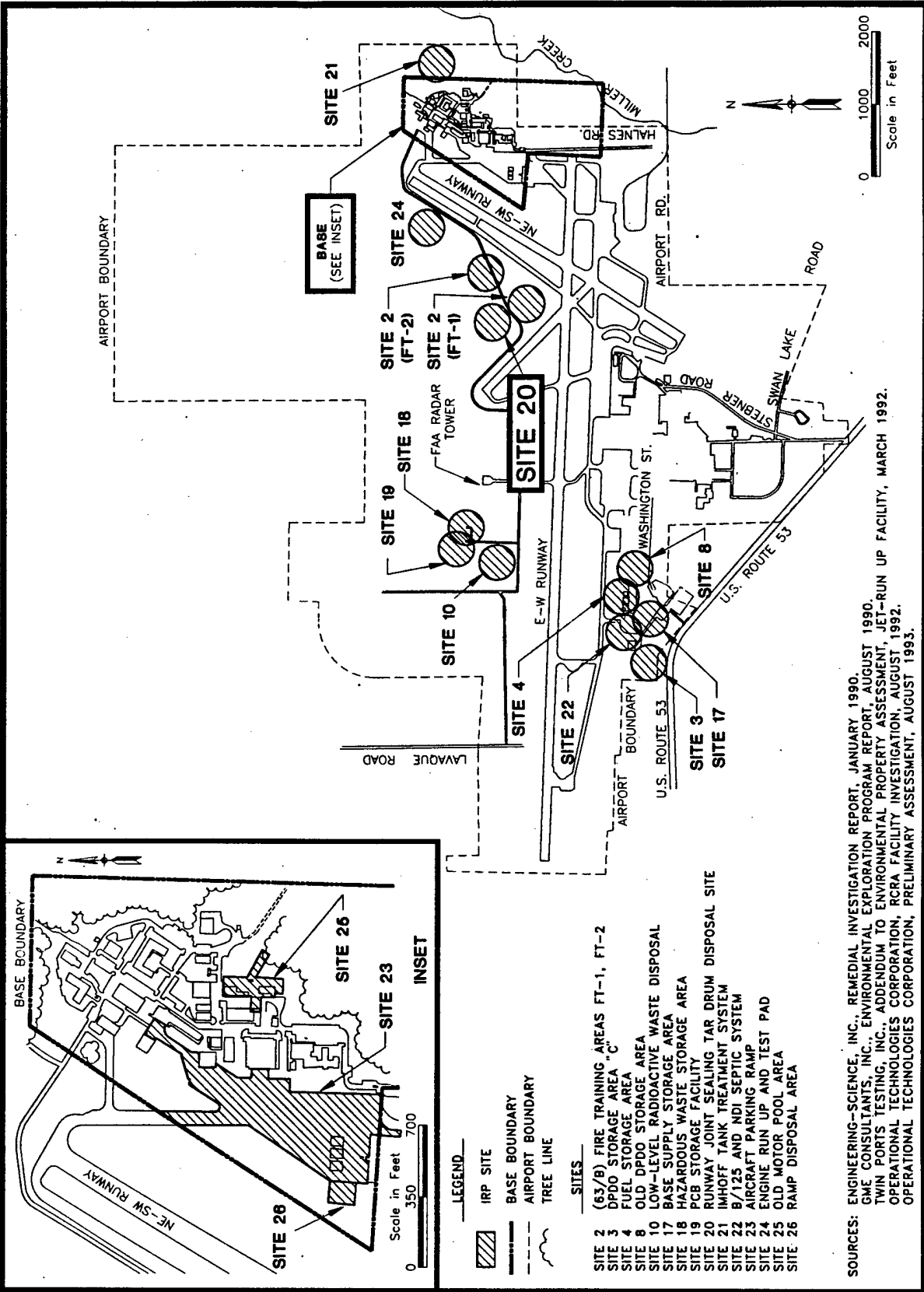


Figure 1-2. Location of Site 20, 148th Fighter Wing, Minnesota ANG
 Duluth International Airport, Duluth, Minnesota

1989; during this removal action, an additional 27 drums were found, resulting in a total of 44 drums. The 44 drums and the contaminated soil were shipped off site as hazardous waste on 19 June 1991.

1.1.2 Topography

The glaciated terrain surrounding the base is characterized by poor drainage, low irregular relief, and many shallow lakes and bogs. The base is located on relatively flat topography, with surface elevations that range from approximately 1,400 to 1,430 feet above sea level. During the construction of the airport, the topography of the area was affected by extensive cut-and-fill operations that involved filling in pre-existing bogs, lowering or removing small knobs, and creating or relocating drainage channels. Site 20 is a grassy, brush-covered, man-made drainage swale. Except for the depression of the drainage swale itself, the area around the drainage swale is generally flat because it has been graded for use as a runway.

1.1.3 Critical Environments

For the purpose of this discussion, critical environments are defined to include all lands and waters that are specifically recognized or managed (by federal, state, or local government agencies or private organizations) as rare, unique, unusually sensitive, or important natural resources. These areas include permanent and seasonal habitats of federally designated endangered species, nature preserves (including federal and state parks), wilderness areas, wildlife sanctuaries, and wetlands, but they do not include parks established solely for historic preservation or recreation.

According to the August 1993 Preliminary Assessment (PA) Report, the Canosia Wildlife Management Area (WMA), which is located 4.1 miles northwest of the base, is used as a nesting area by the Osprey, an endangered bird species.

The PA Report also states that the base and its surrounding areas are located within a major flyway for migratory birds. Traditional wildlife areas that support regional bird migrations are protected. In addition to the Canosia WMA, several Sensitive Natural Areas (SNAs) and other WMAs are located in the vicinity of the base; these areas include: the Moose Mountain SNA, the Hearing Island WMA, the Interstate Island WMA, and the Hemlock Ravine SNA.

Wild Rice Lake, which is located 2.5 miles north of the base, is classified by the Minnesota Department of Natural Resources (MDNR) as a Protected Water. Antoinette Lake, which is located 2.75 miles northeast of the base, is also designated as a Protected Water. This lake serves as the headwaters for the Amity River, which flows southeast into Lake Superior. One perennial stream (Miller Creek) flows southeast across the southeastern corner of the base and is designated by the state as a Trout Stream; however, it has not been restocked by the MDNR since 1973, according to the August 1992 Resource Conservation and Recovery Act (RCRA) Facility Investigation Report.

1.1.4 Adjacent Land Uses

Site 20 is located north of the East-West Runway at DIA and west of the base boundary. Miller Creek flows across the southeastern corner of the base. The base is bordered on the west by DIA and is surrounded on the north, east, and south primarily by woodlands/wetlands; however, scattered residential properties, light commercial development, and mobile home parks are located around and within 1/2 mile of the airport property.

1.1.5 Nearby Populations

The base is located approximately 7 miles northwest of downtown Duluth. The estimated population of the Duluth-Superior Standard Metropolitan Statistical Area is 217,000.

The total population of the base is 947; 330 of these people are employed full-time. The residential area nearest to Site 20 is located about 1 mile east of the site, along Rice Lake Road.

1.1.6 General Surface Water and Groundwater Resources

Hundreds of surface water bodies, including wooded bogs, wetlands, and small ponds, surround the base. Wild Rice Lake and Antoinette Lake are located 2.5 and 2.75 miles north and northeast of the base, respectively. Miller Creek, a perennial stream, flows southeast across the southeastern corner of the base.

Two hydrogeologic units underlie the base area: unconsolidated glacial materials (till) and the underlying bedrock (the Duluth Gabbro). Limited groundwater is present in fracture zones in the bedrock. The groundwater is directly recharged from the ground surface to the shallow water table in the glacial till, where it flows horizontally in the water table and discharges to local streams, tributaries, and ponds. The water table is also continuous with marsh and bog areas, where the water is located at or above the ground surface.

Lindholm, et al. (1979) reported that groundwater yields are generally less than 25 gallons per minute for glacial till and less than 5 gallons per minute for bedrock. The glacial till, however, is used in rural areas as a water source through low-production, hand-dug, or shallow-drilled wells. The well depths in the area range from 10 to 208 BGS, with most depths in the tens of feet. When the till is used as a water source, the wells are dug open-end; where the Duluth Gabbro is used as a water source, the wells are completed as an open hole. In both cases, the lower parts of the wells themselves are used as reservoirs.

In general, the base and the homes located near the base obtain their drinking water from the City of Duluth public water system. The water system intake is located in Lake Superior, which is situated nearly 10 miles south of the base. A few private water wells are located in the rural area that surrounds the airport and the base. The private wells are used for

domestic purposes, with the exception of one well located in Section 12, Range 15W, Township 50N; this well is classified as a commercial well (August 1993 PA Report).

1.1.7 Surface and Subsurface Features

Site 20 is a man-made, grassy drainage swale that is located north of the East-West Runway. The area is covered by brush and small trees. The drainage swale is part of the DIA's stormwater drainage system. No other surface or subsurface features are present at the site.

1.2 Site History and Enforcement Activities

Sections 1.2.1 and 1.2.2 present a history of Site 20 and a discussion of the regulatory agency/public involvement at the site.

1.2.1 Site History

Site 20 (Runway Joint Sealing Tar Drum Disposal Site) was identified in 1988 during an informal tour of the base by the MPCA. During the tour, 17 drums of runway joint sealing tar were discovered in a swale located near the East-West Runway; it is not known when the drums were placed in the hollow. Most of the drums had rusted, and a small amount of tar had leaked from some of the drums onto the ground.

During August 1989, Bay West, Inc. sampled and containerized the tar drums and the spilled residue, which appeared to be a petroleum-based, tar-like sealant. During the site work, an additional 27 drums were found, resulting in a total of 44 drums. One of these drums was a 55-gallon galvanized drum that contained unknown material; the other 43 drums were 55-gallon drums that contained tar. Bay West, Inc. collected one sample from each of the forty-three 55-gallon drums of tar and two samples from the one galvanized drum of unknown material. Six

shallow soil samples were also collected from the drum disposal area. A total of nine samples (five samples selected randomly from the 43 tar drums, one sample from the galvanized drum of unknown material, and three soil samples from the drum disposal area) were submitted to Aspen Research Corporation for laboratory analysis of volatile organic compounds, semivolatile organic compounds, and polychlorinated biphenyls (PCBs). The pH and flashpoint of the sample from the galvanized drum were also determined by the laboratory.

After the drums and the drum disposal area were sampled, Bay West, Inc. overpacked all 43 tar drums and the 1 galvanized drum into 85-gallon drums. Residual tar from the ground surface and contaminated surface soil were overpacked into 6 additional 85-gallon drums and into the void spaces of the 43 tar drums. Bay West, Inc. noted that the tar on the ground surface ranged from 1 to 6 inches thick; however, the material had not penetrated the soil below 1 inch. All tar on the ground surface and all visibly-stained soil were removed during the removal action. After packaging, all fifty 85-gallon drums were delivered to Building 511 for storage, pending disposal.

On 19 June 1991, the drums were shipped as hazardous waste to Tricil Environmental Management in Millington, TN.

1.2.2 Regulatory Agency/Public Involvement

On 14 November 1988, after the drum disposal area was discovered, the MPCA issued a Notice of Violation (NOV) to the base. In accordance with the requirements of the NOV, the base submitted a revised Statement of Work to clean up the site by 30 April 1989. In a letter dated 16 February 1989, the MPCA informed the base that the revised SOW adequately addressed the requirements of the NOV. The drum and soil removal action was conducted in August 1989, and the drums and contaminated soil were disposed off site in June 1991.

1.3 **Highlights of Community Participation**

An Administrative Record, which contains information that was used to support IRP decision-making, has been established at the base. A copy of the Administrative Record Index (ARI) for the base is provided in Appendix A. The Base Environmental Manager has also established public information repositories at the base and at the Duluth Public Library. The information repositories provide final versions of IRP documents to the public. A Community Relations Plan (CRP) was completed for the base in May 1996. According to base personnel, no public comments concerning Site 20 have been received to date.

1.4 **Scope of Response Action**

This DD addresses only Site 20 at the base. Fourteen other sites at the base (Sites 2, 3, 4, 8, 10, 17, 18, 19, and 21 through 26) are also included in the IRP. No operable units have been designated at the base or at the site.

2.0 SUMMARY OF SITE CHARACTERISTICS

This section provides a summary of the characteristics of Site 20, including the physiography, geologic setting, climatology, environmental media, and receptors at the site.

2.1 Physiography, Geologic Setting, and Climatology

The base is located within the North Shore Highland section of the Superior Upland physiographic province, which is characterized by Pleistocene glaciation. As a result of this glaciation, local relief may have distinct glaciation features, such as kames, kettles, marshes, and moraines. The glaciated terrain near the base is characterized by poor drainage, low irregular relief, and numerous shallow lakes and bogs in low areas. During the construction of DIA, the land was subjected to extensive cut-and-fill operations that affected both topography and drainage. Pre-existing bogs were filled in, small knobs were lowered or removed, and drainage channels were built or relocated to direct site runoff. Although the National Geodetic Vertical Datum (NGVD) elevation of the base is approximately 1,400 feet, the land surface to the east of the base drops off abruptly to an elevation of approximately 600 feet NGVD across the City of Duluth to Lake Superior.

The City of Duluth and its surrounding area (including the base) lie on the southern margin of the Superior Province of the Canadian Shield (Medaris, 1983), which consists of a large region of Precambrian sedimentary and igneous rocks that have been metamorphosed and deformed. This area is underlain by crystalline bedrock that is known as the Duluth Gabbro, which is part of the Duluth Complex. This bedrock is composed of various intrusive igneous rocks that contain large amounts of heavier elements such as calcium, iron, and magnesium. The Duluth Gabbro is a dense, heavy crystalline rock that contains few to no pore spaces. However, it can contain fracture zones that can be spaced closely together or miles apart.

The Precambrian bedrock of the Duluth area and northern Minnesota has been scoured by glaciers of Pleistocene Age, which removed younger rock units located over the Precambrian surface (Medaris, 1983). During the last glacial period, the later Wisconsin Superior lobe removed any evidence of earlier glaciation and deposited a veneer of glacial till (a red soil which varies from clay to silt) over the bedrock. Other soil types in the area include loam, sandy loam, and sand (June 1996 SI Report).

The overlying glacial till in the Duluth area is composed of low to moderately permeable unstratified sand, silt, and clay with boulders and cobbles. Locally occurring pockets of peat are found within the till. The till is unconsolidated and ranges in thickness from 10 to over 60 feet.

Minnesota has a predominantly continental climate, which is modified somewhat by the presence of Lake Superior. The City of Duluth averages 143 days between the last freeze in mid-May and the first freeze in early October. At the base, the average first and last freezes occur in late September and late May, resulting in an average freeze-free period of 123 days. Winters are generally cold; the maximum daily temperature usually remains below 32°F on an average of 108 days per year. Summers are generally mild; the maximum daily temperature during June, July, and August is usually near 72 degrees Fahrenheit (°F).

Precipitation is well-distributed throughout the year. The mean annual precipitation is 28.49 inches. Maximum precipitation occurs from May through September; in the base area, the maximum annual precipitation is 39.61 inches (June 1996 SI Report). The mean annual snowfall in the area is 76.9 inches.

2.2 Soil

Descriptions of the soil characteristics and the soil contamination at Site 20 are presented in Sections 2.2.1 and 2.2.2, respectively.

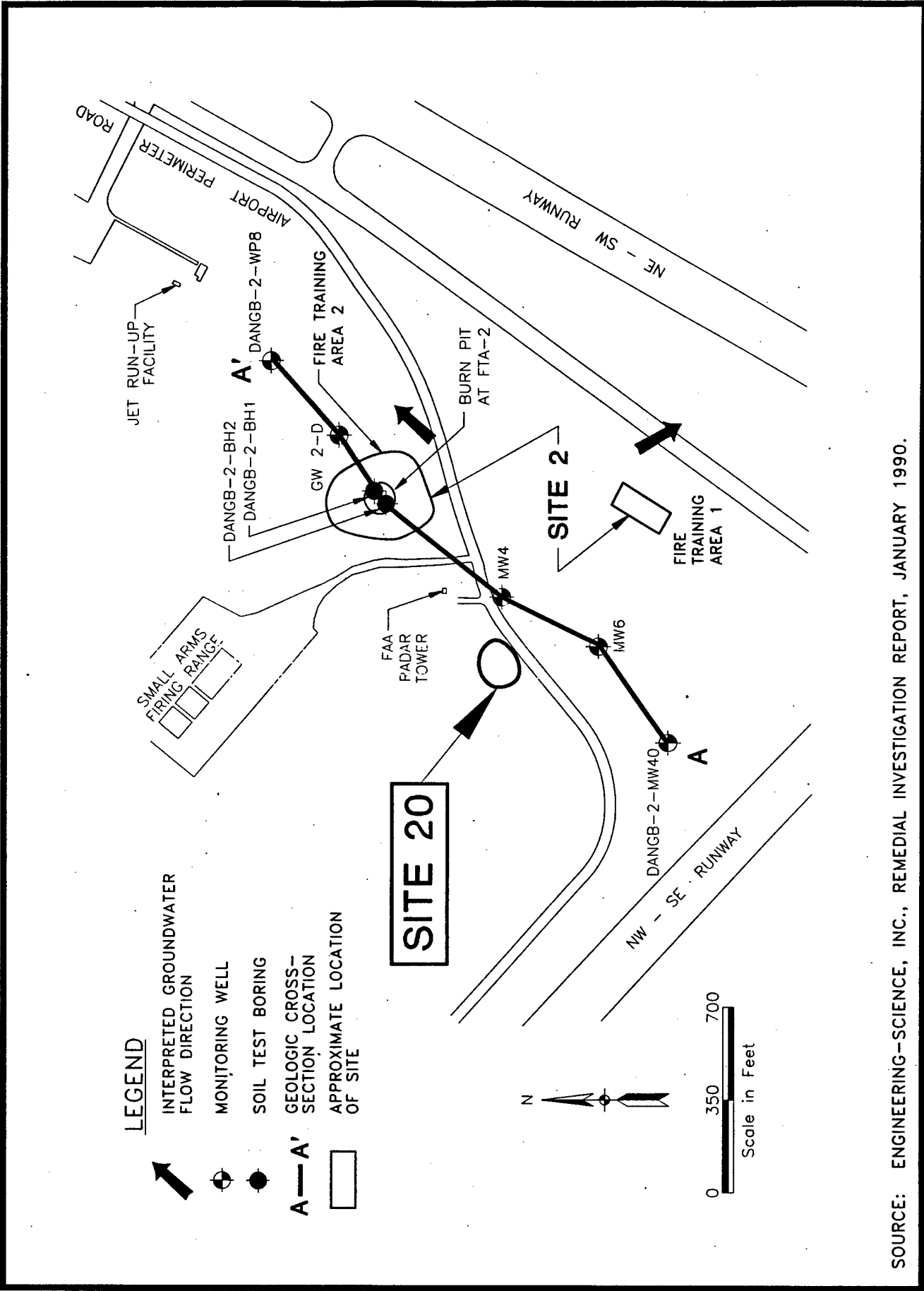
2.2.1 Soil Characteristics

No subsurface exploration was conducted at Site 20. The shallow soil at the base consists of a layer of fill that ranges in thickness from 3 to 5 feet. The fill layer is composed primarily of clean, poorly graded sand and silty sand. Native glacial till soil, which is composed primarily of low to moderately permeable unstratified sand, silt, and clay with boulder and cobble inclusions, is encountered beneath the fill. Locally occurring pockets of peat are found within the till.

A geologic cross-section representative of conditions at Site 20 was developed from the results of a subsurface investigation conducted at IRP Site 2 at the base, which is located immediately southeast of Site 20. The location of the cross-section at the base is shown on Figure 2-1; the geologic cross-section for Site 20 is shown on Figure 2-2.

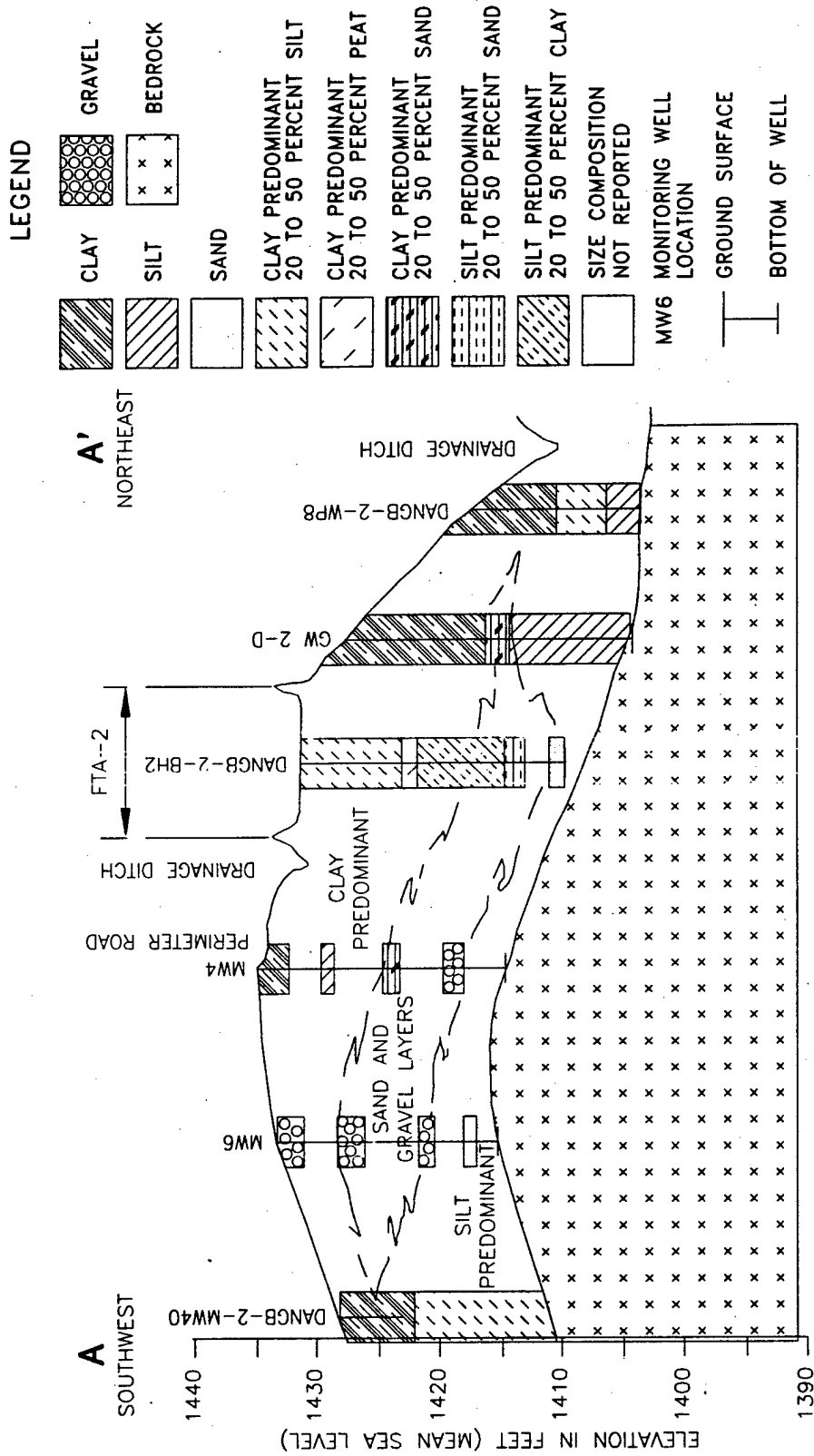
2.2.2 Soil Contamination

Bay West, Inc. collected six soil samples from the drum disposal area in the swale. Three of these samples were submitted for analysis using United States Environmental Protection Agency (U.S. EPA) SW-846 Methods 8240 (volatile organic compounds), 8270 (semivolatile organic compounds), and 8080 (PCBs). A summary of the soil sampling results (after remediation) for Site 20 is presented in Table 2-1. This table also provides the U.S. EPA Region IX Preliminary Remediation Goals (PRGs) for the constituents of concern in residential and industrial soil. A comparison of the maximum detected concentrations of contaminants to



SOURCE: ENGINEERING-SCIENCE, INC., REMEDIAL INVESTIGATION REPORT, JANUARY 1990.

Figure 2-1. Location of Geologic Cross-Section at Site 20, 148th Fighter Wing, Minnesota ANG Duluth International Airport, Duluth, Minnesota



SOURCE: ENGINEERING-SCIENCE, INC., REMEDIAL INVESTIGATION REPORT, JANUARY 1990.

Figure 2-2. Geologic Cross-Section Representative of Conditions at Site 20 (Based on Site 2 RI Activities), 148th Fighter Wing, Minnesota ANG Duluth International Airport, Duluth, Minnesota

Table 2-1

**Results of Soil Sampling at Site 20
148th Fighter Wing, Minnesota ANG,
Duluth International Airport, Duluth, Minnesota**

Analyte	Maximum Detected Concentration in Surface Soil	ARAR/PRG Concentration (RS/IS)	Source of ARAR/PRG	ARAR/PRG Exceeded?
Acenaphthalene	1.1 mg/kg	110/110 mg/kg	Region IX RS/IS	No
Anthracene	0.74 mg/kg	5.7/5.7 mg/kg	Region IX RS/IS	No
Benzo(a)pyrene	1.6 mg/kg	0.061/0.26 mg/kg	Region IX RS/IS	Yes
Bis(2-ethylhexyl)phthalate	2.5 mg/kg	32/140 mg/kg	Region IX RS/IS	No
Phenanthrene	0.41 mg/kg	NA/NA	Region IX RS/IS	NA
Pyrene	0.79 mg/kg	100/100 mg/kg	Region IX RS/IS	No

Sources: Bay West, Inc. Remedial Sampling, Testing, and Protection of Barrels Containing Waste Tar Final Report, Minnesota Air National Guard TACAN Site, Appendix 2, September 1989.

mg/kg - Milligrams per Kilogram.

ARAR - Applicable or Relevant and Appropriate Requirement.

IS - Industrial Soil.

NA - Not Available.

PRG - Preliminary Remediation Goal.

Region IX - U.S. EPA Region IX Preliminary Remediation Goals for Industrial Areas, 1 August 1996.

RS - Residential Soil.

the U.S. EPA Region IX PRGs shows that, with the exception of benzo(a)pyrene (a normal constituent of tar), the PRGs were not exceeded after remediation was completed at the site.

During the sampling program, Bay West, Inc. noted the presence of tar up to 6 inches in thickness on the ground surface; however, the material had not penetrated the soil more than 1 inch. All tar on the ground surface and all visibly-stained soil were removed as part of the removal action.

2.3 Groundwater

Descriptions of the hydrogeologic setting and the groundwater contamination at Site 20 are presented in Sections 2.3.1 and 2.3.2, respectively.

2.3.1 Hydrogeologic Setting

Two hydrogeologic units underlie the base area: unconsolidated glacial materials (till) and the underlying bedrock (the Duluth Gabbro). Limited groundwater is present in fracture zones in the bedrock. The overlying glacial till consists of unsorted, non-stratified till that is 10 to 60 feet thick. Groundwater occurs in the till in limited quantities at depths of 5 to 15 feet BGS. In these units, groundwater flow characteristics are controlled by the amount of clay in the till and the topography of the bedrock.

The hydraulic head in the bedrock near the base is similar to that in the overlying glacial till, while the permeability of the bedrock is generally much lower than that of the overlying glacial till (January 1990 Remedial Investigation Report). Although the two units are hydraulically connected, most groundwater flow occurs in the more conductive glacial till. The principal flow path of groundwater at the base consists of direct recharge from the ground surface to the shallow water table in the glacial till, followed by horizontal flow in the water table and discharge to local streams and ponds. Throughout the area of the base, the shallow groundwater

table provides discharge to streams and their tributaries. The water table is also continuous with marsh and bog areas, where the water is located at or above the ground surface.

2.3.2 Groundwater Contamination

All drums, spilled tar residue, and stained soil were removed from Site 20. The tar residue had penetrated only approximately 1 inch into surface soil. Due to the low solubility of tar, there was no evidence to suggest groundwater contamination; therefore, no groundwater samples were collected at Site 20.

2.4 Surface Water/Sediment

Descriptions of the surface water setting and the surface water/sediment contamination at Site 20 are presented in Sections 2.4.1 and 2.4.2, respectively.

2.4.1 Surface Water Setting

Hundreds of surface water bodies, including wooded bogs, wetlands, and small ponds, surround the base. Wild Rice Lake and Antoinette Lake are located northeast of the base, and one perennial stream, Miller Creek, flows southeast across the base.

Surface water drainage in the Duluth area occurs in the St. Louis Watershed of the Great Lakes Basin (Olcott, et al., 1978). The southeastern corner of the watershed, which is located north of the St. Louis River, drains into several small creeks that flow to the southeast and join the St. Louis River near its mouth. The remainder of the watershed north of the river drains to the southwest, and the smaller streams and tributaries join the St. Louis River along its upper extent. The St. Louis River is the largest Minnesota river that flows into Lake Superior.

Surface water at the airport drains primarily into a large north-south drainage ditch that flows northward into Wild Rice Lake, which is located about 2.5 miles north of the base. The lake drains into the Beaver River and then into the Cloquet River, which joins the St. Louis River approximately 19 miles west of the airport. Because of its location in the eastern portion of the airport, surface water at the base drains eastward into Miller Creek. Miller Creek flows southeast and joins the St. Louis River at the St. Louis Bay.

The surface water flow varies throughout the year. The highest flows occur in April and May, as a result of snow melt and spring rains. The flow then recedes throughout the summer, increasing only temporarily due to occasional periods of stormwater runoff. In the fall, the flow increases slightly as evapotranspiration losses diminish. During the winter, the flow is sustained by groundwater discharge; it begins to recede in the spring, when accumulated snow begins to melt.

2.4.2 Surface Water/Sediment Contamination

No surface water is present at Site 20; the nearest surface water body, Miller Creek, is located approximately 3,500 feet southeast of the site. Miller Creek was not impacted by activities at Site 20. During the drum and soil removal action, low-level soil contamination was detected in the surface soil at Site 20. The drums, spilled tar residue, and contaminated soil have been removed and disposed, and the potential for any contaminant migration to surface water or sediment is extremely low.

2.5 Air

Air sampling was not conducted at Site 20. The source of contamination (the tar drums) was removed, and the diffusion of any appreciable amount of contaminants from the soil to the air is likely to be extremely low because of the limited volatility of tar.

2.6 Receptors

Low-level soil contamination was discovered at Site 20 during the removal action. The drums, spilled tar residue, and contaminated soil were removed and subsequently disposed off site. Site 20 is located in a grassy drainage swale alongside an actively-used runway, and access to the site is expected to be limited. No construction/excavation activities are anticipated within the drainage swale, making contact with the soil unlikely. The area is covered by grass and brush, which limits contact with surface soil. The only potential receptor would be a site worker performing excavation in the drainage swale. No ecological receptors have been identified. As a result of remediation, no source of contamination remains at the site; therefore, no receptors are at risk.

3.0 DATA ANALYSIS/RISK ASSESSMENT

A human health risk evaluation was performed for Site 20 using data collected during the drum and soil removal action. Site 20 was determined to post minimal human health risks for the following reasons:

- The source of contamination at Site 20 has been removed;
- The current land use at Site 20 is light industrial and is likely to remain so in the future; and
- Access to Site 20 is limited because it is located alongside an active runway.

An evaluation of the human health risks associated with exposure to the soil, groundwater, surface water/sediment, and air at Site 20 is provided in Sections 3.1 through 3.4, respectively.

An overall summary of the health risk evaluation for Site 20 is presented in Section 3.5.

3.1 Soil

The tar drums, spilled tar residue, and contaminated soil at Site 20 were removed and disposed off site. A summary of the soil sampling results (after remediation) for Site 20 was presented in Table 2-1. A comparison of the maximum detected concentrations of contaminants to the U.S. EPA Region IX PRGs shows that, with the exception of benzo(a)pyrene, the PRGs were not exceeded after remediation was completed at the site.

Although low concentrations of benzo(a)pyrene were detected in the soil at Site 20, this chemical is a normal constituent of tar, and it is expected to be present in runway joint sealing tar that is typically applied on the ground surface. Benzo(a)pyrene is associated with runoff from asphalt-paved areas or the deposition of aircraft exhaust in the soil. The levels of all PAHs, including benzo(a)pyrene, detected at Site 20 are within typical urban background levels

(see Appendix C). Benzo(a)pyrene was detected at Site 20 at a maximum concentration of 1.6 mg/kg; this chemical has been detected at concentrations as high as 13.00 mg/kg in typical urban soil samples, as shown in Appendix C.

3.2 Groundwater

No subsurface soil contamination was evident or suspected at Site 20; therefore, no subsurface soil or groundwater samples were collected. The drum and soil removal action was completed in 1991. This action removed the source of contamination; no groundwater pathway exists.

3.3 Surface Water/Sediment

Surface water and sediment were not sampled at Site 20 because no surface water or sediment is located near the site. The contamination source was removed. Because no contamination source currently exists, no surface water/sediment pathways exist at the site.

3.4 Air

Air sampling was not conducted at Site 20. The contamination source was removed.

3.5 Summary

No potential significant exposure pathways exist for Site 20 for the following reasons:

- The source of contamination has been removed;

- Access to the site is restricted because the site is located alongside an active runway, and the site is covered by grass and brush;
- The site is expected to remain a light industrial site in the future;
- No surface water or sediment is located near the site;
- The contamination at the site was limited to surface soil and did not impact groundwater; and
- The levels of benzo(a)pyrene detected in the surface soil are within typical urban background levels.

4.0 SELECTED ACTION: NO FURTHER RESPONSE ACTION PLANNED

A NFRAP decision is proposed for Site 20 on the basis that the site poses no significant risk to human health and the environment and complies with all appropriate federal and state requirements. This decision was developed in accordance with the June 1995 U.S. Air Force NFRAP Guide; the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 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 Act (NCP).

Low-level benzo(a)pyrene contamination was discovered in the soil at the site; however, this chemical is associated with tars normally applied to runway surfaces, runoff from asphalt-paved surfaces, and aircraft exhaust; in addition, the detected concentrations of benzo(a)pyrene are within typical urban background levels. The drums, spilled tar residue, and contaminated soil were removed and subsequently disposed off site.

Based on these considerations, Site 20 poses no significant risk to human health and the environment, and NFRAP is recommended for this site.

Appendix A

**REFERENCES AND
DULUTH ADMINISTRATIVE RECORD INDEX**

REFERENCES

Olcott, P.G., D.W. Erickson, P.E. Felsheim, and W.L. Broussard, 1978. Water Resources of the Lake Superior Watershed, Northeastern Minnesota. U.S. Geological Survey, Hydrologic Investigations, Atlas HA-582.

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Montgomery Watson, May 1996. Installation Restoration Program Community Relations Plan, Minnesota Air National Guard, 148th Fighter Wing.

Operational Technologies Corporation, June 1996. Site Investigation for IRP Sites No. 25 and No. 26.

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DOCUMENT TITLE	TYPE	DATE	SITES	AUTHOR	REPOSITORY	DRAWER	FILE	ENTRY
Environmental Protection Committee Minutes for 5 June 97	Meeting Minutes	6/6/97	N/A	S. Wabrowetz	148 FW - Env' Management Office	1	5	7/1/97
Committee Membership	Internal Memo	6/2/97	N/A	K. Stromquist Jr.	148 FW - Env' Management Office	1	5	7/1/97
Committee Membership	Internal Memo	11/25/96	N/A	K. Stromquist Jr.	148 FW - Env' Management Office	1	5	7/1/97
Environmental Protection Committee Minutes for 26 Oct 96	Meeting Minutes	10/29/96	N/A	S. Wabrowetz	148 FW - Env' Management Office	1	5	7/1/97
Environmental Protection Committee Minutes for 26 Sep 96	Meeting Minutes	9/27/96	N/A	S. Wabrowetz	148 FW - Env' Management Office	1	5	7/1/97
Environmental Protection Committee Minutes for 27 Jun 96	Meeting Minutes	7/10/96	N/A	S. Wabrowetz	148 FW - Env' Management Office	1	5	7/1/97
Committee Membership	Internal Memo	5/6/96	N/A	K. Stromquist Jr.	148 FW - Env' Management Office	1	5	7/1/97
Environmental Protection Committee Minutes for 16 Jan 96	Meeting Minutes	1/17/96	N/A	S. Wabrowetz	148 FW - Env' Management Office	1	5	7/1/97
Committee Membership	Internal Memo	1/16/96	N/A	K. Stromquist Jr.	148 FW - Env' Management Office	1	5	7/1/97
Environmental Protection Committee Minutes for 28 Nov 95	Meeting Minutes	12/1/95	N/A	S. Wabrowetz	148 FW - Env' Management Office	1	5	7/1/97
Environmental Protection Committee Minutes for 4 Aug 95	Meeting Minutes	8/14/95	N/A	S. Wabrowetz	148 FW - Env' Management Office	1	5	7/1/97
Environmental Protection Committee Meeting Proposal for 4 Aug 95	Internal Memo	8/1/95	N/A	S. Wabrowetz	148 FW - Env' Management Office	1	5	7/1/97
Committee Membership	Internal Memo	6/26/95	N/A	R. Klosowski	148 FW - Env' Management Office	1	5	7/1/97
Environmental Protection Committee Minutes for 13 Jun 97	Meeting Minutes	6/16/95	N/A	S. Wabrowetz	148 FW - Env' Management Office	1	5	7/1/97
Environmental Protection Committee Meeting Proposal for 29 Mar 95	Internal Memo	3/28/95	N/A	S. Wabrowetz	148 FW - Env' Management Office	1	5	7/1/97
Committee Membership	Internal Memo	12/8/94	N/A	R. Klosowski	148 FW - Env' Management Office	1	5	7/1/97
Environmental Protection Committee Meeting Proposal for 21 Dec 94	Internal Memo	12/8/94	N/A	S. Wabrowetz	148 FW - Env' Management Office	1	5	7/1/97
Environmental Protection Committee Meeting Proposal for 26 Sep 94	Internal Memo	9/21/94	N/A	S. Wabrowetz	148 FW - Env' Management Office	1	5	7/1/97
Quarterly Environmental Protection Committee Meeting	Internal Memo	3/15/94	N/A	S. Wabrowetz	148 FW - Env' Management Office	1	5	7/1/97
Environmental Protection Committee Minutes for 2 Nov 93	Meeting Minutes	11/15/93	N/A	S. Wabrowetz	148 FW - Env' Management Office	1	5	7/1/97
Environmental Protection Committee Meeting Proposal for 2 Nov 93	Internal Memo	10/28/93	N/A	S. Wabrowetz	148 FW - Env' Management Office	1	5	7/1/97
Environmental Protection Committee Minutes for 9 Aug 93	Meeting Minutes	8/9/93	N/A	S. Wabrowetz	148 FW - Env' Management Office	1	5	7/1/97
Environmental Protection Committee Meeting Proposal for 14 Jul 93	Internal Memo	8/2/93	N/A	S. Wabrowetz	148 FW - Env' Management Office	1	5	7/1/97
Environmental Protection Committee Minutes for 30 Jun 93	Meeting Minutes	7/15/93	N/A	S. Wabrowetz	148 FW - Env' Management Office	1	5	7/1/97
Environmental Protection Committee Meeting Proposal for 22 Jan 91	Internal Memo	7/12/93	N/A	S. Wabrowetz	148 FW - Env' Management Office	1	5	7/1/97
Environmental Protection Committee Meeting Agenda for 22 Jan 91	Internal Memo	6/30/93	N/A	S. Wabrowetz	148 FW - Env' Management Office	1	5	7/1/97
Appointment of Unit/Section Environmental Working Group Members and/or...	Meeting Minutes	1/30/91	N/A	G. Niemi	148 FW - Env' Management Office	1	5	7/1/97
Environmental Protection Working Group Meeting	Internal Memo	1/22/91	N/A	J. Stauber	148 FW - Env' Management Office	1	5	7/1/97
Environmental Protection Working Group Meeting	Internal Memo	3/1/93	N/A	T. Heggemeier	148 FW - Env' Management Office	1	1	7/2/97
Environmental Protection Working Group Meeting	Internal Memo	1/3/94	N/A	S. Thompson	148 FW - Env' Management Office	1	1	7/2/97
Environmental Protection Working Group Meeting	Internal Memo	3/5/92	N/A	J. Stauber	148 FW - Env' Management Office	1	1	7/2/97
Environmental Protection Working Group Meeting	Internal Memo	4/13/92	N/A	J. Stauber	148 FW - Env' Management Office	1	1	7/2/97
Environmental Protection Working Group Meeting	Internal Memo	5/12/92	N/A	J. Stauber	148 FW - Env' Management Office	1	1	7/2/97
Environmental Protection Working Group Meeting	Internal Memo	8/7/92	N/A	J. Stauber	148 FW - Env' Management Office	1	1	7/2/97
Environmental Protection Working Group Meeting	Meeting Minutes	10/26/92	N/A	J. Stauber	148 FW - Env' Management Office	1	1	7/2/97
Safety Office Environmental Working Group Members	Internal Memo	6/17/93	N/A	S. Wabrowetz	148 FW - Env' Management Office	1	1	7/2/97
Environmental Protection Working Group Meeting	Internal Memo	1/9/93	N/A	J. Stauber	148 FW - Env' Management Office	1	1	7/2/97
Environmental Protection Working Group Meeting	Internal Memo	2/3/95	N/A	W. Wise	148 FW - Env' Management Office	1	1	7/2/97
Environmental Protection Working Group Meeting	Internal Memo	11/22/95	N/A	M. Johnson	148 FW - Env' Management Office	1	1	7/2/97
Focus '95	Internal Memo	11/2/95	N/A	D. Vavra	148 FW - Env' Management Office	1	1	7/2/97
Focus '95	Internal Memo	12/13/95	N/A	S. Wabrowetz	148 FW - Env' Management Office	1	1	7/2/97
148 Fighter Group Hazardous Waste Management Plan 19-2	Report	5/1/93	N/A	J. Stauber	148 FW - Env' Management Office	1	1	7/2/97
148 Fighter Group Hazardous Waste Management Plan 19-2	Report	5/1/92	N/A	J. Stauber	148 FW - Env' Management Office	1	1	7/2/97
Installation Hazardous Waste Management Plan	Report	6/1/91	N/A	H. McMahon	148 FW - Env' Management Office	1	1	7/2/97
No Action Approval for the Fire Training Area 1 of Site 2...	Letter	8/29/91		2 J. Warner	148 FW - Env' Management Office	4	2 ***	7/2/97
Airbus IRP Sites	Internal Memo	9/13/91		2 J. Manns	148 FW - Env' Management Office	4	2	7/2/97
Modifications to the 'Removal Action Work Plan Site 2'	Letter	2/4/92		2 G. Pulford	148 FW - Env' Management Office	4	2	7/2/97
Proposed Land Application Site Fire Training Area 2, Site 2...	Letter	11/24/92		2 G. Pulford	148 FW - Env' Management Office	4	2	7/2/97
Sites Selection for Site 2 Soils	Letter	4/7/93		2 E. Gentsch	148 FW - Env' Management Office	4	2	7/2/97
Proposed Land Application Site Fire Training Area 2 Soils	Letter	7/21/93		2 J. Warner	148 FW - Env' Management Office	4	2	7/2/97
Site Remediation, FTA-2 & Engine Runup Pad Soil, DAA Project	Internal Memo	7/27/93		2 G. Niemi	148 FW - Env' Management Office	4	2	7/2/97
Site Remediation Fire Training Area 2 (FTA-2)	Letter	2/8/94		2 S. Conley	148 FW - Env' Management Office	4	2	7/2/97
Investigative Soil Borings FTA-2 Site 2...	Letter	2/21/94		2 S. Vergeldt	148 FW - Env' Management Office	4	2	7/2/97

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Soil Excavation and Northwest Airlines Base Construction Resume Work Suspended 10/93	Letter	5/6/94	2 H. Storm	148 FW - Env' Management Office	4	2	7/2/97
Minutes of Meeting Regarding IRP Site 2, FTA-2	Memo	6/2/94	2 S. Conley	148 FW - Env' Management Office	4	2	7/2/97
Duluth AFB, Site 2 Meeting	Meeting Minutes	6/8/94	2 S. Wabrowetz	148 FW - Env' Management Office	4	2	7/2/97
Removal Action Sampling and Analysis Plan Amendment...	Meeting	6/9/94	2 S. Conley	148 FW - Env' Management Office	4	2	7/2/97
FTA-2 Site Remediation	Letter	6/16/94	2 S. Vergeldt	148 FW - Env' Management Office	4	2	7/2/97
Authorization to Continue Excavation at FTA-2	Memo	6/30/94	2 S. Conley	148 FW - Env' Management Office	4	2	7/2/97
June 9, 1994, Meeting Minutes; Removal Action Sampling and Analysis Plan (1attach.)	Letter	6/20/94	2 G. Hinkle	148 FW - Env' Management Office	4	2	7/2/97
Analytical Results of Excavation Water and Depth to Groundwater...	Meeting Minutes	6/23/94	2 J. Goeks	148 FW - Env' Management Office	4	2	7/2/97
Duluth AFB, FT-1/FT-2 Well Construction Details and Data...	Letter	6/27/94	2 S. Vergeldt	148 FW - Env' Management Office	4	2	7/2/97
FTA-2 Site Remediation	Transmittal	6/28/94	2 P. Lannon	148 FW - Env' Management Office	4	2	7/2/97
Project Management Change IRP Site 2, FTA-2 Duluth IAP	Memo	6/30/94	2 S. Conley	148 FW - Env' Management Office	4	2	7/2/97
Duluth AFB, Site FTA-2 Soil Excavation Sampling	Letter	6/30/94	2 S. Vergeldt	148 FW - Env' Management Office	4	2	7/2/97
July 7, 1994, Site Visit and Lab Sample Analysis Plan for Site 2...	Memo	7/12/94	2 P. Lannon	148 FW - Env' Management Office	4	2	7/2/97
Letter Re: Hazardous Waste Clean-up at the Duluth AFB.	Letter	7/15/94	2 P. Lannon	148 FW - Env' Management Office	4	2	7/2/97
Proposal for Bioremediation using Biopiles from FTA-2, Site 2...	Letter	8/16/94	2 P. Kougeas	148 FW - Env' Management Office	4	2	7/2/97
Proposal for Bioremediation of FTA-2 Soils	Letter	12/28/94	2 M. Albuquerque	148 FW - Env' Management Office	4	2	7/2/97
IRP Site 2 Funds	Memo	1/6/95	2 S. Wabrowetz	148 FW - Env' Management Office	4	2	7/2/97
Removal Action Excavation Report, FTA-2, Duluth AFB.	Memo	1/30/95	2 S. Wabrowetz	148 FW - Env' Management Office	4	2	7/2/97
Thermal Treatment of FTA-2 Soils	Letter	2/9/95	2 J. Goeks	148 FW - Env' Management Office	4	2	7/2/97
Revisions to Removal Action Excavation Report, FTA-2, IRP Site 2...	Letter	2/23/95	2 H. Storm	148 FW - Env' Management Office	4	2	7/2/97
New ANG Environmental Appendix (#22) to the MCA	Letter	2/28/95	2 M. Albuquerque	148 FW - Env' Management Office	4	2	7/2/97
City of Duluth Project 95-4408; Thermal Treatment of Stockpiled Soil...	Memo	3/23/95	2 C. Anders	148 FW - Env' Management Office	4	2	7/2/97
Questions Regarding Bids....	Letter	3/27/95	2 S. Conley	148 FW - Env' Management Office	4	2	7/2/97
HWA Site Grading in Duluth, MN.	Facsimile	5/12/95	2 H. Storm	148 FW - Env' Management Office	4	2	7/2/97
Preconstruction Conference Notice	Transmittal	5/23/95	2 S. Conley	148 FW - Env' Management Office	4	2	7/2/97
Meeting Minutes of Preconstruction Conference Notice	Letter	5/10/95	2 S. Conley	148 FW - Env' Management Office	4	2	7/2/97
IRP Site 2 Soil Roasting \$\$\$	Memo	5/16/95	2 S. Wabrowetz	148 FW - Env' Management Office	4	2	7/2/97
Duluth IAP Thermal Treatment of FTA-2 Soils	Memo	8/20/95	2 S. Wabrowetz	148 FW - Env' Management Office	4	2	7/2/97
Sample results 9513 B1-1 through B4-1 (Soli/DIA/Project #9513	Transmittal	9/19/95	2 S. Conley	148 FW - Env' Management Office	4	2	7/2/97
Final Report of Thermal Incineration of Contaminated Soils FTA-2, IRP Site 2...	Results	6/26/95	2,3,4 L. Seager/Lab	148 FW - Env' Management Office	4	2	7/2/97
Project Close-out Report for the Excavation and Remediation of FTA-2 Soils...	Letter	3/18/96	2 B. Winkler	148 FW - Env' Management Office	4	2	7/2/97
Chemical Data for Site 3-DPDO Storage Area "C" at Duluth IAP, MN	Letter	4/16/96	2 B. Winkler	148 FW - Env' Management Office	4	2	7/2/97
Chemical Data for Site 3-DPDO Storage Area "C" at Duluth IAP, MN	Letter	5/20/87	3 R. Wooten	148 FW - Env' Management Office	4	3	7/2/97
Land Farm Sites for IRP Site 3	Letter	22-Jun-87	3 M. Washeleski	148 FW - Env' Management Office	4	3	7/2/97
Preliminary ARARs	Memo	9-May-94	3 S. Wabrowetz	148 FW - Env' Management Office	4	3	7/2/97
Review Comments on Design Report for Site 3... Groundwater Collection...	Facsimile	5/25/94	3 M. Shiun Wei	148 FW - Env' Management Office	4	3	7/2/97
Site 3, 1995 Soil Excavation Report Sampling and Analysis, Jan 19 1996.	Letter	7/26/94	3 T. Cady	148 FW - Env' Management Office	4	3	7/2/97
Remediation of Soils Within the Berms at Site 4	Letter	3/18/96	3 B. Winkler	148 FW - Env' Management Office	4	3	7/2/97
Site 4 Ditches	Letter	3/8/95	4 M. Gronselth	148 FW - Env' Management Office	4	4	7/2/97
Site 4 (POL Facility) Projects	Internal Memo	5/5/95	4 S. Wabrowetz	148 FW - Env' Management Office	4	4	7/2/97
Site 4 (POL Facility) Projects	Memo	11/21/96	4 S. Wabrowetz	148 FW - Env' Management Office	4	4	7/2/97
Revised and Final TAC Site 7 SOW	Letter	12/3/96	4 B. Winkler	148 FW - Env' Management Office	4	4	7/2/97
Installation Restoration Meeting - Site 7	Letter	7/31/90	7 G. Niemi	148 FW - Env' Management Office	4	7	7/2/97
News Release (MPCA Approves Excavation of Contaminated Soil at Site 7)	Meeting	7/9/91	7 D. Spears	148 FW - Env' Management Office	4	7	7/2/97
Approval of Landfarming Activities - Air Dispersion Modeling...	Memo	8/7/91	7 K. Carlson	148 FW - Env' Management Office	4	7 ***	7/2/97
Installation Restoration Meeting at Duluth City Hall	Letter	8/30/91	7 G. Pulford	148 FW - Env' Management Office	4	7	7/2/97
Oct 10, 1991, Meeting Re: "Site 7" at Duluth IAP	Meeting	10/10/91	7 D. Spears	148 FW - Env' Management Office	4	7	7/2/97
Statement of Work (Stage 4) for Site 7	Meeting	10/21/91	7 J. Schweiger	148 FW - Env' Management Office	4	7	7/2/97
Site 7 Cleanup, Duluth AFB	Letter	1/24/92	7 G. Niemi	148 FW - Env' Management Office	4	7	7/2/97
Discharge Standards for Treated Water from Site 7 Excavation	Letter	1/21/92	7 E. Gentsch	148 FW - Env' Management Office	4	7	7/2/97
Well Construction Details and 6-23-94 Measurement Data	Memo	3/6/92	7 G. Pulford	148 FW - Env' Management Office	4	7	7/2/97
Meeting Minutes of Duluth IAP Site Inspection and Planning	Facsimile	6/28/94	7 P. Lannon	148 FW - Env' Management Office	4	7	7/2/97
	Meeting Minutes	12/7/94	7 J. Cline	148 FW - Env' Management Office	4	7	7/2/97

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Funnel & Gate Site Assessment	12/19/94	7 J. Cline	148 FW - Env' Management Office	4	7	7/2/97
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IRP Site 7 Information	12/23/94	7 S. Wabrowetz	148 FW - Env' Management Office	4	7	7/2/97
Proposal and Acceptance of Direct Push Sampling and Monitoring of Well Locations	9/16/94	7 Hazra Inc.	148 FW - Env' Management Office	4	7	7/2/97
Regarding Sites 2,3,4,7 and 26...	6/15/95	7 T. Goeks	148 FW - Env' Management Office	4	7	7/2/97
Site 7 Ground Water Levels	10/8/96	7 S. Wabrowetz	148 FW - Env' Management Office	4	7	7/2/97
Focused Feasibility Study Site No. 7 Duluth IAP	1/30/97	7 J. Cline	148 FW - Env' Management Office	4	7	7/2/97
*****Keys for Site 7*****	7/2/97	7 N/A	148 FW - Env' Management Office	4	7	7/2/97
No Action Approval for Site 8 Duluth AFB.	8/18/93	8 J. Warner	148 FW - Env' Management Office	4	8	7/2/97
Site 8 - Abandon Monitoring Wells	8/17/93	8 148th CES	148 FW - Env' Management Office	4	8	7/2/97
Sample Analysis Results Via OSHA for 22 July 1988...	7/22/88	10 D. Hunter	148 FW - Env' Management Office	4	10	7/2/97
Sample Analysis Results Via OSHA for 25 May 1990...	5/25/90	10 M. Wrobel	148 FW - Env' Management Office	4	10	7/2/97
Sample Analysis Results Via OSHA for 21 June 1990....	6/21/90	10 M. Wrobel	148 FW - Env' Management Office	4	10	7/2/97
Detailed Map of Site 10 at Duluth IAP, MN	3/31/93	10 B. Berg	148 FW - Env' Management Office	4	10	7/2/97
Installation of Natural Gas Line Through Site 10...	4/1/93	10 B. Berg	148 FW - Env' Management Office	4	10	7/2/97
City of Duluth Gas Line Project at DAA, (IRP) Site 10...	4/2/93	10 B. Berg	148 FW - Env' Management Office	4	10	7/2/97
Draft Site 10 Remedial Investigation Report, Duluth AFB.	6/29/93	10 J. Warner	148 FW - Env' Management Office	4	10	7/2/97
Speciation Data for Site 10 and a copy of Air Force....	8/24/94	10 G. Hinkle	148 FW - Env' Management Office	4	10	7/2/97
Maintenance Req. for Radioactive Waste Burial Sites on AF Installations	8/9/88	10 C. Maifet	148 FW - Env' Management Office	4	10	7/2/97
Summary of Radioanalytical Results - Duluth IAP, MN	2/22/90	10 Jo-Ann Sherwin	148 FW - Env' Management Office	4	10	7/2/97
Holding Times for Site 10 Gross Alpha and Gross Beta Analyses	9/2/94	10 J. Jackson	148 FW - Env' Management Office	4	10	7/2/97
Site 10 Speciation Data	4/17/96	10 S. Wabrowetz	148 FW - Env' Management Office	4	10	7/2/97
MPCA Internal Chain of Custody	4/16/96	10 M. Rys	148 FW - Env' Management Office	4	10	7/2/97
Contaminated Soils at IRP Site 17	5/5/95	17 S. Wabrowetz	148 FW - Env' Management Office	4	17	7/3/97
Isocentration Map of TPH Concentration (mg/kg) at Various Depths...	1/2/95	4,17 Duluth AFB	148 FW - Env' Management Office	4	17	7/3/97
Conforming Storage Facility (CSF), DRMO Duluth	8/7/95	17 D. Ball	148 FW - Env' Management Office	4	17	7/3/97
Conforming Storage Facility (CSF), DRMO Duluth	10/27/95	17 D. Ball	148 FW - Env' Management Office	4	17	7/3/97
Conforming Storage Facility (CSF), DRMO Duluth	3/14/96	17 D. Ball	148 FW - Env' Management Office	4	17	7/3/97
Draft No Further Action Decision Document for Site No. 19...	3/2/95	19 K. Pritchett	148 FW - Env' Management Office	4	19	7/3/97
Communications Memorandum Re: SOW	1/9/91	20 G. Niemi	148 FW - Env' Management Office	4	20	7/3/97
Temporary Storage and Disposal of Tar Drums Duluth AFB	1/18/91	20 K. Haberman	148 FW - Env' Management Office	4	20	7/3/97
Photos of IRP Site (Inside of External Folder, Also...)	unk	20 Optech	148 FW - Env' Management Office	4	20	7/3/97
Manifest for Waste Descriptions, Certificate of disposal, etc...	8/14/91	20 G. McAboy	148 FW - Env' Management Office	4	20	7/3/97
Response to request for quotation number DAHA21-89-Q-4028...	7/11/89	20 B. Kulberg	148 FW - Env' Management Office	4	20	7/3/97
IRP Site 20 Information	4/16/96	20 S. Wabrowetz	148 FW - Env' Management Office	4	20	7/3/97
Results of TCLP Analysis For Imhoff Tank at the 148th	10/8/91	21 S. Grage	148 FW - Env' Management Office	4	21	7/3/97
RFI for the 148 TAC. Fighter Interceptor Group, Minnesota...	2/24/92	21 J. Morris	148 FW - Env' Management Office	4	21	7/3/97
Site ID# LEAK00004978	4/22/96	21 S. Wabrowetz	148 FW - Env' Management Office	4	21	7/3/97
Septic Systems Abandoned Under Project 87008	4/19/91	22 G. Niemi	148 FW - Env' Management Office	4	22	7/3/97
EPA Federal Agency Environmental Plan - Project Report	7/10/90	22 G. Niemi	148 FW - Env' Management Office	4	22	7/3/97
Test Results of MPCA Testing Requirements	8/3/91	22 G. Niemi	148 FW - Env' Management Office	4	22	7/3/97
Correspondence From Twin City Testing Re: Monitoring Wells	8/30/91	22 G. Niemi	148 FW - Env' Management Office	4	22	7/3/97
Monitoring Well - Survey	9/27/91	22 G. Niemi	148 FW - Env' Management Office	4	22	7/3/97
Anticipated Schedule - Sampling/Water Level Reports/Report of Chem...	12/16/91	22 G. Niemi	148 FW - Env' Management Office	4	22	7/3/97
Anticipated Schedule - Sampling/Water Level Reports/Report of Chem...	2/20/92	22 G. Niemi	148 FW - Env' Management Office	4	22	7/3/97
Lab Analysis Problems Associated With The RFI for...	3/18/92	22 J. Morris	148 FW - Env' Management Office	4	22	7/3/97
Environmental Monitoring	4/21/92	22 L. Conway	148 FW - Env' Management Office	4	22	7/3/97
Draft No Further Action Decision Document for Site No. 22...	3/2/95	22 K. Pritchett	148 FW - Env' Management Office	4	22	7/3/97
Site ID# LEAK0002588	4/22/96	23 S. Wabrowetz	148 FW - Env' Management Office	4	23	7/3/97
Contaminated Soil Removal and Treatment Documentation...	5/14/96	23 G. Niemi	148 FW - Env' Management Office	4	23	7/3/97
Pamphlet Re: Interim Response Action Excavation, ANG...	10/1/93	24 M. Albuquerque	148 FW - Env' Management Office	4	24	7/3/97
Interim Response Action Excavation Report, Jet Run-up Site...	5/17/91	24 R. Sandberg	148 FW - Env' Management Office	4	24	7/3/97
Lab Request and Chain of Custody Record No 10613	8/12/93	24 T. Goeks	148 FW - Env' Management Office	4	24	7/3/97
Statement of Work (SOW) IRP Stage 3...	5/3/88	1,5,6,9,11-16 P. Dieryck	148 FW - Env' Management Office	4	1,5...	7/3/97

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Duluth AFB - TAC Sites	6/9/89	1.5.6.9.11-16	Optech	148 FW - Env' Management Office	4	1.5.	7/3/97
Review of IRP Meeting for TAC Sites	6/13/89	1.5.6.9.11-16	S. Grage	148 FW - Env' Management Office	4	1.5.	7/3/97
Base Support for TAC Site Remediation	8/2/90	1.5.6.9.11-16	J. Manns	148 FW - Env' Management Office	4	1.5.	7/3/97
Request for Signed IRP Site Decision Documents	8/29/91	1.5.6.9.11-16	E. Robbins II	148 FW - Env' Management Office	4	1.5.	7/3/97
AFCEE Project Overview Folder	12/27/93	1.5.6.9.11-16	T. Goeks	148 FW - Env' Management Office	4	1.5.	7/3/97
The installation Restoration Program (IRP) was established...	11/17/94	1.5.6.9.11-16	G. Hinkle	148 FW - Env' Management Office	4	1.5.	7/3/97
Overview of Duluth International Airport (IAP)	1/17/94	1.5.6.9.11-16	J. Holley	148 FW - Env' Management Office	4	1.5.	7/3/97
Administrative Record Index MN, ANG.	6/18/96	N/A	A. Polzin	148 FW - Env' Management Office	4	Adm.	7/3/97
Public Affairs Activity During the IRP at Duluth IAP	7/20/89	N/A	D. Hinckle	148 FW - Env' Management Office	4	Adm.	7/3/97
Proposal attachment	11/7/89	N/A	D. Winwahn	148 FW - Env' Management Office	4	Adm.	7/3/97
148 FW IRP Community Relations Plan	unk	N/A	Optech	148 FW - Env' Management Office	4	CRP	7/3/97
Community Relations Plan Interviews	unk	N/A	Optech	148 FW - Env' Management Office	4	CRP	7/3/97
ANG Environmental Community Relations Plan	unk	N/A	Optech	148 FW - Env' Management Office	4	CRP	7/3/97
Community Relations Plan 148 FW, Duluth MN.	unk	N/A	G. Hinkle	148 FW - Env' Management Office	4	CRP	7/3/97
National Guard Bureau Community Relations Plan Guidance	11/20/95	N/A	P. Wheeler	148 FW - Env' Management Office	4	CRP	7/3/97
Initiation of IRP Community Relations Plan	11/28/95	N/A	D. Donahue	148 FW - Env' Management Office	4	CRP	7/3/97
CRP Information	3/6/96	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	CRP	7/3/97
Draft Community Relations Plan, MN ANG.	3/8/96	N/A	A. Polzin	148 FW - Env' Management Office	4	CRP	7/3/97
Draft Community Relations Plan, MN ANG.	3/11/96	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	CRP	7/3/97
Comments for Draft Community Relations Plan	3/12/96	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	CRP	7/3/97
Attached is the Transmittal Letter...	5/2/96	N/A	G. Bullman	148 FW - Env' Management Office	4	CRP	7/3/97
Updates for Administrative Record	5/16/96	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	CRP	7/3/97
Final Community Relations Plan, MN ANG.	5/31/96	N/A	A. Polzin	148 FW - Env' Management Office	4	CRP	7/3/97
Installation Restoration Program Community Relations Plan	6/18/96	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	CRP	7/3/97
2 Manuals on the IRP Community Relations Plan with Draft Copy	3/1/96	N/A	M. Watson	148 FW - Env' Management Office	4	CRP	7/3/97
IRP Map Review	4/12/94	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	CRP	7/3/97
Draft Management Action Plan	3/11/94	N/A	S. Slinger	148 FW - Env' Management Office	4	IRP	7/3/97
Comments on Management Action Plan, 148 FW	4/8/94	N/A	T. Goeks	148 FW - Env' Management Office	4	IRP	7/3/97
Addendum to Update Map	12/4/96	N/A	P. Wheeler	148 FW - Env' Management Office	4	IRP	7/3/97
Memo of Agreement Between the Duluth ANG and the 148 ANG	7/10/92	N/A	Optech	148 FW - Env' Management Office	4	IRP	7/3/97
Memo of Agreement Between the Duluth ANG and the 148 ANG	unk	N/A	Optech	148 FW - Env' Management Office	4	IRP	7/3/97
Dept. of Defense and State Memorandum of Agreement	3/2/94	N/A	C. Williams	148 FW - Env' Management Office	4	DA	7/3/97
Environmental Cleanup Cost Recovery Agreements with State...	6/2/94	N/A	D. VanGasbeck	148 FW - Env' Management Office	4	DA	7/3/97
Expense Statement for First Quarter of the First Year of Defense...	11/2/93	N/A	G. Eddy	148 FW - Env' Management Office	4	DSMOA	7/3/97
Quarterly Report and Expense Statement for First Quarter, First...	11/1/95	N/A	G. Eddy	148 FW - Env' Management Office	4	DSMOA	7/3/97
Quarterly Report and Expense Statement for Second Quarter, First...	4/30/96	N/A	G. Eddy	148 FW - Env' Management Office	4	DSMOA	7/3/97
Quarterly Report and Expense Statement for Second Quarter, 2nd...	1/30/97	N/A	G. Eddy	148 FW - Env' Management Office	4	DSMOA	7/3/97
Enclosed is a Draft Spreadsheet Showing the Proposed Treatment...	3/28/97	N/A	R. Baxter	148 FW - Env' Management Office	4	DSMOA	7/3/97
TSDF Annual Facility Fees	5/5/97	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	DSMOA	7/3/97
Issuance of Request for Response Action for Former Duluth AFB	8/31/90	N/A	E. Gentsch	148 FW - Env' Management Office	4	MPCA	7/3/97
Notification of Intent of Issuance of a Request for Response Action...	7/24/90	N/A	G. Williet	148 FW - Env' Management Office	4	MPCA	7/3/97
Notification of Obligation to Take Response Action	8/28/90	N/A	D. Foley	148 FW - Env' Management Office	4	MPCA	7/3/97
Final Agenda August 17, 1990 (MPCA)	8/28/90	N/A	Optech	148 FW - Env' Management Office	4	MPCA	7/3/97
Minnesota Pollution Control Agency Meeting on August 28, 1990	8/17/90	N/A	E. Gentsch	148 FW - Env' Management Office	4	MPCA	7/3/97
Request for issuance of a Request for Response Action to the...	8/28/90	N/A	E. Gentsch	148 FW - Env' Management Office	4	MPCA	7/3/97
Request for issuance of a Request for Response Action to the...	8/28/90	N/A	E. Gentsch	148 FW - Env' Management Office	4	MPCA	7/3/97
Request for Response Action issued to the National Guard Bureau...	3/3/94	N/A	T. Goeks	148 FW - Env' Management Office	4	MPCA	7/3/97
Re: August 28, 1990, RFRA issued to the National Guard Bureau...	3/3/94	N/A	T. Goeks	148 FW - Env' Management Office	4	MPCA	7/3/97
Quarterly Report and Expense Statement for Third Quarter, First...	4/29/94	N/A	G. Eddy	148 FW - Env' Management Office	4	MPCA	7/3/97
Quarterly Report and Expense Statement for Third Quarter, Second...	12/9/94	N/A	G. Eddy	148 FW - Env' Management Office	4	MPCA	7/3/97
Quarterly Report and Expense Statement for First Quarter, Second...	2/7/95	N/A	G. Eddy	148 FW - Env' Management Office	4	MPCA	7/3/97
Quarterly Report and Expense Statement for Second Quarter, Sec...	5/2/95	N/A	G. Eddy	148 FW - Env' Management Office	4	MPCA	7/3/97
Quarterly Report and Expense Statement for Third Quarter, Sec...	7/26/95	N/A	G. Eddy	148 FW - Env' Management Office	4	MPCA	7/3/97
Quarterly Report and Expense Statement for Fourth Quarter, Sec...	1/25/95	N/A	G. Eddy	148 FW - Env' Management Office	4	MPCA	7/3/97

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Quarterly Report and Expense Statement for Fourth Quarter, First...	Report	7/31/96	N/A	G. Eddy	148 FW - Env' Management Office	4	MPCA	7/3/97
Quarterly Report and Expense Statement for First Quarter, Second..	Report	10/30/96	N/A	G. Eddy	148 FW - Env' Management Office	4	MPCA	7/3/97
Quarterly Report and Expense Statement for Third Quarter, Second..	Report	4/4/97	N/A	G. Eddy	148 FW - Env' Management Office	4	MPCA	7/3/97
Change in Project Manager	Letter	12/22/93	N/A	T. Goeks	148 FW - Env' Management Office	4	148lg	7/3/97
Thank you for the call the other day. This letter is to update you on...	Internal Memo	1/7/94	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	148lg	7/3/97
IRP Quarterly Progress Report	Memo	4/12/94	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	148lg	7/3/97
IRP Quarterly Progress Report (APR - JUN 94)	Memo	7/12/94	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	148lg	7/3/97
IRP Quarterly Progress Report	Report	Jul-Aug	N/A	Oplech	148 FW - Env' Management Office	4	148lg	7/3/97
IRP Quarterly Progress Report	Report	1/19/95	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	148lg	7/3/97
IRP Quarterly Progress Report	Report	4/10/95	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	148lg	7/3/97
IRP Quarterly Progress Report	Report	8/22/95	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	148lg	7/3/97
IRP Quarterly Progress Report	Report	11/8/95	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	148lg	7/3/97
IRP Quarterly Progress Report	Report	Oct-Dec	N/A	Oplech	148 FW - Env' Management Office	4	148lg	7/3/97
IRP Quarterly Progress Report	Report	5/20/96	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	148lg	7/3/97
IRP Quarterly Progress Report	Report	10/15/96	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	148lg	7/3/97
IRP Quarterly Progress Report	Report	12/24/96	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	148lg	7/3/97
IRP Quarterly Progress Report	Report	Jan-Mar	N/A	Oplech	148 FW - Env' Management Office	4	148lg	7/3/97
IRP Quarterly Progress Report	Forms	N/A	N/A	Oplech	148 FW - Env' Management Office	4	148lg	7/3/97
Inorganic Analysis Request Forms	Facsimile	6/17/94	N/A	S. Garmhofer	148 FW - Env' Management Office	4	RAB	7/3/97
Installation Restoration Program - Restoration Advisory Board (RAB)..	Internal Memo	11/9/94	N/A	D. VanGasbeck	148 FW - Env' Management Office	4	RAB	7/3/97
Restoration Advisory Board (RAB) Implementation Guidelines and...	Internal Memo	9/27/94	N/A	S. Goodman	148 FW - Env' Management Office	4	RAB	7/3/97
Restoration Advisory Board (RAB) Implementation Guidelines	Internal Memo	6/15/95	N/A	D. VanGasbeck	148 FW - Env' Management Office	4	RAB	7/3/97
Restoration Advisory Board (RABs) (ANGRC/CEV Memorandum...)	Internal Memo	unk	N/A	Oplech	148 FW - Env' Management Office	4	RAB	7/3/97
Implementation Guidelines for Role of RABS in Environmental Clean...	Guidelines	unk	N/A	Oplech	148 FW - Env' Management Office	4	RAB	7/3/97
Press Release: Air Force Officials Today Announced the Start...	Release	5/10/88	N/A	G. Hinkle	148 FW - Env' Management Office	4	PUB	7/3/97
Public Affairs Activity During the IRP at Duluth IAP	Memo	unk	N/A	G. Hinkle	148 FW - Env' Management Office	4	PUB	7/3/97
Communications Memorandum	Memorandum	8/25/89	N/A	J. Manns	148 FW - Env' Management Office	4	PUB	7/3/97
...Please Find Attached Proposed Public Affairs Plan for the...	Letter	11/17/89	N/A	D. Wirwahn	148 FW - Env' Management Office	4	PUB	7/3/97
News Release on January 8, 1990 via Public Affairs...	Release	1/8/90	N/A	E. Andreotte	148 FW - Env' Management Office	4	PUB	7/3/97
Military Affairs Letter to Mayor John Fedo in Regards to Remedial...	Letter	1/16/90	N/A	D. Wirwahn	148 FW - Env' Management Office	4	PUB	7/3/97
Duluth News Tribune Articles Re: 'Toxins Found at Sites on Ex-Air Base	Newspaper	1/17/90	N/A	J. Gravelle	148 FW - Env' Management Office	4	PUB	7/3/97
Duluth News Tribune Articles Re: 'Public Notices'...	Newspaper	1/18/90	N/A	Oplech	148 FW - Env' Management Office	4	PUB	7/3/97
Public Meeting on the Remedial Investigation of the Duluth AFB...	Flyer	2/1/90	N/A	Oplech	148 FW - Env' Management Office	4	PUB***	7/3/97
Duluth News Tribune Articles Re: 'Citizens Briefed on Air Base...'	Newspaper	2/2/90	N/A	J. Gravelle	148 FW - Env' Management Office	4	PUB	7/3/97
Duluth News Tribune Article Re: 'Where were Politicians When...'	Newspaper	2/6/90	N/A	W. Carlson	148 FW - Env' Management Office	4	M.W.	7/3/97
Progress Report Re: Interested Duluth and Hermantown Res.'	Facsimile	7/2/90	N/A	K. Carlson	148 FW - Env' Management Office	4	M.W.	7/3/97
Progress Report Re: Interested Duluth and Hermantown Res.'	Letter	4/4/91	N/A	K. Carlson	148 FW - Env' Management Office	4	PUB	7/3/97
Duluth News Tribune Article Re: 'More Toxic Sites Found at Air Base	Newspaper	4/5/91	N/A	Associated Press	148 FW - Env' Management Office	4	PUB	7/3/97
Public Affairs Arrangements, Duluth IAP.	Letter	12/13/91	N/A	Oplech	148 FW - Env' Management Office	4	PUB	7/3/97
Public Affairs Guidance on 'National Guard Bureau' Env' Programs	Pamphlet	6/16/05	N/A	National Guard Bureau	148 FW - Env' Management Office	4	PUB	7/3/97
Architect-Engineer Contract No. DAHA 90-94-D-0013	Contract	7/28/94	N/A	Warzyn, Inc.	148 FW - Env' Management Office	4	M.W.	7/3/97
Monthly Status Report, MN. ANG. Sites 2,3,4	Letter	3/9/95	2,3,4	M. Watson	148 FW - Env' Management Office	4	M.W.	7/3/97
Draft Meeting Minutes	Letter	3/9/95	N/A	C. Thompson	148 FW - Env' Management Office	4	M.W.	7/3/97
Disposition of Soils Located Inside the Berms at Site 4 in Relation...	Letter	3/31/95	N/A	M. Watson	148 FW - Env' Management Office	4	M.W.	7/3/97
Monthly Status Report, MN. ANG. Sites 2,3,4	Letter	4/7/95	2,3,4	M. Watson	148 FW - Env' Management Office	4	M.W.	7/3/97
Sampling Event 4/6 and 7	Facsimile	4/10/95	4,6,7	A. Polzin	148 FW - Env' Management Office	4	M.W.	7/3/97
Monthly Status Report, MN. ANG. Sites 2,3,4	Report	5/5/95	2,3,4	M. Watson	148 FW - Env' Management Office	4	M.W.	7/3/97
Monthly Status Report, MN. ANG. Sites 2,3,4	Report	6/9/95	2,3,4	M. Watson	148 FW - Env' Management Office	4	M.W.	7/3/97
Monthly Status Report, MN. ANG. Sites 2,3,4	Report	7/5/95	2,3,4	M. Watson	148 FW - Env' Management Office	4	M.W.	7/3/97
Monthly Status Report, MN. ANG. Sites 2,3,4	Report	8/9/95	2,3,4	M. Watson	148 FW - Env' Management Office	4	M.W.	7/3/97
Monthly Status Report, MN. ANG. Sites 2,3,4	Report	9/5/95	2,3,4	M. Watson	148 FW - Env' Management Office	4	M.W.	7/3/97
Monthly Status Report, MN. ANG. Sites 2,3,4	Report	10/10/95	2,3,4	M. Watson	148 FW - Env' Management Office	4	M.W.	7/3/97
Monthly Status Report, MN. ANG. Sites 2,3,4	Report	11/10/95	2,3,4	M. Watson	148 FW - Env' Management Office	4	M.W.	7/3/97
Monthly Status Report, MN. ANG. Sites 2,3,4	Report	12/7/95	2,3,4	M. Watson	148 FW - Env' Management Office	4	M.W.	7/3/97
Monthly Status Report, MN. ANG. Sites 2,3,4	Report	1/10/96	2,3,4	M. Watson	148 FW - Env' Management Office	4	M.W.	7/3/97

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Monthly Status Report, MN. ANG.	Report	3/8/96	N/A	M. Watson	148 FW - Env' Management Office	4	M.W.	7/3/97
Monthly Status Report, MN. ANG	Report	4/5/96	N/A	M. Watson	148 FW - Env' Management Office	4	M.W.	7/3/97
Liquidated Damages	Internal Memo	9/19/96		17 S. Wabrowelz	148 FW - Env' Management Office	4	EAR	7/3/97
Comprehensive Environmental Response, Compensation, and Liab...	Report	12/10/96	3.4	148 FW Duluth, MN.	148 FW - Env' Management Office	4	OPT	7/3/97
Comprehensive Environmental Response, Compensation, and Liab...	Report	12/10/96	17,18,19	148 FW Duluth, MN.	148 FW - Env' Management Office	4	OPT	7/3/97
April 1997 Monthly Progress Report DAHA90-93-D-0009/50...	Report	5/10/97	N/A	T. Harrah	148 FW - Env' Management Office	4	OPT	7/3/97
April 1997 Monthly Progress Report DAHA90-93-D-0005/50...	Report	5/10/97	N/A	T. Harrah	148 FW - Env' Management Office	4	OPT	7/3/97
Schedule Impact on Task 2E (subtasks 1-3) "Data Audit" (Phase I...)	Report	1/21/97	N/A	T. Harrah	148 FW - Env' Management Office	4	OPT	7/3/97
March 1997 Project Progress Report DAHA90-93-D-0005/55...	Report	4/10/97	N/A	T. Harrah	148 FW - Env' Management Office	4	OPT	7/3/97
Minnesota Pollution Control Agency Letter Dated 30 Aug. 1984	Memo	9/27/84	N/A	D. Bradford	148 FW - Env' Management Office	4	MISC	7/3/97
Duluth IAP IRP Meeting	Memo	10/1/87	N/A	D. Helmburger	148 FW - Env' Management Office	4	MISC	7/3/97
ANG Installation Restoration Program (IRP)	Memo	1/15/88	N/A	R. Watson	148 FW - Env' Management Office	4	MISC	7/3/97
Meeting to Discuss ANG/TAC Installation Restoration Program Act...	Memo	4/26/88	N/A	G. Burnet	148 FW - Env' Management Office	4	MISC	7/3/97
Proposed DRMO Warehouse Building Construction at Former Dul...	Letter	9/12/90	N/A	R. Massey	148 FW - Env' Management Office	4	MISC	7/3/97
ANG Installation Restoration Program (IRP)	Memo	1/19/94	N/A	MNAG-TAG	148 FW - Env' Management Office	4	MISC	7/3/97
Environmental Issues at Duluth Int'l Airport	Internal Memo	4/28/94	N/A	R. Kiosowski	148 FW - Env' Management Office	4	MISC	7/3/97
Progress on Duluth AFB State Superfund Site	Letter	4/5/94	N/A	T. Gooks	148 FW - Env' Management Office	4	MISC	7/3/97
IRP Program	Internal Memo	4/6/94	N/A	S. Wabrowelz	148 FW - Env' Management Office	4	MISC	7/3/97
Status of Duluth IAP (ANG) IRP Sites and Draft Schedule	Memo	6/28/94	2,3,4&8	ANGR/CEVR	148 FW - Env' Management Office	4	MISC	7/3/97
Response to Status of Duluth IAP (ANG) IRP Sites and Draft Sched...	Letter	7/21/94	2,3,4&10	P. Lannon	148 FW - Env' Management Office	4	MISC	7/3/97
148 FG Installation Restoration Program	Internal Memo	10/18/94	25&26	S. Wabrowelz	148 FW - Env' Management Office	4	MISC	7/3/97
MPCA Enforcement Position as Conveyed at 9 June 1994 Mtg.	Facsimile	10/31/94	N/A	T. Gooks	148 FW - Env' Management Office	4	MISC	7/3/97
Duluth Air National Guard Base, Installation Restoration Program	Letter	11/4/94	N/A	E. Andrecte	148 FW - Env' Management Office	4	MISC	7/3/97
Tables from Engineering Science's (HAZWRAP) Air Force IRP Final...	Memo	unk	N/A	Optech	148 FW - Env' Management Office	4	MISC	7/3/97
Duluth Air National Guard Base, Installation Restoration Program	Memo	1/6/95	N/A	L. Arnold	148 FW - Env' Management Office	4	MISC	7/3/97
Distribution of Duluth ANGB IRP Sites	Internal Memo	3/14/95	N/A	148 FG/EMO	148 FW - Env' Management Office	4	MISC	7/3/97
Allocation of Duluth IRP Site Responsibility	Memo	3/21/95	N/A	E. Andrecte	148 FW - Env' Management Office	4	MISC	7/3/97
Defense Environmental Restoration Account (DERA) FY 95...	Memo	3/14/95	N/A	G. Hinkle	148 FW - Env' Management Office	4	MISC	7/3/97
Letter of Thanks from Carlos R. Naranjo, P.E.	Letter	10/21/96	N/A	C. Naranjo	148 FW - Env' Management Office	4	MISC	7/3/97
Letter of Thanks Re: Meeting with S. Wabrowelz and T. Harrah	Letter	11/22/96	3,4	T. Harrah	148 FW - Env' Management Office	4	MISC	7/3/97
MPCA's October Hazardous Waste Site Log	Letter	10/8/82	N/A	D. Day	148 FW - Env' Management Office	4	MISC	7/3/97
Updated log of Hazardous Waste Site and Dissemination	Letter	4/19/84	N/A	L. Livesay	148 FW - Env' Management Office	4	MISC	7/3/97
IRP Decision Documentation	Letter	1/19/83	N/A	K. Kane	148 FW - Env' Management Office	4	MISC	7/3/97
IRP Funding	Memo	6/22/87	N/A	R. Watson	148 FW - Env' Management Office	4	MISC	7/3/97
Enforcement Actions Under RCRA and CERCLA at Federal Facilities	Memo	1/25/88	N/A	W. Porter	148 FW - Env' Management Office	4	MISC	7/3/97
Duluth News-Tribune Article Re: 'Toxins Found at Sites on Ex-Air base	Environmental Response and Liability Letter	1/17/90	N/A	J. Graville	148 FW - Env' Management Office	4	MISC	7/3/97
RCRA Corrective Action Plan (Interim Final)	Pamphlet	unk	N/A	Optech	148 FW - Env' Management Office	4	MISC	7/3/97
Recommended Allowable Limits for Drinking Water contaminants	Pamphlet	June 88	N/A	EPA	148 FW - Env' Management Office	4	MISC	7/3/97
Remedial Investigation Fact Sheet for Duluth Air Force Base	Pamphlet	Jan 91	N/A	MN Dept. of Health	148 FW - Env' Management Office	4	MISC	7/3/97
Federal Agency Hazardous Waste Compliance Docket; Initial List...	Pamphlet	Feb 90	N/A	MPCA	148 FW - Env' Management Office	4	MISC	7/3/97
Appendix VII CERCLA Process Letter	Letter	2/12/88	N/A	EPA	148 FW - Env' Management Office	4	MISC	7/3/97
Letter of retrieval of the Project Files from Engineering Science...	Memo	unk	N/A	Optech	148 FW - Env' Management Office	4	MISC	7/3/97
Minnesota Pollution Control Agency (MPCA)	Letter	10/18/95	N/A	G. Bullman	148 FW - Env' Management Office	4	MISC	7/3/97
Letter of intent to Apply for Work in the Cleanup Project in the 148FW	Letter	3/8/96	N/A	J. Warner	148 FW - Env' Management Office	4	MISC	7/3/97
Duluth Air Force Base 'Superfund' Issue.	E-mail	4/28/96	N/A	J. Pierson	148 FW - Env' Management Office	4	MISC	7/3/97
Received Documents Letter from Engineering Science	Memo	6/27/96	N/A	Optech	148 FW - Env' Management Office	4	MISC	7/3/97
Duluth AFB Superfund Site, Duluth, MN.	Memo	10/18/97	N/A	D. VanGasbeck	148 FW - Env' Management Office	4	MISC	7/3/97
Field Analytical Measurement Technologies, Application and Sel.	Memo	4/8/97	2,3,4	H. Konar-Steenberg	148 FW - Env' Management Office	4	MISC	7/3/97
IRP Relative Risk Evaluations	Pamphlet	Apr 96	N/A	CMECC	148 FW - Env' Management Office	4	MISC	7/3/97
Draft Relative Risk Site Evaluation For Sites 1,2,3&4	Letter	5/8/96	N/A	Andrews AFB.	148 FW - Env' Management Office	4	RRA	7/21/97
Yellow Folder Containing Relative Risk Information (3 Sections...)	Packets	10/15/96	1,2,3,4	G. Eddy	148 FW - Env' Management Office	4	RRA	7/21/97
IRP Phase 1: Records Search; Duluth IAP, Minnesota	Pamphlet	6/18/05	N/A	Optech	148 FW - Env' Management Office	4	RRA	7/21/97
Retired Personnel Who Possibly May Have Disposed of Haz...	Memo	Mar 82	N/A	Eng-Science, Inc.	148 FW - Env' Management Office	4	REC	7/21/97
		11/30/81	N/A	R. Youngstrom	148 FW - Env' Management Office	4	REC	7/21/97

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Defense Environmental Quality Program Policy Memo 80-6...	Internal Memo	12/15/81	N/A	M. McPherson	148 FW - Env' Management Office	4	REC	7/21/97
Interview on Hazardous Material Disposal Sites	Internal Memo	12/29/81	N/A	M. McPherson	148 FW - Env' Management Office	4	REC	7/21/97
...As you are aware, the Minnesota Pollution Control Agency (MP...	Letter	10/18/82	N/A	D. Day	148 FW - Env' Management Office	4	REC	7/21/97
Hazardous Waste Disposal Sites	Memo	12/2/82	N/A	R. Youngstrom	148 FW - Env' Management Office	4	REC	7/21/97
Regulatory Agency Comments - IRP Phase II, Stage I, Duluth IAP	Internal Memo	2/20/85	N/A	Don-Michael Bradford	148 FW - Env' Management Office	4	Pha2	7/21/97
Presurvey for Phase II, Stage II	Letter	3/22/85	N/A	Optech	148 FW - Env' Management Office	4	Pha2	7/21/97
Draft - IRP Phase II, Stage II	Draft	8/23/85	N/A	Optech	148 FW - Env' Management Office	4	Pha2	7/21/97
Draft Statement of Work (SOW) for Phase II, Stage II, Duluth IAP	Internal Memo	8/23/85	N/A	E. Barnes	148 FW - Env' Management Office	4	Pha2	7/21/97
Base Support Letter for Phase II, Stage II, Problem Confirmation...	Internal Memo	1/2/86	N/A	G. Woodrum	148 FW - Env' Management Office	4	Pha2	7/21/97
Base Support Letter for Phase II, Stage II, Problem Confirmation...	Internal Memo	1/21/86	N/A	G. Woodrum	148 FW - Env' Management Office	4	Pha2	7/21/97
Transfer of IRP Responsibility for Duluth IAP, MN.	Internal Memo	4/18/86	N/A	J. Dougherty	148 FW - Env' Management Office	4	Pha2	7/21/97
Duluth AFB, IRP	Pamphlet	4/24/86	N/A	E. Gentsch	148 FW - Env' Management Office	4	Pha2	7/21/97
Duluth AFB Site IRP	Pamphlet	5/30/86	N/A	E. Gentsch	148 FW - Env' Management Office	4	Pha2	7/21/97
Update on Status of Duluth IAP Phase II, Stage II, IRP	Internal Memo	7/17/86	N/A	M. Washeleski	148 FW - Env' Management Office	4	Pha2	7/21/97
Support Items for IRP Phase II, Stage II, Duluth IAP	Draft	7/18/86	N/A	J. Broman	148 FW - Env' Management Office	4	Pha2	7/21/97
Support Items for IRP Phase II, Stage II, Duluth IAP	Internal Memo	7/28/86	N/A	J. Broman	148 FW - Env' Management Office	4	Pha2	7/21/97
Duluth Air Force Base IRP, Phase II, Stage II	Pamphlet	10/14/86	N/A	E. Gentsch	148 FW - Env' Management Office	4	Pha2	7/21/97
MPCA Response to DPDO Storage Area "C" Analytical Results...	Internal Memo	7/30/87	N/A	Optech	148 FW - Env' Management Office	4	Pha2	7/21/97
Duluth IAP - Installation Restoration Program Meeting: 16 Sep 87	Meeting Minutes	9/16/87	8,10	Unk	148 FW - Env' Management Office	4	Pha2	7/21/97
IRP, Phase II, Stage II, Draft Report, Duluth IAP, MN.	Internal Memo	10/23/87	N/A	J. Dougherty	148 FW - Env' Management Office	4	Pha2	7/21/97
Duluth Air Force Base, ANG Source Areas IRP, Phase II, Stage II...	Pamphlet	10/29/87	2,3,4,10	E. Gentsch	148 FW - Env' Management Office	4	Pha2	7/21/97
...Forwarded for your Review and Comment is the Draft Phase II...	Internal Memo	10/30/87	N/A	J. Miller	148 FW - Env' Management Office	4	Pha2	7/21/97
Review of Phase II, Stage II, Draft Report, Duluth IAP IRP	Internal Memo	11/5/87	N/A	S. Grage	148 FW - Env' Management Office	4	Pha2	7/21/97
Review of Phase II, Stage II, Draft Report, Duluth IAP IRP	Internal Memo	11/6/87	N/A	S. Grage	148 FW - Env' Management Office	4	Pha2	7/21/97
...Forwarded for your Review and Comment is the Draft Phase II...	Internal Memo	11/30/87	N/A	D. Heimberger	148 FW - Env' Management Office	4	Pha2	7/21/97
...Attached is a copy of the Air Force Installation Restoration Pro...	Letter	9/30/88	N/A	T. Titus	148 FW - Env' Management Office	4	Pha2	7/21/97
USAF Occupation and Environmental Health Laboratory	Pamphlet	unk	N/A	E. Barnes	148 FW - Env' Management Office	4	Pha2	7/21/97
Resource Conservation and Recovery Act Facility Investigation (RFI)	Letter	3/13/91	N/A	B. Brott	148 FW - Env' Management Office	4	RCRA	7/21/97
Request for Assistance To Comply with the RCRA Facility Invest...	Internal Memo	4/19/91	N/A	J. Manns	148 FW - Env' Management Office	4	RCRA	7/21/97
...in Your May 10, 1991, Telephone Conversation with Elizabeth...	Letter	6/17/91	N/A	R. Bjork	148 FW - Env' Management Office	4	RCRA	7/21/97
Minutes from the June 27, 1991 Meeting by the MPCA	Meeting Minutes	7/15/91	N/A	C. Harrah	148 FW - Env' Management Office	4	RCRA	7/21/97
... We have completed our initial review of the RCRA Facility Invest...	Letter	9/6/91	N/A	B. Brott	148 FW - Env' Management Office	4	RCRA	7/21/97
Enclosure of Three Tables listing Contents of Barrels from sites...	Internal Memo	11/8/91	2,3,4,8	Jo-Ann Sherwin	148 FW - Env' Management Office	4	RCRA	7/21/97
... We have Completed our Review of the Revised RCRA Facility...	Letter	12/3/91	N/A	B. Brott	148 FW - Env' Management Office	4	RCRA	7/21/97
... We have Completed our Review of the Revised RCRA Facility...	Letter	1/17/92	N/A	B. Brott	148 FW - Env' Management Office	4	RCRA	7/21/97
Regulatory Review Meeting for RCRA Facility Investigation (RFI)...	Meeting Minutes	unk	17,18,21,22	Optech	148 FW - Env' Management Office	4	RCRA	7/21/97
... We have Completed our Review of the Revised RCRA Facility...	Letter	12/9/92	17	R. Baxter	148 FW - Env' Management Office	4	RCRA	7/21/97
... Response to Letter of 9 Dec 92, Referencing the RFI for the ...	Internal Memo	4/15/93	17	G. Hinkle	148 FW - Env' Management Office	4	RCRA	7/21/97
MPCA & ANGRC Correspondence	Internal Memo	10/29/93	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	RCRA	7/21/97
Response to Regulatory Comments at the Duluth RFI...	Letter	5/10/94	N/A	M. Giles	148 FW - Env' Management Office	4	RCRA	7/21/97
Draft Addendum 1 to Resource Conservation and Recovery Act...	Letter	11/30/94	N/A	K. Pritchett	148 FW - Env' Management Office	4	RCRA	7/21/97
Comments on Draft Addendum 1 to RFI for Sites 17,18,21	Internal Memo	1/16/95	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	RCRA	7/21/97
Facsimile Transmittal Sheet - Draft Comments on Addendum 1 to...	Facsimile	2/14/95	N/A	R. Baxter	148 FW - Env' Management Office	4	RCRA	7/21/97
Sampling Locations at SWM/CERCLA Site no. 17	Draft	Feb '95	17	Optech	148 FW - Env' Management Office	4	RCRA	7/21/97
148 Fighter Group MN ANG. Remedial Design Regulatory Meeting...	Meeting Minutes	3/30/95	17,18,21	R. Baxter	148 FW - Env' Management Office	4	RCRA	7/21/97
... We have Completed our Review of the Draft Addendum to the...	Letter	3/23/95	17,18,21	S. Wabrowetz	148 FW - Env' Management Office	4	RCRA	7/21/97
Duluth ANG. Draft Addendum to the RCRA Facility Investigation...	Draft	unk	17,18,21	Optech	148 FW - Env' Management Office	4	RCRA	7/21/97
Response to Comments from the MPCA	Letter	4/13/95	N/A	R. Murray	148 FW - Env' Management Office	4	RCRA	7/21/97
Final Minutes for Remedial Design Kickoff, Scoping and Regulatory...	Meeting Minutes	2/16/95	17,18,21	Optech	148 FW - Env' Management Office	4	RCRA	7/21/97
148 FG, Duluth ANG Regulatory Meeting Minutes.	Internal Memo	7/7/95	N/A	D. Anderson	148 FW - Env' Management Office	4	RCRA	7/21/97
... Attached are the Air National Guard Responses to Your Comm...	Internal Memo	8/29/95	N/A	G. Bullman	148 FW - Env' Management Office	4	RCRA	7/21/97
... Attached are the Transmittal Letters to be included for the...	Letter	10/10/95	17,18,21	K. Pritchett	148 FW - Env' Management Office	4	RCRA	7/21/97
Addendum 1 to Resource Conservation and Recovery Act (RCRA)...	Memo	10/25/95	17,18,21	S. Wabrowetz	148 FW - Env' Management Office	4	RCRA	7/21/97
RFI For IRP Sites 17, 18 and 21								

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Addendum 1 to RFI for IRP Sites 17, 18 and 21 Re: Our Meeting in Duluth on February 15, 1995.	Internal Memo	11/6/95	17,18,21	S. Wabrowetz	148 FW - Env' Management Office	4	RCRA	7/21/97
Draft Corrective Measure Study (CMS) Report for IRP Sites No. 17...	Letter	5 apr 95	N/A	E. Gawrys	148 FW - Env' Management Office	4	CMS	7/21/97
Draft CMS for IRP Sites 17, 18 and 21	Letter	8/11/95	17,18,21	K. Pritchett	148 FW - Env' Management Office	4	CMS	7/21/97
Draft CMS for IRP Sites 17, 18 and 21	Internal Memo	8/15/95	17,18,21	S. Wabrowetz	148 FW - Env' Management Office	4	CMS	7/21/97
Comments for Corrective Measures Study Report	Internal Memo	8/15/95	17,18,21	S. Wabrowetz	148 FW - Env' Management Office	4	CMS	7/21/97
... The Draft Corrective Measures Study for the Duluth IAP...	Internal Memo	11/3/95	17,18,21	S. Wabrowetz	148 FW - Env' Management Office	4	CMS	7/21/97
IRP Site 21/25, Inhoff Tank	Internal Memo	11/3/95	N/A	G. Hinkle	148 FW - Env' Management Office	4	CMS	7/21/97
Corrective Measure Study Comments on Site 17, 18 and 21...	Internal Memo	12/9/95	21,25	S. Wabrowetz	148 FW - Env' Management Office	4	CMS	7/21/97
Transmittal letters to be included for the Congressional distribution...	Letter	2/21/96	17,18,21	R. Baxter	148 FW - Env' Management Office	4	CMS	7/21/97
ANG Responses to your Comments on the Draft Corrective Meas...	Internal Memo	2/22/96	N/A	G. Bullman	148 FW - Env' Management Office	4	CMS	7/21/97
Final Corrective Measures Study Report for IRP Sites 17 - 21 excl.20	Internal Memo	3/8/96	17,18,19,21	G. Bullman	148 FW - Env' Management Office	4	CMS	7/21/97
IRP Documents	Letter	7/24/96	N/A	K. Pritchett	148 FW - Env' Management Office	4	CMS	7/21/97
Corrective Measure Study Comments on Site 17, 18 and 21...	Internal Memo	8/12/96	17,18,19,21	S. Wabrowetz	148 FW - Env' Management Office	4	CMS	7/21/97
Names for the Regulatory Meeting for RD (Sites 17 and 21)	Letter	2/15/95	17,21	B. Brott	148 FW - Env' Management Office	4	CMS	7/21/97
Final Minutes for Remedial Design Kickoff, Scoping and Regulatory...	Letter	4/13/05	N/A	Optech	148 FW - Env' Management Office	4	RDP	7/21/97
Facsimile Transmittal Sheet - Review of IRP Document	Facsimile	10/2/95	17,18,21,25	S. Wabrowetz	148 FW - Env' Management Office	4	RDP	7/21/97
Facsimile Transmittal Sheet - Review of IRP Document	Facsimile	10/2/95	17,18,21,25	S. Wabrowetz	148 FW - Env' Management Office	4	RDP	7/21/97
35% Submittal for Remedial Design 148th Fighter Group	Letter	9/19/95	N/A	R. Murray	148 FW - Env' Management Office	4	RDP	7/21/97
IRP Services for Surveillance and Oversight of Remedial Actions at...	Facsimile	7/24/95	17,18,21,25	Bldg. R47	148 FW - Env' Management Office	4	RDP	7/21/97
Comments for Draft RD for Sites 17, 18, 21/25	Internal Memo	10/26/95	17,18,21,25	S. Wabrowetz	148 FW - Env' Management Office	4	RDP	7/21/97
... The Draft Site Investigation (SI) Report, and Remedial Design...	Internal Memo	11/3/95	N/A	G. Hinkle	148 FW - Env' Management Office	4	RDP	7/21/97
100% Advance Final - 148th Fighter Wing Duluth IAP	Letter	3/13/96	N/A	R. Murray	148 FW - Env' Management Office	4	RDP	7/21/97
IRP Site Meeting	Internal Memo	3/19/96	17,18,19,21/25	S. Wabrowetz	148 FW - Env' Management Office	4	RDP	7/21/97
Comments for Statement of Work for Sites 17, 18, 19, 21/25.	Internal Memo	3/20/96	17,18,19,21,25	S. Wabrowetz	148 FW - Env' Management Office	4	RDP	7/21/97
Final Remedial Design - 148th Fighter Wing, Duluth IAP.	Letter	4/23/96	N/A	T. Harrah	148 FW - Env' Management Office	4	RDP	7/21/97
Response to Comments	Letter	4/24/96	N/A	T. Harrah	148 FW - Env' Management Office	4	RDP	7/21/97
Cost Estimate Summary Remediation of Sites No. 17, 18, 19 and ...	Summary	unk	17,18,19,21/25	Optech	148 FW - Env' Management Office	4	RDP	7/21/97
IRP Documents	Internal Memo	7/24/96	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	RDP	7/21/97
Comments on Statement of Work for the Remediation of SWMUs...	Facsimile	9/23/96	17,18,19,21/25	E. Gawrys	148 FW - Env' Management Office	4	RDP	7/21/97
Comments on Statement of Work for the Remediation of SWMUs...	Letter	10/9/96	17,18,19,21/25	E. Gawrys	148 FW - Env' Management Office	4	RDP	7/21/97
Defense Environmental Restoration Account (DERA) FY 96...	Internal Memo	1/23/96	N/A	G. Bullman	148 FW - Env' Management Office	4	Rem A	7/21/97
Offer of Environmental Project to the Small Business Adminis...	Internal Memo	3/7/96	17,18,19,21/25	T. Horness	148 FW - Env' Management Office	4	Rem A	7/21/97
Request for Extension of Funds Reservation	Internal Memo	3/8/96	N/A	T. Horness	148 FW - Env' Management Office	4	Rem A	7/21/97
2 Draft pages	Draft	mar '95	N/A	Optech	148 FW - Env' Management Office	4	Rem A	7/21/97
Delivery of Revised Draft RACER Cost Estimate for Duluth ANG...	Letter	3/25/96	17,18,19,21/25	C. Naranjo	148 FW - Env' Management Office	4	Rem A	7/21/97
Facsimile with Information and Questions	Facsimile	4/2/96	17,18,19	Optech	148 FW - Env' Management Office	4	Rem A	7/21/97
Extension for Advance Contracting Authorization for the 148 FG...	Internal Memo	3/26/96	N/A	G. Hinkle	148 FW - Env' Management Office	4	Rem A	7/21/97
SONAG Questions for Site 17 and 25	Memo	5/10/96	17,25	S. Wabrowetz	148 FW - Env' Management Office	4	Rem A	7/21/97
Proposal Outline Soil and Ground Water Remediation Duluth ANG...	Facsimile	5/17/96	17,18,19,21,25	K. Harenda	148 FW - Env' Management Office	4	Rem A	7/21/97
Comments on SONAG's Proposal Outline, Dated May 17, 1996	Internal Memo	5/22/96	N/A	T. Horness	148 FW - Env' Management Office	4	Rem A	7/21/97
SONAG Letter of May 7, 1996, RE: Soil Remediation Minnesota A...	Internal Memo	5/22/96	N/A	G. Hinkle	148 FW - Env' Management Office	4	Rem A	7/21/97
Duluth News Tribune Classified Articles containing Public Notices...	Newspaper	9/26/96	N/A	Optech	148 FW - Env' Management Office	4	Rem A	7/21/97
Minnesota Decision Document, Sites 2,3, and 4, Duluth AFB	Letter	9/22/95	2,3,4	T. Goeks	148 FW - Env' Management Office	4	DD	7/21/97
Comments for Draft DD, Sites 2,3, and 4	Internal Memo	1/19/96	2,3,4	S. Wabrowetz	148 FW - Env' Management Office	4	DD	7/21/97
... We have reviewed the Draft Decision Document (DD) for Sites ...	Internal Memo	2/28/96	2,3,4	G. Hinkle	148 FW - Env' Management Office	4	DD	7/21/97
IRP Sites 2,3, and 4 Draft Final Decision Document	Memo	3/19/96	2,3,4	S. Wabrowetz	148 FW - Env' Management Office	4	DD	7/21/97
Draft Final Decision Document, Sites 2,3, and 4, MN ANG.	Letter	3/13/96	2,3,4	A. Polzin	148 FW - Env' Management Office	4	DD	7/21/97
Comments for Sites 2,3, and 4 Draft Final Decision Document	Internal Memo	3/22/96	2,3,4	S. Wabrowetz	148 FW - Env' Management Office	4	DD	7/21/97
IRP Documents	Internal Memo	3/21/96	2,3,4	S. Wabrowetz	148 FW - Env' Management Office	4	DD	7/21/97
Final Decision Document, Sites 2,3, and 4 MN, ANG.	Letter	5/17/96	2,3,4	A. Polzin	148 FW - Env' Management Office	4	DD	7/21/97
Duluth AFB: MPCA Modification Comment to "Sites 2,3, and 4 Fin..."	Memo	8/5/95	2,3,4	M. Rys	148 FW - Env' Management Office	4	DD	7/21/97
Site #2 - FTA 1 and 2	Evaluation	unk	2,3,4,8,10	T. Sturdivant	148 FW - Env' Management Office	4	FEAS	7/21/97
USEPA EVALUATION METHODOLOGY	Evaluation	unk	2,3,4,8,10	Optech	148 FW - Env' Management Office	4	FEAS	7/21/97

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Statement of Work for Remedial Investigation, Feasibility Study...	Study	2/10/88	N/A	Hazwep Support	148 FW - Env' Management Office	4	FEAS	7/21/97
Kick-Off Meeting Minutes Remedial Investigation, MN, ANG...	Meeting Minutes	3/4/88	N/A	R. McLeod	148 FW - Env' Management Office	4	FEAS	7/21/97
... A Meeting was Held at the Minnesota Air National Guard...	Meeting	7/2/88	N/A	Eng.-Science, Inc.	148 FW - Env' Management Office	4	FEAS	7/21/97
... Enclosed for Your Review is a Draft Copy of Minutes for the ...	Draft	12/1/88	N/A	Eng.-Science, Inc.	148 FW - Env' Management Office	4	FEAS	7/21/97
IRP Meeting - ANG Sites	Meeting	7/19/89	2,3,4,10	S. Grage	148 FW - Env' Management Office	4	FEAS	7/21/97
Comments to Draft Remedial Investigation Report for the MN...	Letter	10/17/89	2,3,4,8,10	E. Gentszsch	148 FW - Env' Management Office	4	FEAS	7/21/97
Public Meeting on the Remedial Investigation of the Duluth AFB...	Meeting	2/1/90	N/A	Optech	148 FW - Env' Management Office	4	FEAS	7/21/97
Public Affairs Arrangements, Duluth IAP.	Letter	unk	N/A	Optech	148 FW - Env' Management Office	4	FEAS	7/21/97
148th FIG IRP Meeting	memo	6/18/90	N/A	D. Spears	148 FW - Env' Management Office	4	FEAS	7/21/97
...Enclosed is one copy of the Feasibility Study, Minnesota Air...	Letter	8/24/90	N/A	Jo-Ann Sherwin	148 FW - Env' Management Office	4	FEAS	7/21/97
IRP Meeting/TAC Sites	Internal Memo	10/31/90	7	S. Grage	148 FW - Env' Management Office	4	FEAS	7/21/97
Review of Feasibility Study for Sites 2,3,4, and 8. Duluth AFB	Letter	7/24/91	2,3,4,8	J. Warner	148 FW - Env' Management Office	4	FEAS	7/21/97
IRP Sites Feasibility Study Meeting Held at the 148th FIG, Minn...	Meeting	8/21/91	2,3,4,8	D. Spears	148 FW - Env' Management Office	4	FEAS	7/21/97
...Enclosed are four copies of the meeting minutes for the meeting...	Meeting Minutes	9/6/91	2,3,4,8	Jo-Ann Sherwin	148 FW - Env' Management Office	4	FEAS	7/21/97
Modifications and Comments on Feasibility Study for Sites 2,3,4,8.	Study	9/17/91	2,3,4,8	G. Pulford	148 FW - Env' Management Office	4	FEAS	7/21/97
Correction on Ozone Availability in Duluth, Minnesota.	Letter	10/21/91	2,3,4,8	E. Gentszsch	148 FW - Env' Management Office	4	FEAS	7/21/97
Draft Feasibility Study for Sites 2,3,4, and 8 Duluth AFB.	Letter	10/14/92	2,3,4,8	J. Warner	148 FW - Env' Management Office	4	FEAS	7/21/97
Draft Feasibility Study for Sites 2,3,4 and 8 Duluth AFB.	Letter	10/14/92	2,3,4,8	J. Warner	148 FW - Env' Management Office	4	FEAS	7/21/97
... Attached are the Transmittal Letters to be Included for the...	Internal Memo	8/29/94	N/A	G. Hinkle	148 FW - Env' Management Office	4	FEAS	7/21/97
Project 957033.MPP Charts	chart	10/7/94	N/A	Optech	148 FW - Env' Management Office	4	FEAS	7/21/97
Public Meeting Information Packet Re: Environmental Issues	Meeting	6/21/95	N/A	Optech	148 FW - Env' Management Office	4	FEAS	7/21/97
Kick-off/Scoping Meetings Schedule	Schedule	13-17 feb 97	N/A	Optech	148 FW - Env' Management Office	4	FEAS	7/21/97
Preliminary Document Outlines	Letter	2/21/95	N/A	M. Gronseth	148 FW - Env' Management Office	4	FEAS	7/21/97
Cost Proposal for Modification to Feasibility Study Addendum...	Facsimile	3/21/95	3,4	Bldg. R47	148 FW - Env' Management Office	4	FEAS	7/21/97
Draft Feasibility Study Addendum, Sites 2,3 and 4, MN, ANG..	Letter	3/23/95	2,3,4	C. Thompson	148 FW - Env' Management Office	4	FEAS	7/21/97
Draft FS Addendum	Internal Memo	4/3/95	2,3,4	148 FG/EMO	148 FW - Env' Management Office	4	FEAS	7/21/97
Contract Nr. DAHA90-94-D-0013, Delivery Order Nr. 0011, Feas...	Internal Memo	4/3/95	N/A	M. Lewis	148 FW - Env' Management Office	4	FEAS	7/21/97
Final Regulatory Meeting Minutes for the FS Addendum	Letter	4/3/95	N/A	C. Thompson	148 FW - Env' Management Office	4	FEAS	7/21/97
Final FS Addendum/RD Kickoff Meeting Minutes	Letter	4/3/95	N/A	C. Thompson	148 FW - Env' Management Office	4	FEAS	7/21/97
FS Addendum Minutes, February 13, 1995 Meeting, Duluth AFB...	Letter	4/14/95	2,3,4	T. Goeks	148 FW - Env' Management Office	4	FEAS	7/21/97
Revised - Draft Feasibility Study Addendum, Sites 2,3 and 4, ...	Letter	4/20/95	2,3,4	C. Thompson	148 FW - Env' Management Office	4	FEAS	7/21/97
Draft Final Feasibility Study Addendum, Sites 2, 3, and 4, MN...	Letter	5/2/95	2,3,4	C. Thompson	148 FW - Env' Management Office	4	FEAS	7/21/97
Duluth News Tribune Public Notice of ANG Environmental Project...	Newspaper	6/1/95	N/A	Optech	148 FW - Env' Management Office	4	FEAS	7/21/97
21 June 1995 Public Meeting	Internal Memo	6/6/95	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	FEAS	7/21/97
Draft Final Feasibility Study Addendum, Sites 2, 3, 4, and 8...	Facsimile	6/19/95	2,3,4,8	T. Goeks	148 FW - Env' Management Office	4	FEAS	7/21/97
Draft Final Feasibility Study Addendum, Sites 2,3,4 and 8	Letter	8/19/95	2,3,4,8	T. Goeks	148 FW - Env' Management Office	4	FEAS	7/21/97
... Attached are the Air National Guard Responses to Your Comm...	Internal Memo	8/4/95	N/A	G. Bullman	148 FW - Env' Management Office	4	FEAS	7/21/97
August 4, 1995, Air National Guard Letter Response to Minnesota...	Letter	9/11/95	2,3,4,8	T. Goeks	148 FW - Env' Management Office	4	FEAS	7/21/97
Draft Comment Resolution	Internal Memo	10/16/95	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	FEAS	7/21/97
FS Addendum; Minnesota Air National Guard, Duluth MN.	Facsimile	10/23/95	N/A	Bldg. R47	148 FW - Env' Management Office	4	FEAS	7/21/97
... Attached are the Transmittal Letters to be Included for the...	Internal Memo	10/30/95	N/A	G. Hinkle	148 FW - Env' Management Office	4	FEAS	7/21/97
Final Feasibility Study Addendum	Internal Memo	12/1/95	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	FEAS	7/21/97
The Minnesota Pollution Control Agency (MPCA) Staff's Mod...	Letter	4/10/96	2,3,4	B. Winkler	148 FW - Env' Management Office	4	FEAS	7/21/97
Preliminary Document Outlines	Letter	2/21/95	N/A	M. Gronseth	148 FW - Env' Management Office	4	FEAS	7/21/97
Preliminary Draft Remedial Design/Performance Statement of Work...	Letter	4/7/95	3,4	C. Thompson	148 FW - Env' Management Office	4	FEAS	7/21/97
MANG Comments for RD/PSOW	Facsimile	4/12/95	3,4	S. Wabrowetz	148 FW - Env' Management Office	4	FEAS	7/21/97
Commerce Business Daily Newspaper Area F, is outlined	Newspaper	3/30/95	N/A	Optech	148 FW - Env' Management Office	4	FEAS	7/21/97
Remedial Design	Facsimile	4/19/95	3,4	P. Wheeler	148 FW - Env' Management Office	4	FEAS	7/21/97
Review Comments, PSOW, Soil/Groundwater Remediation	Internal Memo	4/14/95	3,4	T. Horness	148 FW - Env' Management Office	4	FEAS	7/21/97
Draft Statement of Work for Remediation of Solis and Groundwater...	Draft	4/28/95	3,4	C. Thompson	148 FW - Env' Management Office	4	FEAS	7/21/97
Contents for Draft Statement of Work	Memo	5/8/95	3,4	S. Wabrowetz	148 FW - Env' Management Office	4	FEAS	7/21/97
Review Comments, Draft PSOW, Soil/Groundwater Remediation	Internal Memo	5/8/95	3,4	T. Horness	148 FW - Env' Management Office	4	FEAS	7/21/97
... The Draft remedial design submittal for the Duluth International ...	Internal Memo	9 may 95	N/A	G. Hinkle	148 FW - Env' Management Office	4	FEAS	7/21/97
Final Statement of Work for Remediation of Solis and Groundwater...	Letter	5/12/95	3,4	C. Thompson	148 FW - Env' Management Office	4	FEAS	7/21/97

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Additional Copies of the Final Statement of Work	Letter	5/23/95 3.4	C. Thompson	148 FW - Env' Management Office	4	7/21/97
Site visit for IRP Sites 3 and 4	Memo	6/6/95 3.4	S. Wabrowetz	148 FW - Env' Management Office	4	7/21/97
Pre Proposal Conference	Listing	6/13/95 N/A	Optech	148 FW - Env' Management Office	4	7/21/97
Amendment of Solicitation/Modification of Contract	Contract	7/24/95 N/A	Optech	148 FW - Env' Management Office	4	7/21/97
Responses to MPCA Comments of SI Work Plan	Facsimile	4/13/95 25,26	K. Pritchett	148 FW - Env' Management Office	4	7/21/97
Overview Minutes from 17 Oct Mtg., Duluth Air Force Base Site	Facsimile	10/10/94 25,26	T. Goeks	148 FW - Env' Management Office	4	7/21/97
Draft Installation Restoration Program (IRP) Site Investigation Work...	Letter	12/3/94 25,26	K. Pritchett	148 FW - Env' Management Office	4	7/21/97
Final Kickoff Meeting Minutes IRP Services for Site Investigation...	Letter	12/12/94 25,26	K. Pritchett	148 FW - Env' Management Office	4	7/21/97
148 FG Comments on Site 25/26 S.I. Work Plan	Internal Memo	1/16/95 25,26	148 FG/EMO	148 FW - Env' Management Office	4	7/21/97
Draft Site Investigation Workplan, Sites 25 and 26, Duluth AFB.	Letter	3/23/95 25,26	T. Goeks	148 FW - Env' Management Office	4	7/21/97
Modifications and Comments Draft Site Investigation Work Plan...	Facsimile	5/2/95 25,26	Bldg. R47	148 FW - Env' Management Office	4	7/21/97
Attached is the Response to MPCA Comments (Todd's comm....	Facsimile	4/7/95 N/A	K. Pritchett	148 FW - Env' Management Office	4	7/21/97
Ref[2]: EPA Jan 1992 IDW Guidance Document	Facsimile	4/10/95 N/A	K. Pritchett	148 FW - Env' Management Office	4	7/21/97
Duluth Air Force Base Sites 25 & 26	Facsimile	4/13/95 25,26	K. Pritchett	148 FW - Env' Management Office	4	7/21/97
Review of Work Plan for Investigation at Site 25, Dated Dec. 1994.	Letter	4/26/95 25	B. Brott	148 FW - Env' Management Office	4	7/21/97
...Attached is the Air National Guard Readiness Center (ANGRC)...	Facsimile	5/2/95 25,26	G. Bullman	148 FW - Env' Management Office	4	7/21/97
Installation Restoration Program (IRP) Site Investigation (SI) Work...	Letter	4/27/95 25,26	K. Pritchett	148 FW - Env' Management Office	4	7/21/97
Draft Site Investigation (SI) report for IRP Sites No. 25 and No. 26...	Letter	8/19/95 25,26	K. Pritchett	148 FW - Env' Management Office	4	7/21/97
Comments for the "Site Investigation Report for IRP Sites No. 25...	Memo	11/1/95 N/A	S. Wabrowetz	148 FW - Env' Management Office	4	7/21/97
... The Draft Site Investigation (SI) Report, and Remedial Design...	Internal Memo	11/3/95 N/A	G. Hinkle	148 FW - Env' Management Office	4	7/21/97
Draft Final Site Investigation Report for IRP Sites No. 25 and 26...	Letter	12/18/95 25,26	K. Pritchett	148 FW - Env' Management Office	4	7/21/97
Site Investigation Report for IRP Sites No. 25 and No. 26	Internal Memo	1/17/96 25,26	S. Wabrowetz	148 FW - Env' Management Office	4	7/21/97
Comments for Draft Final SI Report for IRP Sites No. 25 and No. 26	Internal Memo	1/20/96 25,26	S. Wabrowetz	148 FW - Env' Management Office	4	7/21/97
December 1995, Site Investigation Report for IRP Sites No. 25 and...	Letter	4/10/96 25,26	B. Winkler	148 FW - Env' Management Office	4	7/21/97
... We have Completed Review of the Draft Final Site Investigation...	Letter	3/29/96 25,26	E. Gawrys	148 FW - Env' Management Office	4	7/21/97
... Attached is the Transmittal Letter to be Included for Distribution...	Internal Memo	5/21/96 N/A	G. Bullman	148 FW - Env' Management Office	4	7/21/97
Site Investigation Report for IRP Sites No. 25 and No. 26	Letter	6/19/96 25,26	K. Pritchett	148 FW - Env' Management Office	4	7/21/97
Final Site Investigation Report for IRP Sites 25 and 26	Internal Memo	6/27/96 25,26	S. Wabrowetz	148 FW - Env' Management Office	4	7/21/97
Installation Restoration Program Documents	Internal Memo	7/24/96 N/A	S. Wabrowetz	148 FW - Env' Management Office	4	7/21/97
Modifications and Comments Draft Site Investigation Work Plan...	Modifications	unk 25,26	Optech	148 FW - Env' Management Office	4	7/21/97
PRO-ACT Technical Inquiry 5391 - Environmental Protection Agency	EPA Guidance	4/6/95 N/A	W. Mabson	148 FW - Env' Management Office	4	7/21/97
WLSDD Contaminated Water Discharge Approval	Letter	12/2/93 N/A	M. Guite	148 FW - Env' Management Office	4	7/21/97
Proposed Disposal of Soil and Water Contents of Various IRP Drums	Letter	11/5/93 N/A	E. Gentsch	148 FW - Env' Management Office	4	7/21/97
Facsimile Transmittal Sheet 'IRP Waste Drum Information'	Facsimile	9/2/93 N/A	S. Wabrowetz	148 FW - Env' Management Office	4	7/21/97
Facsimile Transmittal Sheet 'IRP Waste Drum Information'	Facsimile	10/7/93 N/A	S. Wabrowetz	148 FW - Env' Management Office	4	7/21/97
Field Screening Data for Volatile Organic Compounds in Soil Simpls...	chart	unk N/A	Optech	148 FW - Env' Management Office	4	7/21/97
Engineering Science IRP Drums	chart	unk N/A	Optech	148 FW - Env' Management Office	4	7/21/97
Facsimile Transmittal Sheet 'List of IRP Waste Drums'	Facsimile	8/4/93 N/A	148 FG/SGEC	148 FW - Env' Management Office	4	7/21/97
Drums Containing Soil and Water from Environmental Investigations...	Facsimile	8/31/93 N/A	M. Jackson	148 FW - Env' Management Office	4	7/21/97
Drums Containing Soil and Water from Environmental Investigations...	Facsimile	8/24/93 N/A	M. Jackson	148 FW - Env' Management Office	4	7/21/97
Barrels Remaining From RI Work at ANG Base at Duluth	Letter	4/1/92 N/A	Jo-Ann Sherwin	148 FW - Env' Management Office	4	7/21/97
...In an Effort to Improve Our Support for You, We are Testing a...	Letter	unk N/A	M. Wantland	148 FW - Env' Management Office	4	7/21/97
Waste Water Drums	Memo	1/31/94 N/A	S. Wabrowetz	148 FW - Env' Management Office	4	7/21/97
Facsimile Transmittal Sheet Re: 'Waste Water Drum Contents'	Facsimile	11/5/93 N/A	S. Wabrowetz	148 FW - Env' Management Office	4	7/21/97
...In an Effort to Improve Our Support for You, We are Testing a...	Letter	unk N/A	M. Wantland	148 FW - Env' Management Office	4	7/21/97
WLSDD Contaminated Water Discharge Approval	Letter	2/9/94 N/A	M. Guite	148 FW - Env' Management Office	4	7/21/97
...As Per our Phone Conversation (12 August 1993) here is a Cont...	Letter	8/13/93 N/A	L. Douglas-Krzywinski	148 FW - Env' Management Office	4	7/21/97
...I have Discussed These Additional Drums of Water and Soil...	Letter	10/12/93 N/A	L. Douglas-Krzywinski	148 FW - Env' Management Office	4	7/21/97
...I have Discussed These Additional Drums Labeled DECON BA....	Letter	10/22/93 N/A	L. Douglas-Krzywinski	148 FW - Env' Management Office	4	7/21/97
Facsimile Transmittal Sheet Re: 'Last Request for Info on IRP Drums'	Facsimile	11/2/93 N/A	S. Wabrowetz	148 FW - Env' Management Office	4	7/21/97
Facsimile Transmittal Sheet Re: 'IRP Drum Disposal + PMEL Site...	Facsimile	10/18/93 N/A	S. Wabrowetz	148 FW - Env' Management Office	4	7/21/97
Facsimile Transmittal Sheet Re: 'Additional Drums of Water...'	Facsimile	10/7/93 N/A	S. Wabrowetz	148 FW - Env' Management Office	4	7/21/97
Waste IRP Drums	Internal Memo	10/18/93 N/A	S. Wabrowetz	148 FW - Env' Management Office	4	7/21/97
Volatile Organic Compounds Detected in Site #21, Groundwater ...	chart	unk 21	Optech	148 FW - Env' Management Office	4	7/21/97

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chart	unk	N/A	Optech	148 FW - Env' Management Office	4	AWP	7/21/97
OPTTECH IRP Drums							
Facsimile Transmittal Sheet Re: 'Waste Water Drum Contents' IRP Drums (Soil/Water) From Sites 17 and 21	11/9/93	N/A	S. Wabrowetz	148 FW - Env' Management Office	4	AWP	7/21/97
Request for Discharge Approval	10/31/94	17,21	148 FG/EMO	148 FW - Env' Management Office	4	AWP	7/21/97
Peer Task 2518-001: Technical Support for the Remediation of Sites...	3/31/95	N/A	T. Tuominen	148 FW - Env' Management Office	4	AWP	7/21/97
Comments for Revised Draft Work Plan (Sites 17, 18, 19, 21-25)	4/5/95	N/A	S. Lipinski	148 FW - Env' Management Office	4	AWP	7/21/97
Technical Assistance Submittal, Task 2A - Technical Review Case...	1/21/97	17,18,19,21,25	C. Stanley	148 FW - Env' Management Office	4	AWP	7/21/97
Review of the Revised Draft Workplan	1/28/97	17,18,19,21,25	S. Wabrowetz	148 FW - Env' Management Office	4	AWP	7/21/97
Completed Draft Review Workplan for Sites: 17,18,19,21,25	1/30/97	17,18,19,21,25	T. Harrah	148 FW - Env' Management Office	4	AWP	7/21/97
Workplan Comment Responses For Review Facsimile	4/1/97	17,18,19,21,25	E. Gawrys	148 FW - Env' Management Office	4	AWP	7/21/97
Professional Contaminated Soil Treatment Service Pamphlet Schedule for Remediation For Duluth, MN., Sites No. 17, 18 & 19.	4/17/97	17,18,19,21,25	E. Gawrys	148 FW - Env' Management Office	4	AWP	7/21/97
Designation of Contracting Officer's Representative (COR)	4/22/97	17,18,19,21,25	C. Stanley	148 FW - Env' Management Office	4	AWP	7/21/97
Excavation Workplan for the 148th ANG, Sites 17, 18 and 19.	N/A	N/A	Cedar Ridge	148 FW - Env' Management Office	5	project	7/22/97
Health and Safety Plan for Sites 17, 18, 19, 21/25	11/19/96	17,18,19	H. Stull	148 FW - Env' Management Office	5	project	7/22/97
Waste Profile Sheet for Timberline Trail	10/3/96	N/A	M. Lewis	148 FW - Env' Management Office	5	project	7/22/97
Performance Bond for Remediation of Sites 17, 18, 19, 21/25	10/8/96	17	S. Wabrowetz	148 FW - Env' Management Office	5	project	7/22/97
Analytical Results of Waste Characterization Samples for Sites 17, ...	10/1/96	17,18,19	M. Smith	148 FW - Env' Management Office	5	project	7/22/97
Application For Compositing of Petroleum Impacted Soils	Oct 96	17,18,19,21,25	S. Kerr	148 FW - Env' Management Office	5	project	7/22/97
Analytical Summary from Map Locations 1-12 Located on Pg. 2	10/15/96	17,18,19,21,25	Bay West, Inc.	148 FW - Env' Management Office	5	project	7/22/97
Draft Laboratory Results for Soil Collected by Cheryl Brewer/ George.	10/17/96	17,18,19	E. Bacig	148 FW - Env' Management Office	5	project	7/22/97
Draft Laboratory Results for Soil Collected by Cheryl Brewer/ George.	10/18/96	17	L. Thiry	148 FW - Env' Management Office	5	project	7/22/97
Draft Laboratory Results for Soil Collected by Cheryl Brewer/ George.	10/18/96	17	L. Thiry	148 FW - Env' Management Office	5	project	7/22/97
IRP Site 17	10/22/96	17	S. Wabrowetz	148 FW - Env' Management Office	5	project	7/22/97
Backfill for IRP Sites 17 and 19	10/30/96	17,19	S. Wabrowetz	148 FW - Env' Management Office	5	project	7/22/97
Locations for Sample Gathering at Site 17 (hand sketched)	unk	17	unk	148 FW - Env' Management Office	5	project	7/22/97
Analytical Summary from Map Locations 1 - 24 and Sample #'s	unk	24-Jan	unk	148 FW - Env' Management Office	5	project	7/22/97
Comments on the Duluth Air Base Laboratory Submittal	10/22/96	N/A	L. Charpentier	148 FW - Env' Management Office	5	project	7/22/97
Site 18/19 Data	10/24/96	18,19	L. Thiry	148 FW - Env' Management Office	5	project	7/22/97
Task Order #1 (DAHA90-96-D-0011-0001)	10/25/96	N/A	T. Horness	148 FW - Env' Management Office	5	project	7/22/97
Limited Delegation of Contract Administration for Contract No. DAHA	10/9/96	N/A	J. Kampschroeder	148 FW - Env' Management Office	5	project	7/22/97
Site 17 - 148th ANG Duluth, MN. AET #96-7457	11/1/96	17	A. Smith	148 FW - Env' Management Office	5	project	7/22/97
Compositing of Petroleum Cont. Soil Batch-Site ID: LEAK00002588	10/30/96	Leak00002588	C. McLain	148 FW - Env' Management Office	5	project	7/22/97
Site 18 Sample Results	11/7/96	18	S. Wabrowetz	148 FW - Env' Management Office	5	project	7/22/97
Proposed Contract Modifications for DAHA90-93-0005	11/4/96	N/A	T. Harrah	148 FW - Env' Management Office	5	project	7/22/97
IRP Site 18	11/8/96	18	S. Wabrowetz	148 FW - Env' Management Office	5	project	7/22/97
Report of Density Tests for Sites 17, 18 and 19, Duluth ANG.	11/11/96	17,18,19	A. Smith	148 FW - Env' Management Office	5	project	7/22/97
Negotiated Cost for Modification to Contract DAHA90-93-0005	12/10/96	N/A	T. Harrah	148 FW - Env' Management Office	5	project	7/22/97
Peer Task 2518-001: Technical Support for the Remediation of Sites...	12/18/96	17,18,19,21,25	C. Stanley	148 FW - Env' Management Office	5	project	7/22/97
Comments for Corrective Implementation Report	1/31/97	17,18,19	S. Wabrowetz	148 FW - Env' Management Office	5	project	7/22/97
Draft Phase I Data Audit Report for Contract DAHA90-93-D-0005/55	3/4/97	N/A	T. Harrah	148 FW - Env' Management Office	5	project	7/22/97
Comments for Draft Optech Data Audit	3/8/97	17,18,19,21,25	S. Wabrowetz	148 FW - Env' Management Office	5	project	7/22/97
Draft Data Audit for Sites 17, 18 and 19	3/9/97	17,18,19,21,25	S. Wabrowetz	148 FW - Env' Management Office	5	project	7/22/97
Project Schedule/ Project Cost Chart	unk	17,18,19,21,25	unk	148 FW - Env' Management Office	5	project	7/22/97
Names and Addresses of Project Associates	unk	N/A	unk	148 FW - Env' Management Office	5	project	7/22/97
Imhoff Tank Sludge Analytical Sample Results DANG Site 21	5/14/97	21	E. Bacig	148 FW - Env' Management Office	5	project	7/22/97
Water Sample for DRMO Project	5/16/97	N/A	Lake Superior Labs	148 FW - Env' Management Office	5	project	7/22/97
Imhoff Tank Sludge Analytical Sample Results DANG Site 21	5/19/97	21	E. Bacig	148 FW - Env' Management Office	5	project	7/22/97
... The following items from our comment letter of April 17 1997, on...	5/20/97	N/A	E. Gawrys	148 FW - Env' Management Office	5	project	7/22/97
Cedar Ridge Compositing Permit	5/20/97	N/A	E. Bacig	148 FW - Env' Management Office	5	project	7/22/97
Special Waste Profile Sheet	5/22/97	N/A	G. Samo	148 FW - Env' Management Office	5	project	7/22/97
UST Soil Results	5/23/97	21/25	S. Wabrowetz	148 FW - Env' Management Office	5	project	7/22/97

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Site 25 Sample Locations + TPH Results	5/29/97	25	AER	148 FW - Env' Management Office	5	7/22/97
Compositing of Petroleum Cont. Soil Batch- Facility ID: SW#509	6/3/97	21/25	C. McLain	148 FW - Env' Management Office	5	7/22/97
Pilot Study SVE Blower Information	6/4/97	N/A	E. Bacig	148 FW - Env' Management Office	5	7/22/97
Authorization to Backfill Sites 21/25	6/11/97	21/25	S. Wabrowetz	148 FW - Env' Management Office	5	7/22/97
Analytical Request and Summary for 12 Jun, 1997.	6/13/97	N/A	J. Berdahl	148 FW - Env' Management Office	5	7/22/97
Straight Bill of Lading for Project # JMJ1000	6/19/97	N/A	Superior Special Serv.	148 FW - Env' Management Office	5	7/22/97
May 1997 Monthly Progress Report DAHA90-93-D-0005/55 -- PR-14	6/10/97	N/A	T. Harrah	148 FW - Env' Management Office	5	7/22/97
Site 17 Excavation and Sample Locations (sketch...)	unk	17	unk	148 FW - Env' Management Office	5	7/22/97
UST Soil Stockpile Compositing Permit	6/25/97	N/A	E. Bacig	148 FW - Env' Management Office	5	7/22/97
Replacement Asphalt at Site 21	7/3/97	21	S. Wabrowetz	148 FW - Env' Management Office	5	7/22/97
Peer Task 251B-001; Technical Support for the Remediation of Sites...	6/27/97	17,18,19	C. Stanley	148 FW - Env' Management Office	5	7/22/97
Site Map Showing Test Pit Sample Locations and Lab Results.	7/3/97	17	G. Knight	148 FW - Env' Management Office	5	7/22/97
Site 17 Letter of Temporarily Halting Excavating Due to Mixed Results	7/3/97	17	S. Wabrowetz	148 FW - Env' Management Office	5	7/22/97
Straight Bill of Lading for Project # JMJ1000	6/4/97	N/A	Superior Special Serv.	148 FW - Env' Management Office	5	7/22/97
Receipt for Special Tank(s)/Facilities From Baker Tanks.	7/9/97	N/A	B. Richards	148 FW - Env' Management Office	5	7/22/97
Cost Proposal for Additional Soils Excavation at Site 17, Duluth ANG	7/14/97	17	P. Wheeler	148 FW - Env' Management Office	5	7/22/97
Daily Progress Report Submitted by G. Knight for 26 Days at Site 17	numerous	17	G. Knight	148 FW - Env' Management Office	5	7/22/97
Weekly Observation Report #1 - #12 for Sites 17, 18, 19 and 21/25	numerous	17,18,19,21/25	AET	148 FW - Env' Management Office	5	7/22/97
Pre-Construction Conference attendance for DAHA90-96-D-0011	unk	N/A	unk	148 FW - Env' Management Office	5	7/22/97
Construction Meeting Minutes for Sites 21/25.	5/12/97	21/25	AET	148 FW - Env' Management Office	5	7/22/97
Summary of Pre-Construction Meeting for the Remediation of Sites...	5/20/97	17,18,19,21/25	T. Harrah	148 FW - Env' Management Office	5	7/22/97
Contains Monthly Progress Reports and AER Contract Progress Rep.	numerous	17,18,19,21/25	H. Stull	148 FW - Env' Management Office	5	7/22/97
Soil/Groundwater Remediation: Contract No. DAHA21-95-C-0003	2/29/96	17	N. Tegler	148 FW - Env' Management Office	5	7/22/97
Site 3, 1995 Soil Excavation Report Sampling and Analysis, Jan 19 1996.	3/18/96	3	B. Winkler	148 FW - Env' Management Office	5	7/22/97
Summarization of April 4 Meeting With Mr. Horness	4/9/96	2,3,4	N. Tegler	148 FW - Env' Management Office	5	7/22/97
Contract DAHA21-95-D-0003. Soil/Groundwater Remediation.	4/9/96	2,3,4	G. Hinkle	148 FW - Env' Management Office	5	7/22/97
Re: April 2, 1996, Conference Call Regarding Site 2, 3, and 4...	4/4/96	2,3,4	B. Winkler	148 FW - Env' Management Office	5	7/22/97
Statement of Work, Groundwater Monitoring, Duluth ANGB.	5/15/96	2,3,4,10	T. Horness	148 FW - Env' Management Office	5	7/22/97
Modification P00002 to Relocate Site 3 Bloopile, Soil/Groundwater...	5/15/96	N/A	T. Horness	148 FW - Env' Management Office	5	7/22/97
Site Map.	6/12/96	N/A	Bay West, Inc.	148 FW - Env' Management Office	5	7/22/97
FSO to Extend 3 Phase Primary to "Bio-Pile" Located at the ANG.	6/21/96	N/A	unk	148 FW - Env' Management Office	5	7/22/97
Excavation that Modification P00004 has not Been Signed due...	8/16/96	4	N. Tegler	148 FW - Env' Management Office	5	7/22/97
Excavation of Soil in Bottom of Containment Area **3 Copies**	8/19/96	N/A	T. Horness	148 FW - Env' Management Office	5	7/22/97
Site 3 Soil Analysis	1/19/95	3	Bay West, Inc.	148 FW - Env' Management Office	5	7/22/97
Soil Vapor Log for Site 3; Job # 9621	9/3/96	3	Earth Burners Inc.	148 FW - Env' Management Office	5	7/22/97
Construction Cost Estimate Breakdown for DAHA21-95-C-0003	unk	3,4	Energy & Env' Tech. Inc.	148 FW - Env' Management Office	5	7/22/97
Treatment of Site 3 Soils	10/7/96	3	S. Wabrowetz	148 FW - Env' Management Office	5	7/22/97
Groundwater Remediation at Sites 3 and 4	4/24/96	3,4	Energy & Env' Tech. Inc.	148 FW - Env' Management Office	5	7/22/97
Soil/Groundwater Remediation: Contract No. DAHA21-95-C-0003	10/4/96	3,4	N. Tegler	148 FW - Env' Management Office	5	7/22/97
Soil/Groundwater Remediation: Contract No. DAHA21-95-C-0003	10/7/96	3,4	N. Tegler	148 FW - Env' Management Office	5	7/22/97
Soil/Groundwater Remediation at Sites 3 and 4	10/7/96	3,4	N. Tegler	148 FW - Env' Management Office	5	7/22/97
Chain of custody Report and Map Relating the Sample Points site 3.	10/8/96	3	M. Hardin	148 FW - Env' Management Office	5	7/22/97
Map and Sample Log of Site 3 and 4	unk	3,4	unk	148 FW - Env' Management Office	5	7/22/97
Up to Date Map of Site 4 and Lab Results of Certain Gridmarks	10/9/96	4	M. Hardin	148 FW - Env' Management Office	5	7/22/97
Long Term Ground Water Monitoring	10/7/96	3,4,10	T. Horness	148 FW - Env' Management Office	5	7/22/97
Confirmatory analytical portions of Site 3 and 4 excavations at MN...	10/8/96	3,4	N. Tegler	148 FW - Env' Management Office	5	7/22/97
Soil/Groundwater Remediation: Contract No. DAHA21-95-C-0003	10/25/96	4	N. Tegler	148 FW - Env' Management Office	5	7/22/97
Site 4 South Ditch	11/1/96	4	S. Wabrowetz	148 FW - Env' Management Office	5	7/22/97
Summary of Lab Results Plus Map for Duluth ANG, Site 4	11/1/96	4	S. Wabrowetz	148 FW - Env' Management Office	5	7/22/97
Approval to Backfill South Ditch at Site 4	11/7/96	4	S. Wabrowetz	148 FW - Env' Management Office	5	7/22/97
Proposal for Additional Sampling at Sites 3 and 4	7/5/96	3,4	N. Tegler	148 FW - Env' Management Office	5	7/22/97
Modified Proposals per Negotiations Between USFPO and EETCO...	7/29/96	N/A	N. Tegler	148 FW - Env' Management Office	5	7/22/97
Amendment of Solicitation/ Modification of Contract	7/31/96	N/A	J. Guzder	148 FW - Env' Management Office	5	7/22/97
Revised Proposals for the Reduction of GW Treatment System O&M	7/11/96	4	N. Tegler	148 FW - Env' Management Office	5	7/22/97

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Contract DAHA21-95-D-0003, Soil/Groundwater Remediation.	7/29/96	N/A	Bldg. U-1 Camp Ripley	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Proposal for Groundwater Monitoring at Sites 2,3,4 and 10	6/7/96	2,3,4,10	N. Tegler	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Revised Proposal for Groundwater Monitoring at Sites 2,3,4 and 10	7/8/96	2,3,4,10	N. Tegler	148 FW - Env' Management Office	5	RP 3/4	7/22/97
EETCO Ground Water Monitoring Proposal	7/11/96	2,10	S. Wabrowetz	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Contract Progress Report	12/21/95	3,4	N. Tegler	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Breakout of O&M	12/13/95	N/A	T. Homess	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Soil/Groundwater Remediation at Sites 3 and 4	4/24/96	3,4	N. Tegler	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Soil/Groundwater Remediation: Contract No. DAHA21-95-C-0003	10/4/96	N/A	N. Tegler	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Map of Site 4 to Include Areas of Special Interest. Which are expl...	23/10/96	4	M. Hardin	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Construction Cost Breakdown for Project DAHA21-95-C-0003	unk	N/A	Energy & Env' Tech. Inc.	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Memorandum of Record for Negotiation Conference Calls	7/26/96	N/A	B. Hoenes	148 FW - Env' Management Office	5	RP 3/4	7/22/97
WLLSSD Contaminated Discharge Approval	11/5/96	N/A	T. Tuominen	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Excavation of Soil in Bottom of Containment Area	8/15/96	4	T. Homess	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Letter of Completion on the Backfill Portion of the Contract Re: site 4	11/22/96	4	M. Hardin	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Construction Meeting Minutes for Sites 3 and 4. AET Job #95-7284	9/17/96	3,4	unk	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Contract Progress Report	12/3/96	N/A	N. Tegler	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Letter Stating That Earth Burners, Inc. has Thermally Incinerated...	11/11/96	N/A	M. MacMillan	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Payrolls from Earth Burners	12/2/96	N/A	T. Homess	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Soil/Groundwater Remediation: Contract No. DAHA21-95-C-0003	12/6/96	4	N. Tegler	148 FW - Env' Management Office	5	RP 3/4	7/22/97
South Ditch Excavation at IRP Site 4	12/6/96	4	S. Wabrowetz	148 FW - Env' Management Office	5	RP 3/4	7/22/97
South Ditch Excavation at IRP Site 4	12/16/96	4	S. Wabrowetz	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Contract No. DAHA21-95-C-0003	12/16/96	3,4	N. Tegler	148 FW - Env' Management Office	5	RP 3/4	7/22/97
3 Copies and Electronic Files, or the As-Built Drawings for Sites 3,4	12/24/96	3,4	T. Harrah	148 FW - Env' Management Office	5	RP 3/4	7/22/97
3 Copies and Electronic Files, or the As-Built Drawings for Sites 3,4	12/24/96	3,4	T. Harrah	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Soil/Groundwater Remediation: Contract No. DAHA21-95-C-0003	6/19/97	N/A	N. Tegler	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Proposed Changes to Testing, Soil/Groundwater Remediation...	6/25/97	N/A	T. Homess	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Soil/Groundwater Remediation: Contract No. DAHA21-95-C-0003	5/19/97	N/A	N. Tegler	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Soil/Groundwater Remediation: Contract No. DAHA21-95-C-0003	6/10/97	4	N. Tegler	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Project: Duluth ANGB - Site 4	10/31/96	4	L. Thiry	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Project: Duluth ANGB - Site 4	10/29/96	4	L. Thiry	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Project: Duluth ANGB - Site 4	10/22/96	4	L. Thiry	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Project: Duluth ANGB - Site 4	10/18/96	4	L. Thiry	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Project: Duluth ANGB - Site 4	10/16/96	4	L. Thiry	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Project: Duluth ANGB - Site 4	10/14/96	4	L. Thiry	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Meeting Minutes For 31 Oct 95 IRP Construction Meeting	10/31/95	3,4	S. Wabrowetz	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Meeting Minutes For 7 Nov 95 IRP Construction Meeting	11/7/95	3,4	S. Wabrowetz	148 FW - Env' Management Office	5	RP 3/4	7/22/97
Meeting Minutes For 14 Nov 95 IRP Construction Meeting	11/15/95	3,4	S. Wabrowetz	148 FW - Env' Management Office	5	RP 3/4	7/22/97
9 July 96 Construction Meeting	7/10/96	2,3,4,10	S. Wabrowetz	148 FW - Env' Management Office	5	RP 3/4	7/22/97
4 Handwritten Memos by unk. Author Containing Notes Re: meetings	numerous	N/A	unk	148 FW - Env' Management Office	5	RP 3/4	7/22/97
File Index				148 FW - Env' Management Office	8	1	7/22/97
Phase I - Records Search	Mar '82	N/A	Engineering Science	148 FW - Env' Management Office	8	2	7/22/97
Phase II Stage 1 - Problem Confirmation Study	Oct '84	1, - 10	Weston Des. Consult.	148 FW - Env' Management Office	8	3	7/22/97
Phase II - Confirmation/Qualification Stage 2 - Drait (Vol 1-3) (*1 of ...)	Sep '87	1, - 10	Dames & Moore	148 FW - Env' Management Office	8	4	7/22/97
R/I/F/S & RD Work Plan, Revision 0	Jul '88	2,3,4,8,10	Engineering Science	148 FW - Env' Management Office	8	5	7/22/97
R/I/F/S & RD Work Plan	Jul '88	2,3,4,8,10	Engineering Science	148 FW - Env' Management Office	8	6	7/22/97
Remedial Investigation Report (Vol 1-7) (*1)	Jan '90	2,3,4,8,10	Engineering Science	148 FW - Env' Management Office	8	7	7/22/97
Proposed Land Application Sites, FTA 2, Site 2 Interim Response...	Jul '93	2	Twin Ports Testing	148 FW - Env' Management Office	9	1	7/22/97
Focused Feasibility Study for Site 3, DPDO Storage Area	Feb '94	3	Martin Marietta Energy..	148 FW - Env' Management Office	9	2	7/22/97
Pre-Design Study for Site 3 DPDO Storage Area "C"	Aug '93	3	Engineering Science	148 FW - Env' Management Office	9	3	7/22/97
Design Report for Site 3, DPDO Storage Area "C"	Jul '94	3	Engineering Science	148 FW - Env' Management Office	9	4	7/22/97
Plans & Specs for the Groundwater Collection...	Jul '94	3	Engineering Science	148 FW - Env' Management Office	9	5	7/22/97
Feasibility Study (*3)	Aug '94	2,3,4,8	Engineering Science	148 FW - Env' Management Office	9	6	7/22/97
Thermal Incineration of Contaminated Soils Report	Nov '95	2	Salo Engineering	148 FW - Env' Management Office	9	7	7/22/97

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Remedial Investigation Report (Vol 1-3) (*3)	Aug '94 10	Engineering Science	148 FW - Env' Management Office	9	8	7/23/97
Removal Action Excavation Report FTA - 2 (Vol 1-2)	Dec '94 2	Twin Ports Testing	148 FW - Env' Management Office	9	9	7/23/97
Final Feasibility Study Addendum (*8)	Nov '95 2,3,4	Montgomery Watson	148 FW - Env' Management Office	9	10	7/23/97
Feasibility Study - Public Meeting Transcript	Jun '95 2,3,4	Montgomery Watson	148 FW - Env' Management Office	9	11	7/23/97
Draft Final Decision Document	Mar '96 2,3,4	Montgomery Watson	148 FW - Env' Management Office	9	12	7/23/97
RD/Performance Statement of Work (photo-ready copy)	Apr '95 3,4	Montgomery Watson	148 FW - Env' Management Office	9	13	7/23/97
Contract Documents - Thermal Treatment of Soils	Mar '95 2	Sato Engineering	148 FW - Env' Management Office	9	14	7/23/97
Removal Action Excavation Report FTA - 2, IRP Site 2	Mar '94 2	Twin Ports Testing	148 FW - Env' Management Office	9	15	7/23/97
Groundwater Monitoring at Site 10 and FTA - 2	Mar '95 2,10	Twin Ports Testing	148 FW - Env' Management Office	9	16	7/23/97
Facility Investigation Work Plan	Jul '91 17,18,19,21,22	Optech	148 FW - Env' Management Office	9	17	7/23/97
Facility Investigation Work Plan	Oct '91 17,18,19,21,22	Optech	148 FW - Env' Management Office	10	1	7/23/97
Facility Investigation of SWMUs - Final Draft (Vol 1-4)	Jul '92 17,18,19,21,22	Optech	148 FW - Env' Management Office	10	2	7/23/97
Facility Investigation Work Plan (Addendum 1)	Dec '93 17,18,21	Optech	148 FW - Env' Management Office	10	3	7/23/97
Draft No Further Action DD for Site No.19 (*1)	Mar '95 19	Optech	148 FW - Env' Management Office	10	4	7/23/97
Draft No Further Action DD for Site No.22 (*1)	Mar '95 22	Optech	148 FW - Env' Management Office	10	5	7/23/97
Draft Remedial Design Plan for Sites 17, 18, 21/25	Sep '95 17,18,21/25	Optech	148 FW - Env' Management Office	10	6	7/23/97
Addendum 1 to RFI for 17, 18, 21 (Vol 1-2) (*8)	Oct '95 17,18,21	Optech	148 FW - Env' Management Office	10	7	7/23/97
IRP Preliminary Assessment (*11)	Aug '93 25,26	Optech	148 FW - Env' Management Office	10	8	7/23/97
IRP Site Investigation Work Plan (*2)	Apr '95 25,26	Optech	148 FW - Env' Management Office	10	9	7/23/97
Invitation for Bid: Ground Water Sampling	May '95 2,3,4,10	USPFO	148 FW - Env' Management Office	10	10	7/23/97
Corrective Measure Study - Final (*2)	Mar '96 17,18,19,21/25	Optech	148 FW - Env' Management Office	10	11	7/23/97
Racer Cost Estimate for Remediation of IRP Sites	Mar '96 17,18,19,21/25	Optech	148 FW - Env' Management Office	10	12	7/23/97
Remedial Sampling, Testing & Protection of Barrels	Sep '89 20	Bay West, Inc.	148 FW - Env' Management Office	10	13	7/23/97
Analytical Results for Bay West Project 9199	Sep '89 20	Aspen Research Corp.	148 FW - Env' Management Office	10	14	7/23/97
Environmental Compliance review (POL Facility)	Nov '92 4	Short-Elliott Hendrickson	148 FW - Env' Management Office	10	15	7/23/97
Site 3 1995 Soil Excavation Sampling & Analysis	Jan '96 3	Bay West, Inc.	148 FW - Env' Management Office	10	16	7/23/97
SOW for Remediation of Sites 17, 18, 19 and 21/25	Apr '96 17,18,19,21/25	Optech	148 FW - Env' Management Office	10	17	7/23/97
Photo Ready Copy of SOW for Remediation of Sites	Apr '96 17,18,19,21/25	Optech	148 FW - Env' Management Office	10	18	7/23/97
Site Assessment Work Plan for Leak Sites...	Oct '95 Tank Sites	Optech	148 FW - Env' Management Office	11	1	7/23/97
Final Remedial Investigation Report for Leak Sites...(*8)	Aug '96 Tank Sites	Optech	148 FW - Env' Management Office	11	2	7/23/97
Final Site Investigation Report - Vol 1-2 (*3)	Jun '96 25,26	Optech	148 FW - Env' Management Office	11	3	7/23/97
Development of Sampling Plans, Protocols and Reports	Jan '95	MPCA	148 FW - Env' Management Office	11	4	7/23/97
Community Relations Plan (5 Copies)	May '96	Montgomery Watson	148 FW - Env' Management Office	11	5	7/23/97
Ground Water Monitoring Report	Jun '95 2,3,4,10	RSU	148 FW - Env' Management Office	11	6	7/23/97
Ground Water Sampling Cost Proposal	Aug/Sep '96 2,3,4,10	Montgomery Watson	148 FW - Env' Management Office	11	7	7/23/97
Final Ground Water Sampling and Analysis Plan	Nov '96 2,3,4,10	Montgomery Watson	148 FW - Env' Management Office	11	8	7/23/97
Statement of Work for Remediation of Soil & Groundwater	May '95 3,4	Montgomery Watson	148 FW - Env' Management Office	11	9	7/23/97
Request for Technical Proposal for Soil/Groundwater Rem'	May '95 3,4	USPFO	148 FW - Env' Management Office	11	10	7/23/97
Technical Proposal for Soil/Groundwater Remediation	Fall '95 3,4	EETCO	148 FW - Env' Management Office	11	11	7/23/97
Statement of Qualifications	Fall '95 3,4	EETCO	148 FW - Env' Management Office	11	12	7/23/97
Submittals for Soil/Groundwater Remediation	Fall '95 3,4	EETCO	148 FW - Env' Management Office	12	1	7/23/97
RI/FS Stage 3 (vol 1A - 5)	Jan '90 1,5,6,7,9	Woodward-Clyde	148 FW - Env' Management Office	12	2	7/23/97
Work Plan for Remediation of Sites 17,18,19,21/25	Jan '97 17,18,19,21/25	Peer Consultant	148 FW - Env' Management Office	12	3	7/23/97
Corrective Measures Implementation report	Dec '96 17,18,19	AER	148 FW - Env' Management Office	12	4	7/23/97
Data Audit for Confirmation Sampling (Vol 1-3)	Mar '97 17,18,19	Optech	148 FW - Env' Management Office	12	5	7/23/97
Sampling and Analysis Report	Mar '97 17,18,19	Optech	148 FW - Env' Management Office	12	6	7/23/97
No Further Response Action Planned Decision Document	Jun '97 20	Radian International	148 FW - Env' Management Office	12	7	7/23/97
No Further Response Action Planned Decision Document	Jun '97 22	Radian International	148 FW - Env' Management Office	12	8	7/23/97
No Further Response Action Planned Decision Document	Jun '97 23	Radian International	148 FW - Env' Management Office	12	9	7/23/97
Phase II - Confirmation/Quantification Stage 2 (Vol 1&2)	8/1/88 1,5,6,7,9	Dames & Moore	Duluth Public Library	N/A	N/A ***	7/23/97
IRM/Ground Water Monitoring Work Plan	6/1/91 7	O'Brien & Gere Eng.	Duluth Public Library	N/A	N/A ***	7/23/97
Duluth AFB RI Meeting-Tape 1	2/1/90 N/A	unk	Duluth Public Library	N/A	N/A ***	7/23/97
Duluth AFB RI Meeting-Tape 1	2/1/90 N/A	unk	Duluth Public Library	N/A	N/A ***	7/23/97
MPCA News Release	10/8/82 N/A	M. Borchert	Duluth Public Library	N/A	N/A ***	7/23/97

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MPCA News Release "MPCA Approves Excavation of cont. Soil at 7"	Public Particip.	8/7/91 7	K. Carlson	Duluth Public Library	N/A	N/A ***	7/23/97
Public Meeting	Public Particip.	2/1/90	D. Wir Wahn	Duluth Public Library	N/A	N/A ***	7/23/97
Public Meeting - Draft	Public Particip.	1/5/90	D. Wir Wahn	Duluth Public Library	N/A	N/A ***	7/23/97
Public Notice Feasibility Study & Addendum Availability	Public Particip.	6/1/95	S. Wabrowetz	Duluth Public Library	N/A	N/A ***	7/23/97
MPCA Fact Sheet "Duluth Air Force Base"	Public Particip.	2/1/90	MPCA	Duluth Public Library	N/A	N/A ***	7/23/97
MPCA to interested Duluth and Hermantown Residents	Public Particip.	7/3/90	K. Carlson	Duluth Public Library	N/A	N/A ***	7/23/97
Guidance for Conducting Remedial Investigation and Feasibility Studies	Guidance Doc.	10/1/88	EPA	Duluth Public Library	N/A	N/A ***	7/23/97
Guidance on Preparing Superfund Decision Documents: Proposed Plan	Guidance Doc.	7/1/89	EPA	Duluth Public Library	N/A	N/A ***	7/23/97
Request for Response Action - Board Item RFRRA, Agenda Item Con...	Report	8/28/90	E. Gentzsch	Duluth Public Library	N/A	N/A ***	7/23/97
NOI to Issue RFRRA, Commissioner's Notice Letter	Letter	7/24/90	G. Willet	Duluth Public Library	N/A	N/A ***	7/23/97
NOI to issue RFRRA, Commissioner's Notice Letter	Letter	8/7/90	T. Moilan	Duluth Public Library	N/A	N/A ***	7/23/97
MPCA Meeting Agenda & Request for Litigation Authority	Letter	6/26/90	MPCA	Duluth Public Library	N/A	N/A ***	7/23/97
Tactical Air Command Work Plan - IRP Stage 4 - Site 7	Report	6/1/91 7	O'Brien & Gere Eng.	Duluth Public Library	N/A	N/A ***	7/23/97
Hazard Ranking System Scoring	Report	7/11/84	EPA Region V	Duluth Public Library	N/A	N/A ***	7/23/97
Hazard Ranking System Scoring	Report	8/12/86	EPA Region V	Duluth Public Library	N/A	N/A ***	7/23/97

Note: All *** indicate info is at the Duluth Public Library.

Appendix B

**SELECTED SUPPORTING DOCUMENTATION
FOR DRUM AND SOIL REMOVAL ACTION AT SITE 20**



Minnesota Pollution Control Agency

520 Lafayette Road, Saint Paul, Minnesota 55155
Telephone (612) 296-6300



February 16, 1989

Colonel John D. Broman
H.Q. 148th Fighter Interception Group
Minnesota Air National Guard
Duluth International Airport
Duluth, Minnesota 55811-5000

Dear Colonel Broman:

Based on my discussions with the MPCA staff and your submittal of a revised Statement of Work, received on December 16, 1988, the MPCA staff feel that the Minnesota Air National Guard (MnANG) has adequately addressed the issues presented in the requirements section of the NOV issued on November 14, 1988, and is currently meeting the intent of the Minnesota hazardous waste rules. It is our understanding that work on the cleanup has been scheduled to be completed by April 30, 1989.

Please continue to coordinate with Enrique Gentsch on cleanup of the excavated drums at the TACAN site. We appreciate your continued cooperation in this matter.

If you have any questions concerning this letter, please contact Jeff Golden of my staff at 612/296-8568.

Sincerely,

Larry Christensen, Chief
Hazardous Waste Section
Hazardous Waste Division

LC/JAG:ls

cc: Wayne Golly, MPCA, Duluth
Joe Maternowski, Special Assistant Attorney General
Enrique Gentsch, Site Response Section

21 FEB 1989

BASE TYPE (Form designed for use on elite (12-pitch) typewriter) or print. Instructions on cover page.

OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. **MD00077314191607** Manifest Document No. **2** Page 1 of 1
 Information in shaded area not required by Federal law. Minnesota rules require Items H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z.

3. Generator's Name and Mailing Address: **INDO Duluth Duluth IAF, MN 55811**
 State Manifest Document Number: **MN 001124**
 State Generator ID: **001124**

4. Generator's Phone (218) **723 7461** 24hr **0-218-723-7233**

5. Transporter 1 Company Name: **LATONAR ENVIRONMENTAL INC** 6. US EPA ID Number: **808987574647**
 State Transporter ID: **001124**
 Transporter's Phone: **612-338-1111**

7. Transporter 2 Company Name: 8. US EPA ID Number:
 State Transporter ID:
 Transporter's Phone:

9. Designated Facility Name and Site Address: **Tricel Environmental Management 3536 Fite St. Millington, TN 38053** 10. U.S. EPA ID Number: **TN0000614927**
 State Facility ID: **001124**
 Facility's Phone: **615-457-4600**

HM	11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers		13. Total Quantity	14. Unit Wt/Vol	Waste No.
		No	Type			
a.	X Combustible Liquid, HOS Combustible Liquid, HA1993 (TAR) (HOSSE) Non-Regulated Solids (Tar Clean-up) (HOSSE)	0.0.4	DM	0.1.6.9.5	P	
b.		0.4.6	DM	2.3.9.1.0	P	
c.						
d.						

J. Additional Descriptions for Materials Listed Above:
 a) **9001-001 Guide 021**
 b) **9001-001 Guide 022 Trucks 378 POF 291220**
 K. Handling Codes for Wastes Listed Above:

15. Special Handling Instructions and Additional Information:
 Please send all correspondence and billing to:
Tricel Environmental, PO Box 140, Nashville, TN 37202 TEL: 700-61-0062/007
 16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name, are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and government regulations and all applicable state laws and regulations.
 If I am a large quantity generator I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage or disposal currently available to me which minimizes the present and future threat to human health and the environment, or, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best management method that is available to me and that I can afford.

Printed/Typed Name: **SUSAN THOMPSON** Signature: *Susan Thompson* Date: **06/13/97**
 17. Transporter 1 Acknowledgement of Receipt of Materials
 Printed/Typed Name: **Robert E. ...** Signature: *Robert E. ...* Date: **06/17/97**
 18. Transporter 2 Acknowledgement of Receipt of Materials
 Printed/Typed Name: Signature: Date:

19. Discrepancy Indication Space:

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
 Printed/Typed Name: Signature: Date:

the Minnesota Division of Emergency Services at 612/778-0800; the National Response Center at 800/424-8802. Outside Minnesota, call the National Response Center and appropriate state agency.

GENERATOR

TRANSPORTER

FACILITY

TY



Chemical Waste Management, Inc.

Emelle Facility
P.O. Box 55
Emelle, Alabama 35459-0055
205/652-9721

EPA ID NUMBER: ALD000622464

07904

Tricil Environmental
3536 Fite Road
Millington, TN 38053

CERTIFICATE OF DISPOSAL

Chemical Waste Management, Inc. has received waste material from
Tricil Environmental described on Alabama Hazardous Waste
Manifest number CWMA 589045. Chemical Waste Management, Inc.,
hereby certifies waste material received on the 2nd day of
July , 1991 was disposed of in compliance with State and
Federal Regulations.

Glory F. McAboy

Glory F. McAboy, Recordkeeping & Reporting Supervisor

Date 07/24/91

#24



TRICIL ENVIRONMENTAL MGT. INC.
3536 FITE RD.
MILLINGTON, TENNESSEE 38053

CERTIFICATE OF DISPOSAL

Tricil Environmental Management Inc., a Tennessee Corporation with its principal offices located at 3536 Fite Rd, Millington, TN hereby certifies and affirms that the following materials have been disposed of on the dates and using the methods specified below:

MN11243

I. Generator: DRMO DULUTH
Address:

DULUTH IAP, MN 55811-0000

II. Manifest Number: 11243
Date Received: 06/24/91
Contract #: DLA-200-91-D-0000
Delivery #: 0007

III. Waste Descriptions

A. COMBUSTIBLE LIQUID NOS NA1993

B. NON REGULATED SOLID TAR CLEANUP NONE

EPA Codes	In Amount	Out Amount
NONE	1695 P	1695 P
NONE	23910 P	23910 P

IV. Date of Disposition: A. 07/01/91 B. 07/01/91

V. Method of Disposition:

A. D81 at CWMAL 07904 1695 P
B. D81 at CWMAL 07904 - A 23910 P

VI. Comments:

A. 4 DM 07904
B. 46 DM 07904

This certification is your notice of the final disposition of the materials listed above.

[Signature]

Facility Manager

08/14/91

(Signature)

(Title)

(Date)

Appendix C

**BACKGROUND LEVELS OF POLYCYCLIC AROMATIC HYDROCARBONS (PAHs)
AND SELECTED METALS IN URBAN SURFACE SOIL**

Background Levels of Polycyclic Aromatic Hydrocarbons (PAH) and Selected Metals in New England Urban Soils

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* To whom all correspondence should be addressed.

ABSTRACT: Polycyclic aromatic hydrocarbons (PAH) are byproducts of combustion and are ubiquitous in the urban environment. They are also present in industrial chemical wastes, such as coal tar, petroleum refinery sludges, waste oils and fuels, and wood-treating residues. Thus, PAHs are chemicals of concern at many waste sites. Risk assessment methods will yield risk-based cleanup levels for PAHs that range from 0.1 to 0.7 mg/kg. Given their universal presence in the urban environment, it is important to compare risk-based cleanup levels with typical urban background levels before utilizing unrealistically low cleanup targets. However, little data exist on PAH levels in urban, nonindustrial soils. In this study, 60 samples of surficial soils from urban locations in three New England cities were analyzed for PAH compounds. In addition, all samples were analyzed for total petroleum hydrocarbons (TPH) and seven metals. The upper 95% confidence interval on the mean was 3 mg/kg for benzo(a)pyrene toxic equivalents, 12 mg/kg for total potentially carcinogenic PAH, and 25 mg/kg for total PAH. The upper 95% confidence interval was 373 mg/kg for TPH, which exceeds the target level of 100 mg/kg used by many state regulatory agencies. Metal concentrations were similar to published background levels for all metals except lead. The upper 95% confidence interval for lead was 737 mg/kg in Boston, 463 mg/kg in Providence, and 378 mg/kg in Springfield.

KEY WORDS: background, PAH, metals, urban, anthropogenic, soil.

I. INTRODUCTION

Polycyclic aromatic hydrocarbons (PAHs) are byproducts of combustion and are naturally occurring chemicals in the environment. Forest fires and volcanoes are major natural sources of PAHs, but there are anthropogenic sources as well due to burning of fossil fuels, including automobile and industrial emissions. PAHs are chemicals of concern in many waste site investigations that are undertaken pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Resource Conservation and Recovery Act (RCRA), and state

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hazardous waste programs. Risk assessments performed according to federal guidance for former manufactured gas plant sites, wood treating facilities, petroleum refineries, and other sites generally conclude that PAHs pose unreasonable risks to human health and that remedial actions must be taken to reduce risks to acceptable levels. The majority of the risk posed by PAHs is generally due to benzo(a)pyrene and the other PAHs that have been shown to cause cancer in laboratory animals after repeated dosings. The U.S. EPA (1993a) currently identifies seven PAHs as "probable human (B2) carcinogens": benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene.

Because of the very health-protective assumptions used in regulatory risk assessments, very low risk-based clean-up levels for PAHs are derived for such sites. In Michigan, residential soil cleanup levels of 0.33 mg/kg for each carcinogenic PAH have been set (MDNR, 1993). In New Jersey, proposed residential soil cleanup levels are 0.66 mg/kg for benzo(a)pyrene (New Jersey Register, 1992). The use of standard CERCLA risk assessment guidance (U.S. EPA, 1993b) results in the derivation of a risk-based cleanup level for benzo(a)pyrene of 0.1 mg/kg.

All of these risk-based soil cleanup levels are below the urban, nonindustrial background soil concentrations presently reported in the literature. However, the availability of such data is very limited. Blumer (1961) reports that benzo(a)pyrene concentrations in Cape Cod, MA, soils range from 0.04 to 1.3 mg/kg. Menzie et al. (1992) report that urban background soil levels of total carcinogenic PAH range from 0.06 to 5.8 mg/kg. Butler et al. (1984) report that total PAH levels in soils alongside roadways in England range from 4 to 20 mg/kg, and potentially carcinogenic PAH range from 0.8 to 11.5 mg/kg. Blumer et al. (1977) report that total PAH levels in soils in a Swiss town range from 6 to 300 mg/kg.

It is very difficult to compare the data from these studies to the results of site risk assessments due to the limited dataset and the nonuniformity of the PAH compounds evaluated. Clearly, more data are required from nonindustrial urban locations to define the urban background level for PAH and to critically evaluate the role of risk assessment in setting remedial goals for PAH in soils. Accordingly, we have collected 60 samples of surficial soils from urban locations in three New England cities and analyzed them for all 17 PAH compounds present on the EPA's Target Compound List, which is used in the Superfund program. In addition, all samples were analyzed for total petroleum hydrocarbons (TPH) and for seven metals: arsenic, barium, cadmium, chromium, lead, mercury, and selenium.

II. METHODS

A. Sample Collection

Samples of surficial soils from urban locations in three New England cities were collected: Boston, MA; Providence, RI; and Springfield, MA. Twenty independent

samples and duplicates of two samples were collected in each city. The samples were collected on July 21, 22, and 23, 1992, respectively. The samples were taken at a depth of 0 to 6 in. in areas considered to be not directly affected by industrial sites. Generally, the locations were along roads and sidewalks, and in parks and open lots. Each location was characterized in writing, including a soil description, and photographically documented. The samples were collected following standard environmental sampling protocols (U.S. EPA, 1986).

B. Sample Analysis

Chemical analysis of the samples was performed by AnalytiKEM, Inc. (Cherry Hill, NJ). The samples were analyzed by GC-MS for the 17 PAH compounds present on the EPA's Target Compound List using the methods required by EPA Method 8270 for the analysis of semivolatile compounds. In addition, the samples were analyzed for the eight RCRA metals, total petroleum hydrocarbons (TPH; EPA Method 418.1), and total solids. The complete analyte list is given in Table 1.

C. Data Validation

Validation of the data received from AnalytiKEM was performed according to U.S. EPA (1991) guidelines. The data were reviewed for completeness, holding times, GC-MS tuning and system performance, initial and continuing calibrations, laboratory method blank analysis, surrogate recoveries, matrix spike and matrix spike duplicate analysis, field duplication precision, and compound quantitation and detection limits.

D. Data Analysis

The analytical data were summarized in accordance with U.S. EPA (1989) risk assessment guidance. If a compound was detected at least once in surface soil, one half the sample quantitation limit (SQL) was used as a proxy concentration for all samples reported as "below detection limit" in the estimation of exposure point concentrations. However, if a compound was not detected in any sample, that compound was omitted from further consideration. In addition, when a proxy concentration (i.e., one half the detection limit) was greater than the highest actual detected value for a compound in any sample, that concentration was considered to be an aberration and was omitted from the database. This is consistent with U.S. EPA (1989) guidance, which recognizes that high sample quantitation limits can lead to unrealistic concentration estimates.

TABLE 1
Chemical Analyses of Urban Soils

Semivolatile Organics, EPA Target Compound List

Naphthalene
Acenaphthylene
Acenaphthene
Fluorene
Phenanthrene
Anthracene
Fluoranthene
Pyrene
Benzo(a)anthracene
Chrysene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(a)pyrene
Indeno(1,2,3-cd)pyrene
Dibenzo(a,h)anthracene
Benzo(g,h,i)perylene
2-Methylnaphthalene

Metals

Arsenic, total
Barium, total
Cadmium, total
Chromium, total
Lead, total
Mercury, total
Selenium, total
Silver, total

Other

Total petroleum hydrocarbons
Solids

A slightly different method of analysis was used to evaluate PAH. Because PAH are generally found in groups, it was conservatively assumed that if one PAH was detected in a sample, other compounds in that class might also be present in that sample. Therefore, if one PAH was detected in a sample, all undetected PAH were assigned a proxy concentration equal to one half the SQL. If a sample had no detected PAH, no PAH were assumed to be present in the sample, and a concentration of zero was used for all nondetects.

Summary statistics (minimum, maximum, arithmetic mean, upper 95% confidence limit on the arithmetic mean, and frequency of detection) were generated for each compound for each city and for all three cities combined.

The data for PAH were summarized in several different ways. Of the 17 PAH analyzed in each sample, seven are considered to be probable human carcinogens (Group B2) by the U.S. EPA (1993a). The U.S. EPA has derived a cancer slope factor, which is a measure of the carcinogenic potency of a compound, only for benzo(a)pyrene (B(a)P) (U.S. EPA, 1993a). Review of the literature indicates that not all PAH are equally potent with respect to tumor induction. Several researchers have proposed toxic equivalency schemes that relate the tumorigenic potency of each PAH to that of B(a)P (ICF-Clement Associates, 1988; Woo, 1989). B(a)P toxic equivalency factors (B(a)P-TEFs) can be used to adjust either the B(a)P dose-response value to provide a compound-specific dose-response value, or the concentration of each PAH in a sample to be expressed in terms of B(a)P toxic equivalents (B(a)P-TE). The latter method was used here. B(a)P-TE were calculated using the B(a)P toxic equivalency factors recommended for use by the U.S. EPA (1993c), as shown in Table 2. For each sample, PAH concentrations were reported for each of the 17 PAH on the analyte list, for total PAH (tPAH), for total carcinogenic PAH (cPAH), and for B(a)P-TE, and these values were used to generate the summary statistics for each group of samples.

III. RESULTS

Analysis of the laboratory results for the PAH indicates that quality control criteria were acceptable. The data were analyzed to determine if any statistically significant differences existed between the datasets for the three cities. A Hartley test for homogeneity of variances (Mendenhall, 1979) and a one-factor analysis of variance to test for equality of the means (Mendenhall, 1979) indicated no statistically significant differences. The results indicate that the PAH data can be pooled and treated as one dataset for further statistical analyses.

TABLE 2
Benzo(a)Pyrene Toxic
Equivalent Factors (BAP-TEF)

Compound	EPA TEF
Benzo(a)pyrene	1.0
Benz(a)anthracene	0.1
Benzo(b)fluoranthene	0.1
Benzo(k)fluoranthene	0.1
Chrysene	0.001
Dibenzo(a,h)anthracene	1.0
Indeno(1,2,3-c,d)pyrene	0.1

The results of the PAH analyses are presented in Table 3 for all cities combined. A summary of the PAH results by city and for all cities combined is presented in Table 4, which reports for each: tPAH, total cPAH, and total B(a)P-TE. The arithmetic mean and the upper 95% confidence limit concentration are reported for each. Table 4 provides a summary of the data by city, and the results are graphically presented in Figure 1.

Table 5 presents a summary of the metals, TPH, and solids data by city. A Hartley test for homogeneity of variances and a one-factor analysis of variance to test for equality of the means indicated that the metals and TPH data from the three cities cannot be combined. This is due to the fact that the concentrations in each city are not normally distributed and did not have equal variances. The concentrations of the metals are compared to the arithmetic mean concentrations in the eastern U.S. (ATSDR, 1992) in Table 5. Most notably, lead concentrations are much higher than background concentrations. This is most likely due to the effects of automobile exhaust.

In order to determine if sample location significantly affected PAH concentration results, individual samples were classified based on the sample location's

TABLE 3
Summary Statistics for PAH — All Areas Combined

Compound	Minimum detect (mg/kg)	Maximum detect (mg/kg)	Arithmetic mean	Upper 95% Interval (mg/kg)	Frequency of detection*	
2-Methylnaphthalene	0.017	0.64	0.151	0.173	19	62
Acenaphthene	0.024	0.34	0.201	0.306	30	62
Acenaphthylene	0.018	1.10	0.173	0.208	24	62
Anthracene	0.029	5.70	0.351	0.535	54	62
Benzo(a)anthracene	0.048	15.00	1.319	1.858	58	62
Benzo(a)pyrene	0.040	13.00	1.323	1.816	57	62
Benzo(b)fluoranthene	0.049	12.00	1.435	1.973	55	62
Benzo(g,h,i)perylene	0.200	5.90	0.891	1.195	36	62
Benzo(k)fluoranthene	0.043	25.00	1.681	2.522	59	62
Chrysene	0.038	21.00	1.841	2.693	60	62
Dibenzo(a,h)anthracene	0.020	2.90	0.388	0.521	32	62
Fluoranthene	0.110	39.00	3.047	4.444	60	62
Fluorene	0.022	3.30	0.214	0.317	35	62
Indeno(1,2,3-c,d)pyrene	0.093	6.00	0.987	1.293	43	62
Naphthalene	0.018	0.66	0.125	0.149	35	62
Phenanthrene	0.071	36.00	1.838	2.982	61	62
Pyrene	0.082	11.00	2.398	2.945	61	62
Total BAP-TE	0.257	21.31	2.437	3.324	62	62
Total carcinogenic PAH	0.680	77.70	8.973	12.423	62	62
Total PAH	2.292	166.65	18.361	24.819	62	62

* Frequency of detection = number detected: number samples.

TABLE 4
Background PAH Concentrations in Urban Surface Soils*

Compound	Boston (n = 20)		Providence (n = 20)		Springfield (n = 20)		All cities (n = 60)	
	Arithmetic mean (ppm)	Upper 95% Cl (ppm)	Arithmetic mean (ppm)	Upper 95% Cl (ppm)	Arithmetic mean (ppm)	Upper 95% Cl (ppm)	Arithmetic mean (ppm)	Upper 95% Cl (ppm)
Total B(a)P-TE	2.4	4.6	2.1	2.9	2.8	4.5	2.4	3.3
Total cPAH	8.4	16.0	7.8	11.0	10.6	18.3	9.0	12.4
Total PAH	18.7	35.9	16.8	23.5	19.1	29.9	18.4	24.8
TPH	474.9	652.6	267.4	338.2	184.4	233.3	306.2	372.8

* 0 to 6 in.

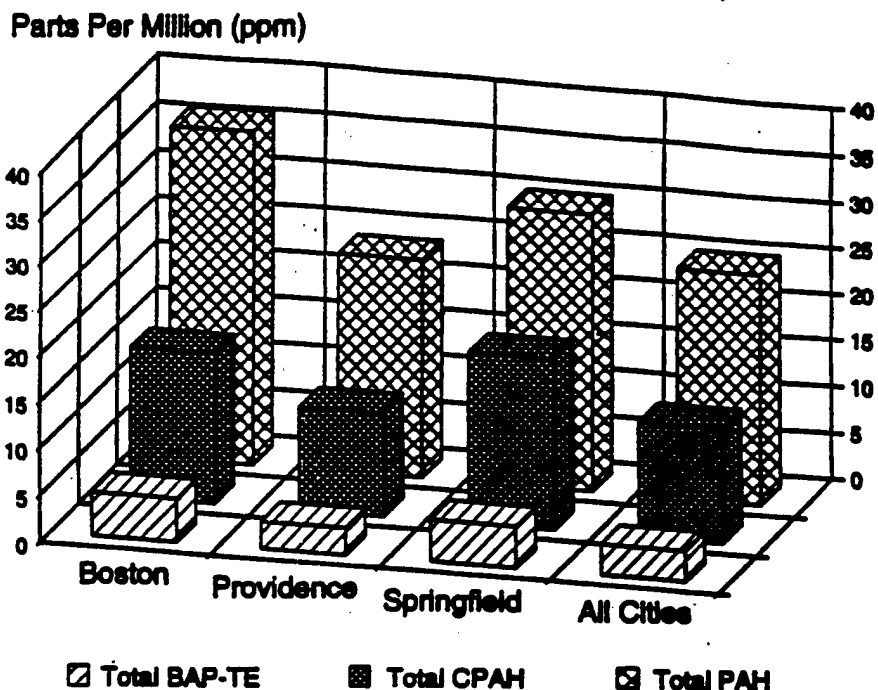


FIGURE 1. Background concentrations of PAH in urban soils. Data presented are the upper 95% confidence interval on the arithmetic mean. Data are presented numerically in Table 4.

proximity to asphalt pavement, based on both written and photographic documentation of sample location. Generally, samples collected within 4 to 6 ft of a road were considered to be near pavement. Of the 60 separate locations, 42 were considered to be near pavement and 18 were not. When tested for equality of variance and means as above, the two populations were determined to be significantly different. The mean total PAH concentration near pavement was 22 ppm compared to 8 ppm not near pavement. These results are shown in Table 6.

Similar analyses were performed to see if TPH or total organic carbon concentrations could be used as surrogates for PAH concentrations. The results showed that there is no correlation between PAH and TPH concentrations, nor between PAH and total organic carbon concentrations (data not shown).

The highest total PAH concentration detected was 166 mg/kg, taken from a street corner in Boston. The next highest PAH concentration was 109 mg/kg, taken at the base of a telephone pole. Four of the 60 samples were taken at the bases of telephone poles, with widely varying results. The total PAH concentrations in the other three locations were 62, 4, and 45 mg/kg.

TABLE 5
Summary Statistics for Metals, TPH, and Soils by City

Compound	Boston (n = 20)			Providence (n = 20)			Springfield (n = 20)		
	Arithmetic mean (mg/kg)	Upper 95% Interval (mg/kg)	Arithmetic mean (mg/kg)	Upper 95% Interval (mg/kg)	Arithmetic mean (mg/kg)	Upper 95% Interval (mg/kg)	Arithmetic mean (mg/kg)	Upper 95% Interval (mg/kg)	Arithmetic mean in U.S. soils ^a (mg/kg)
	Arsenic, total	4.20	5.59	3.53	4.27	5.63	9.23	7.4	
Barium, total	53.95	66.25	45.29	59.43	45.17	51.03	420		
Cadmium, total	1.55	2.79	ND	ND	ND	ND	0.25 ^b		
Chromium, total	23.00	27.69	12.08	14.35	12.62	14.45	52		
Lead, total	398.70	737.44	305.76	462.98	261.69	377.76	17		
Mercury, total	0.29	0.39	0.19	0.24	0.20	0.25	0.12		
Selenium, total	0.51	0.57	0.39	0.48	0.53	0.55	0.45		
Total petroleum hydrocarbons	474.90	652.62	267.43	338.19	184.38	233.27	—		
Total solids	90%	93%	93%	95%	90%	92%	—		

^a ATSDR. 1992. *Public Health Assessment Guidance Manual*. PB92-147164. U.S. Department of Health and Human Services.

^b ATSDR. 1991. *Toxicological Profile for Cadmium*. PB92-147164. Draft. U.S. Department of Health and Human Services.

TABLE 6
Comparison of Background PAH Concentrations in Urban Soils: The Effects of Proximity to Pavement

Compound	Near pavement		Not near pavement		Results of statistical analysis					
	Arithmetic mean (ppm)	Standard deviation	Arithmetic mean (ppm)	Standard deviation	Test for homogeneity of variances			Test of equality of means		
					Sample F-statistic	Associated degrees of freedom	Statistically significant at 0.05 level of significance	Sample Student's t	Associated degrees of freedom	Statistically significant at 0.05 level of significance
Total B(a)P-TB	2.9	4.2	1.1	0.92	21.3	41, 17	Yes	2.69	50	Yes
Total PAH	21.9	30.7	8.3	7.2	18.4	41, 17	Yes	2.69	50	Yes

IV. CONCLUSION

In this study, 20 surface soil samples were collected from each of three New England cities and analyzed for PAH, TPH, and metals. The results of the statistical analyses described in the previous section show that, with respect to PAH, the three datasets are not significantly different and can be considered as one dataset representative of urban environments. The samples were taken in typical urban areas but not near known industrial sites. Therefore, these data are considered to be representative of the generalized effects of urban activities.

It is clear from the results presented here that common regulatory target cleanup levels for cPAH and B(a)P-TE (0.1 to 0.66 mg/kg) are much below the background concentrations of these compounds in urban surface soils (upper 95% confidence interval of 3.3 and 12.4 mg/kg for total B(a)P-TE and total cPAH, respectively). Figure 2 graphically compares the "bright line" target cleanup level for B(a)P of 0.1 mg/kg with the total B(a)P-TE (upper 95% confidence interval on the arithmetic mean) measured in urban environments.

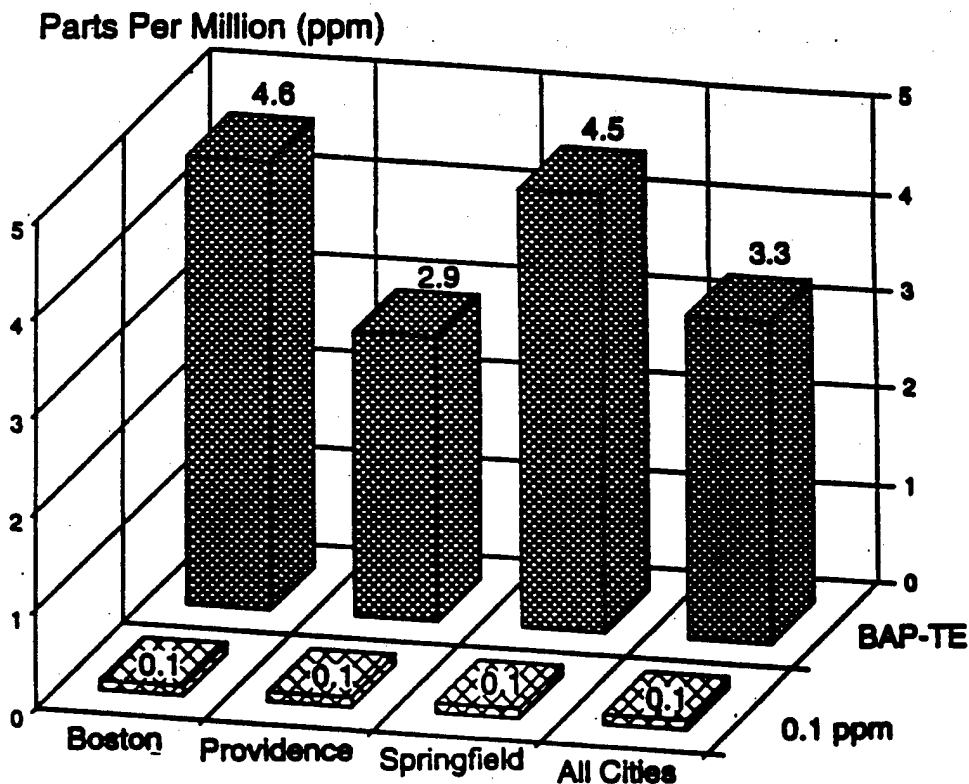


FIGURE 2. Comparison of B(a)P-TE with U.S. EPA Region III⁴ risk-based concentration for B(a)P. B(a)P data presented are the upper 95% confidence interval on the arithmetic mean.

Upper 95% confidence intervals are compared because this is the statistic preferred by EPA and many states for risk assessment. Moreover, the State of Massachusetts defines its background concentrations of metals based on the upper 95% confidence limit on the arithmetic mean concentration (Massachusetts Department of Environmental Protection, 1992). For all cities combined, the background level of B(a)P-TE of 3.3 mg/kg is approximately ten times greater than the target cleanup level of 0.33 mg/kg and approximately 30 times higher than the target cleanup level of 0.1 mg/kg. For those regulatory situations in which the use of B(a)P-TEFs in determining site risk is not allowed, the background level of cPAH is approximately 40 to 100 times greater than these target cleanup levels.

An analysis of the data comparing samples taken near pavement with those determined to be not near pavement indicated that those samples designated near pavement had significantly higher, approximately threefold higher, PAH concentrations for both total PAH and total B(a)P-TE. This is most likely due to the presence of diesel and automobile exhaust particles, perhaps influenced by the presence of asphalt and runoff of vehicular oil from the roads.

Total petroleum hydrocarbons (TPH) were also found at consistently high levels in each city. The commonly applied regulatory cleanup level for TPH is 100 mg/kg. This cleanup level is not risk based and is three times lower than the background concentration of TPH found in this study (arithmetic mean of 306 mg/kg and upper 95% confidence interval on the mean of 373 mg/kg).

It is incumbent upon the regulatory agencies to recognize that substantial background levels of PAH and TPH exist in our urban environments and to acknowledge this information in the development of realistic target cleanup levels. The use of these background data in setting more realistic target cleanup levels may result in better allocation of remedial and regulatory dollars in site investigations.

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