UNITED STATES AIR FORCE
ELMENDORF AIR FORCE BASE, ALASKA

ENVIRONMENTAL RESTORATION PROGRAM

LF04 DEBRIS REMOVAL WORK PLAN

FINAL

SEPTEMBER 2004

TABLE OF CONTENTS

SECTION **PAGE**

ACRONYMS AND ABBREVIATIONS iii
1.0 INTRODUCTION 1-1
1.1 PROJECT OBJECTIVES 1-2
1.2 WORK PLAN OBJECTIVE 1-2
1.3 WORK PLAN ORGANIZATION 1-5
1.4 REGIONAL SETTING 1-6
1.5 SITE HISTORY 1-7
1.6 SUMMARY OF PREVIOUS ANNUAL DEBRIS REMOVAL ACTIONS 1-7
2.0 PROJECT TEAM ORGANIZATION 2-1
2.1 3 CES/CEVR PROJECT MANAGER 2-1
2.2 AFCEE ALASKA COORDINATOR 2-1
2.3 PROJECT MANAGER 2-1
2.4 CONTRACTS MANAGER 2-1
2.5 SITE SAFETY AND HEALTH OFFICER 2-2
2.6 FIELD TEAM MEMBERS 2-2
2.7 CIVIL SUBCONTRACTOR 2-2
3.0 PROPOSED DEBRIS REMOVAL FIELDWORK 3-1
3.1 MOBILIZATION AND SITE ACCESS 3-1
3.1.1 Site Layout 3-1
3.2 TIDES 3-3
3.3 REMOVAL OF NON-HAZARDOUS DEBRIS 3-3
3.4 HANDLING OF POTENTIALLY HAZARDOUS MATERIALS 3-4
3.4.1 Potential Unexploded Ordnance 3-5
3.4.2 Small Arms Casings 3-5
3.4.3 Drums and Containers 3-5
3.4.4 Suspected Asbestos-Containing Materials 3-7
3.4.5 Transformers and other Electrical Components 3-7
3.4.6 Batteries 3-8
3.4.7 Suspect Medical Waste 3-8
3.5 DATA QUALITY OBJECTIVES 3-8

TABLE OF CONTENTS
CONTINUED

SECTION **PAGE**

3.6 WASTE CHARACTERIZATION SAMPLING 3-9
3.6.1 Drum Contents 3-12
3.6.2 Suspected Asbestos-Containing Material 3-12
3.7 DATA COLLECTION AND DOCUMENTATION 3-12
3.8 SURVEYING 3-12
4.0 PROJECT SCHEDULE 4-1
5.0 REFERENCES 5-1

TABLES

Table 1-1 Annual Debris Removal Summary, FY 1997-2003 1-8
Table 3-1 Project Data Quality Objectives - LF04 Elmendorf Air Force Base, Alaska .. 3-10

FIGURES

Figure 1-1 LF04 Site Location Map 1-3
Figure 3-1 LFO4 Site Layout 3-2
Figure 3-2 Anchorage Area Tide Tables 3-3
Figure 4-1 LF04 Debris Removal and Monitoring 4-2

APPENDICES

Appendix A Sampling and Analysis Plan
- Part 1 Field Sampling Plan
- Part 2 Quality Assurance Project Plan
- Part 3 Waste Management Plan

Appendix B Health and Safety Plan

Appendix C Response to Comments

ACRONYMS AND ABBREVIATIONS

3 CES	3rd Civil Engineer Squadron
3 SFS	Security Forces Squadron
ACM	asbestos-containing material
AFB	Air Force Base
AFCEE	Air Force Center for Environmental Excellence
ATV	all-terrain vehicle
CEVR	Civil Engineer Environmental Restoration
COR	Contracting Officer's Representative
DRMO	Defense Reutilization and Marketing Office
DQO	data quality objective
EOD	Explosive Ordinance Disposal
ESF	Environmental Staging Facility
FS	Feasibility Study
FSP	Field Sampling Plan
GPS	Global Positioning System
HSP	Health and Safety Plan
LF	landfill
OEW	ordnance and explosive waste
OSHA	Occupational Safety and Health Administration
OU	operable unit
PCB	polychlorinated biphenyl
QAPP	Quality Assurance Project Plan
RI	Remedial Investigation
RTK	real time kinematic
ROD	Record of Decision
SAP	Sampling and Analysis Plan
SSHO	Site Safety and Health Officer
TSCA	Toxic Substances Control Act
TSDF	Treatment, Storage and Disposal Facility
USAF	U.S. Air Force
UXO	unexploded ordnance
WMP	Waste Management Plan
WP	Work Plan

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1.0 INTRODUCTION

This Debris Removal Work Plan (WP) describes the project approach and methods to be used in removing debris from Landfill No. 4 (LF04) on Elmendorf Air Force Base (AFB), Alaska. The effort is being performed for the Air Force Center for Environmental Excellence (AFCEE) under Contract No. FA8903-04-D-8673, Task Order No. 01 in support of the 3rd Civil Engineer Squadron/Civil Engineer Environmental Restoration (3 CES/CEVR).

Source area LF04, the Knik Bluff Landfill, is located on the west side of Elmendorf AFB (Figure 1-1) and is one of six different source areas within Operable Unit No. 6 (OU6). LF04 was used as a surface dump from 1945 to 1957. The landfill, which is adjacent to the Knik Arm of the Cook Inlet, has eroded over time and material from the landfill has drifted down the slope and onto the beach. A Remedial Investigation (RI) / Feasibility Study (FS) for OU6 was completed by the U.S. Air Force (USAF) in 1996 (USAF 1996). The primary objectives of the RI were to characterize and delineate the nature and extent of contamination and relate these to human health and ecological risks. Based on the results of the RI, remedial action alternatives were evaluated in the FS, and a remedy was selected and is presented in the OU6 and Source Area SS19 Record of Decision (ROD) (USAF 1997). The selected remedy listed in the ROD for LF04 South Groundwater is long-term monitoring and institutional controls and product removal. The selected remedy for LF04 North/Beach soil is annual removal of beach debris and institutional controls. The objectives of this remedy are to mitigate both human dermal exposure and exposure of environmentally sensitive receptors, to the extent practicable, to landfill waste or debris.

The annual removal of beach debris includes the removal of all LF04 landfill material that has fallen onto the beach that can be reasonably collected for disposal, as well as debris on the bluff slope or other low-lying areas that can be accessed and removed without hazard. Hazardous materials encountered during the debris removal will be sampled, handled, and disposed of according to appropriate regulations. Only debris that can be handled without disturbing bluff soils will be removed. If partially buried items are encountered and cannot be removed without disturbing bluff soils, these items may be cut off and the remainder left in place. Large non-hazardous items (e.g., concrete) may be left in place or placed along the bluff to mitigate further erosion.

An Operations and Management Plan (USAF 2003) has also been prepared for this site. The plan includes information to support LF04 activities and establishes a protocol for recording the nature and location of debris exposed at the LF04 beach, a monitoring program to document erosion of the bluff, a database/tracking tool that accurately classifies and describes all material removed from the beach during debris removal actions, both hazardous and non-hazardous, and a monitoring program for beachfront soil and sediments. Data will be collected and documented during the beach debris removal to support Operations and Management Plan objectives.

1.1 PROJECT OBJECTIVES

The objectives of the LF04 beach debris removal are to mitigate, to the extent practicable, human dermal exposure and exposure of environmentally sensitive receptors to landfill wastes and debris and to prevent the accumulation of excess debris on the beach. This will be accomplished by:

- Removal of all debris that has fallen onto the beach that can be reasonably collected for disposal, as well as debris on the bluff slope or other low-lying areas that can be accessed and removed without hazard;
- Sampling and characterization of all potentially hazardous materials to accurately determine the requirements for proper disposal;
- Disposal of all debris (both hazardous and non-hazardous) in compliance with local, state, and federal requirements;
- Documentation of the location and type of all debris removed from the beach area; and
- Conduct all operations in a safe and compliant manner and minimize the impact of debris removal activities on the local flora and fauna.

1.2 WORK PLAN OBJECTIVE

The objective of this Debris Removal WP is to describe the LF04 debris removal field activities, including details on the following:

- Previous annual debris removal actions and a description of debris encountered;
- Data requirements and data quality objectives (DQOs);
- Methods to accomplish debris removal and other related tasks; and
- Field and laboratory quality assurance procedures so data of known quality are produced.

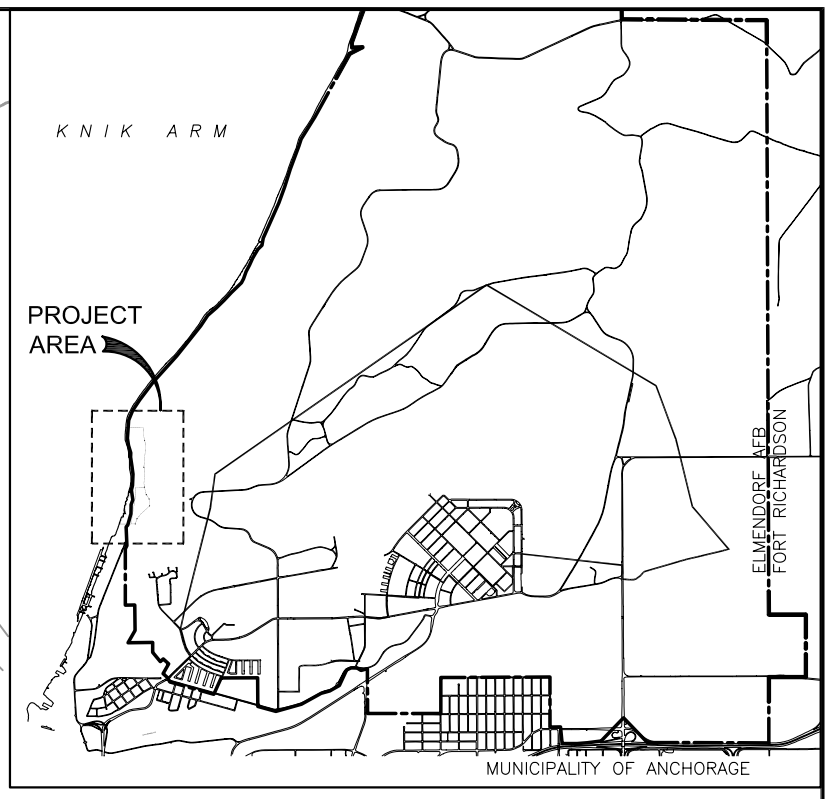
NORTH

LEGEND:

EXISTING POL PIPELINE

FORMER POL PIPELINE

MARSH / WETLANDS



CAIRN POINT

ELMENDORF AFB

LF04 NORTH/BEACH

LF04 SOUTH

KNIK ARM

26TH ST

ACCESS TO BEACH

ACCESS TO BEACH

PORT OF ANCHORAGE

50 75 100 125 150 175 200 225 250

LF04 SITE LOCATION MAP

ELMENDORF AFB, ALASKA

PROJECT MANAGER: K. McGovern	FILE NAME: LF04 Staging Area.dwg	DATE: Sept. 8, 04
DRAWN BY: BJP	LAYOUT TAB: LF04 Site Location	FIGURE NO.: 1-1
JE	FILE LOCATION: Elmendorf \ 05BM0101	

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This plan has been developed based on the results and experiences of previous debris removal operations at LF04. Site-specific DQOs have been developed and are included in Section 3.5. The procedures in the plan follow the guidelines of the U.S. Environmental Protection Agency's Comprehensive Environmental Response, Compensation, and Liability Act, and Basewide policies and procedures for debris removal at Elmendorf AFB as applicable to environmental restoration projects.

1.3 WORK PLAN ORGANIZATION

This WP is divided into the following sections:

- Section 1.0 introduces the project, describes the regional setting and site history, and presents previous investigation findings
- Section 2.0 describes the project team organization
- Section 3.0 provides site information and the proposed fieldwork approach for the site including debris disposal locations
- Section 4.0 provides the project schedule
- Section 5.0 lists the references

Provided as appendices to this WP are a Sampling and Analysis Plan (SAP), Appendix A, and a Health and Safety Plan (HSP), Appendix B.

The SAP includes a Field Sampling Plan (FSP), Quality Assurance Project Plan (QAPP), and Waste Management Plan (WMP). The FSP covers the field sampling program and includes detailed procedures for waste characterization sampling activities, equipment and instrumentation use, sample preservation and storage, maintenance of field records, decontamination procedures, sample transport, and chain-of-custody protocols. Information regarding analytical requirements, quality assurance/quality control measures, data deliverables, sampling procedures, analytical DQOs, container requirements, and sample custody requirements is contained in the QAPP. The WMP contains information concerning waste management and disposal.

The HSP describes the site-specific safety and health procedures, practices, and equipment to be implemented and utilized to protect affected personnel from the potential hazards and exposure pathways associated with the site-specific tasks to be performed. The HSP also describes procedures for bringing hazardous materials onto Elmendorf AFB.

1.4 REGIONAL SETTING

Elmendorf AFB is located in south central Alaska, along the Knik Arm of the Cook Inlet and adjacent to the Municipality of Anchorage (Figure 1-1). The base comprises 13,130 acres, bordered to the north and west by the Cook Inlet, to the east by Fort Richardson, and to the south by the municipality of Anchorage. Land use on the base is varied. Nearly half (6,053 acres) of the base has been developed for airfield operations (runways, taxiways, and maintenance areas) and support operations, including housing and recreational facilities. The remaining acreage (7,077 acres) is mostly undeveloped and includes 1,416 acres of wetlands, lakes, and ponds.

Elmendorf AFB lies within the Cook Inlet-Susitna Lowlands, which is bordered on the west by the Alaska Range and on the east by the Kenai, Chugach, and Talkeetna mountain ranges. The Elmendorf terminal moraine traverses the Base northeast to southwest. The southern boundary of the Elmendorf Moraine is a ridgeline running along the north side of the east-west runway.

At the Elmendorf Moraine, a groundwater divide closely matches the moraine crest. Regional groundwater flow south of the moraine is south and west toward Ship Creek. Regional groundwater flows to the west-northwest on the northern limb of the moraine and to the west on the western side.

In the northwestern portion of Elmendorf AFB, morainal sediments outcrop along a steep escarpment (bluff) overlooking Knik Arm. This escarpment was caused by the rebound of the ground surface after glacial retreat and erosion of the moraine from glacial meltwater. At the base of the escarpment, a sandy beach horizon has developed. The beach horizon is composed primarily of well-sorted littoral sands, as the tidal range of the Knik Arm periodically covers the entire beach. The beach horizon overlies clay lenses of the Bootlegger Cove formation, which outcrop intermittently along the beach. The shallow groundwater at the beach appears to be laterally consistent with the groundwater in the western portion of the outwash plain.

LF04 is located east of Knik Arm on the west side of Elmendorf AFB. LF04 coincides mostly with the presence of a steep bluff that drops from an elevation in excess of 200 feet down to sea level. The landfill parallels Knik Arm for a distance of approximately 3,000 feet and is approximately 600 feet wide. Along the southern end of the landfill, the ground surface slopes toward Knik Arm and the bluff is less pronounced.

1.5 SITE HISTORY

LF04 was used as a surface dump from 1945 to 1957. Old cars, construction rubble, and small quantities of general refuse were dumped at the landfill, in addition to an unknown number of 55-gallon drums. Tidal action has eroded the bluff and exposed portions of the landfill and debris from the landfill has drifted down slope onto the beach. Observations made from the beach suggest that the landfill material was also burned in place. Several groundwater seeps occur on the Knik Arm Bluff or at the beach. Active fuel lines traverse the southern extent of LF04.

1.6 SUMMARY OF PREVIOUS ANNUAL DEBRIS REMOVAL ACTIONS

Debris removal has occurred annually since 1997. Table 1-1 includes quantities and descriptions of debris removed each year from the LF04 beach area.

Table 1-1
Annual Debris Removal Summary, Fiscal Year 1997-2003

Fiscal Year	Quantity of Debris Removed (tons)	Items of Interest / Disposal of Hazardous Substances, Pollutants, or Contaminants
1997	98	Debris, mostly weathered metal One roll of asbestos wrap, one large battery, two small transformers, twenty-five 5-gallon drums and five 5- to 10-gallon drums with unknown contents
1998	15 10	General refuse Recyclable material
1999	29	General refuse – including small arms shells and casings, and a howitzer case
2000	12	Non-hazardous solid waste car parts, electrical parts, and other miscellaneous debris One steel cylinder
2001	34	Non-hazardous waste including vehicle parts, electrical parts, wire, rubber products, and metallic slag
2002	18	Non-hazardous solid waste including wire, pipes, cans, concrete, rebar, steel, rubber products, vehicle parts, electrical components, large chunks of melted metal, and other miscellaneous debris Forty rifle casings
2003	17.3	Debris, including weathered metal debris (crushed drums, wire, pipes, slag, rebar, vehicle parts, etc.), miscellaneous rubber and rubber coated material, electrical components, melted materials, and wood. Two medical glass syringes, one 30 caliber and one 50 caliber brass shell casing, and two pieces of asbestos pipe.

2.0 PROJECT TEAM ORGANIZATION

This section describes the organization structure, lines of authority, and responsibilities of key individuals for this project. Jacobs is responsible for implementing the project, which includes debris removal and disposal, sample collection, securing analytical services, data processing, interpretation and presentation of findings, and the quality assurance procedures and quality control measures associated with these activities. Responsibilities of key personnel are defined below.

2.1 3 CES/CEVR PROJECT MANAGER

The 3 CES/CEVR Project Manager is responsible for ensuring that all required and/or appropriate operations and maintenance activities associated with LF04 are planned, performed, and completed in compliant, safe, and effective manner thus ensuring that LF04 does not pose unacceptable risks to human health or the environment.

2.2 AFCEE ALASKA COORDINATOR

The AFCEE Alaska Coordinator is responsible for overseeing AFCEE program issues and ensuring that project team staffing needs are met.

2.3 PROJECT MANAGER

The project manager is responsible for coordinating all aspects of the project and serves as the main point of contact to AFCEE, USAF, and subcontractor personnel. The project manager is responsible for the management and execution of the task order and tracking project costs, schedule, and completion of deliverables. The project manager is responsible for ensuring the quality of the product through appropriate selection of staff and review of a complete deliverable product. The project manager will also provide technical oversight and review of engineering aspects of all tasks.

2.4 CONTRACTS MANAGER

The contracts manager is responsible for oversight of all contractual issues and will act as the primary point of contact for the AFCEE Contracting Officer.

2.5 SITE SAFETY AND HEALTH OFFICER

The site safety and health officer (SSHO) is responsible for implementation of the HSP for all personnel at the job site. The SSHO has the authority to stop work if site conditions do not meet applicable safety requirements, including those outlined in Appendix B of this document and Occupational Safety and Health Administration (OSHA) Regulations.

2.6 FIELD TEAM MEMBERS

Field team member responsibilities include site management, site safety, analytical sampling, and quality control activities. In general, the field team activities and responsibilities ensure that all field activities are conducted safely and in accordance with this work plan and contract specifications.

2.7 CIVIL SUBCONTRACTOR

The subcontractor responsibilities include the performance of debris removal activities in accordance with the criteria identified in this work plan and in compliance with all applicable federal, state, and municipal requirements.

3.0 PROPOSED DEBRIS REMOVAL FIELDWORK

This section addresses mobilization, site access, methods of debris removal, and disposal of potentially hazardous and non-hazardous debris. Debris will be photographed and its location surveyed prior to removal as discussed in Sections 3.7 and 3.8.

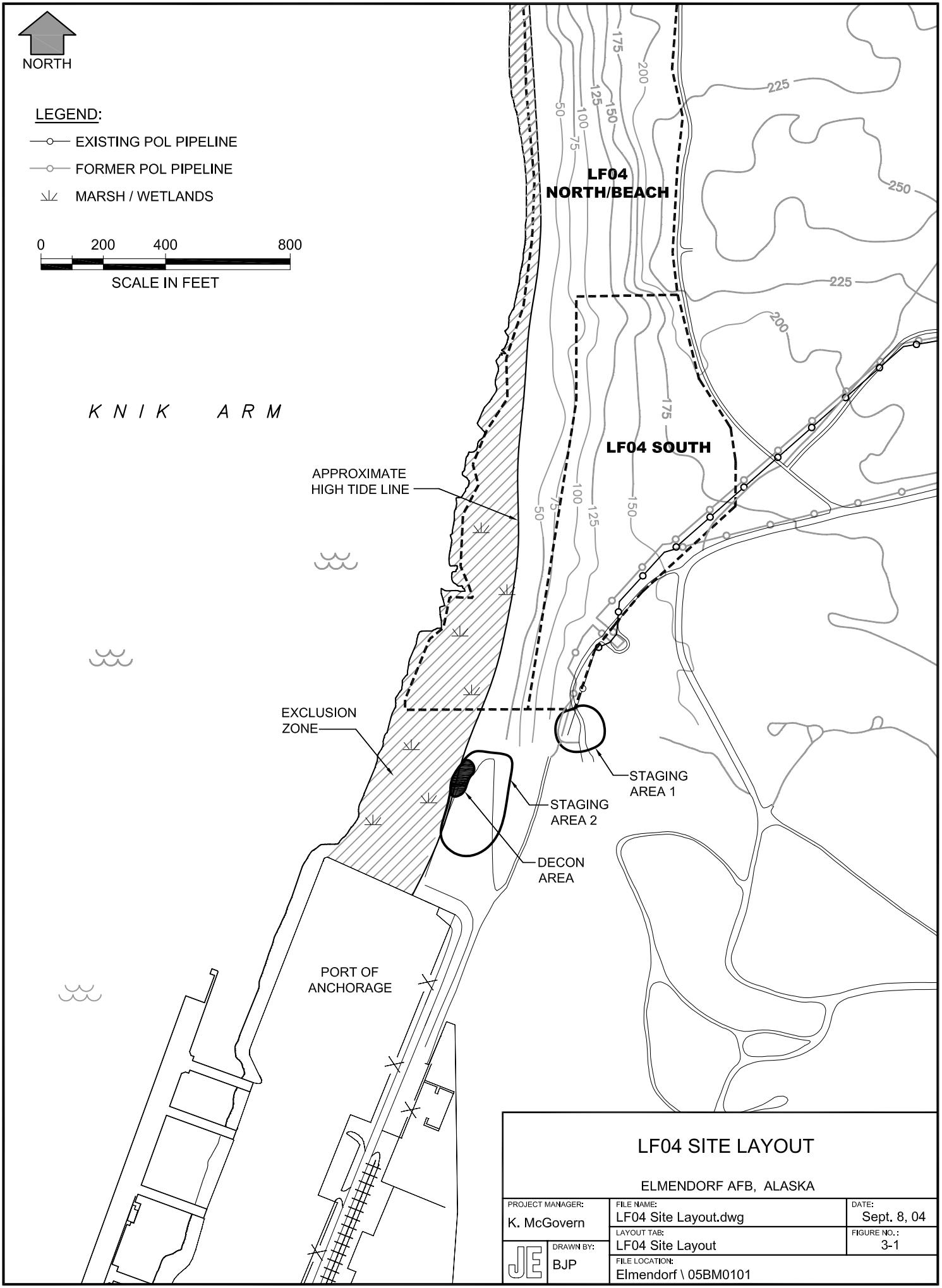
3.1 MOBILIZATION AND SITE ACCESS

Access to Elmendorf AFB must be arranged in advance through the AFCEE Contracting Officer. Base passes for individual personnel can then be obtained from the 3rd Security Forces Squadron (3 SFS) at the Boniface Gate; this pass provides access to Elmendorf AFB. In addition, the 3 CES/CEVR Project Manager will notify the 3 SFS 24 hours prior to accessing LF04. LF04 can also be accessed through the Port of Anchorage. The 3 CES/CEVR Project Manager will notify the Port of Anchorage representative 48 hours prior to accessing LF04. All personnel must then check in at the Port of Anchorage security checkpoint when entering the area. An access letter will be generated listing all Jacobs and subcontractor personnel requiring access to the site. A copy of this letter will be furnished to the guards at the security checkpoint. All equipment will then be mobilized to the staging area at LF04.

3.1.1 Site Layout

Figure 3-1 represents the LF04 beach and staging areas. Staging area number 1 is located at the top of the hill and staging area number 2 is located at the bottom of the hill (see Figure 3-1). The staging areas will contain a waste debris storage area, a drum decontamination / containment area, portable latrines, and adequate space for equipment storage.

A dirt road from the staging areas provides access to the beach. From the base of this road, travel to the north beach should be made along the foot of the bluff. The area near the base of the road contains potentially sensitive flora and impacts to this area must be minimized. Past debris removal efforts employed the use of a corduroy road made of alder cut from the area immediately above the foot of the hill. This road will be reused to the extent practical. Additional alders may be cut from the area immediately above the foot of the hill to stabilize and repair the existing corduroy road. Cutting of additional alders will be minimized.



LF04 SITE LAYOUT

ELMENDORF AFB, ALASKA

PROJECT MANAGER: K. McGovern	FILE NAME: LF04 Site Layout.dwg	DATE: Sept. 8, 04
DRAWN BY: JE BJP	LAYOUT TAB: LF04 Site Layout	FIGURE NO.: 3-1
	FILE LOCATION: Elmendorf \ 05BM0101	

G:\Autocad\Elmendorf\05BM0101\LF04 Site Layout.dwg Sep 28,2004 -BPeratro)

3.2 TIDES

Access to beach and ability to perform debris removal operations is limited by tidal action in the beach area. Figure 3-2 contains tide information for the months of August and September 2004.

Figure 3-2
Anchorage Area Tide Tables

ANCHORAGE DISTRICT — Anchorage, Knik Arm, Alaska

AUGUST 04	HIGH TIDES A.M.	FT.	P.M.	FT.	LOW TIDES A.M.	FT.	P.M.	FT.
1 Sun	8:04	31.4	9:08	29.8	2:47	3.2	3:26	-4.5
2 Mon	8:54	31.6	9:45	30.2	3:35	1.8	4:07	-4.2
3 Tue	9:42	31.3	10:22	30.5	4:21	0.8	4:46	-3.2
4 Wed	10:29	30.3	11:01	30.3	5:04	0.5	5:22	-1.7
5 Thu	11:16	28.7	11:40	29.6	5:46	0.8	5:57	0.4
6 Fri	.....	.....	12:04	26.7	6:29	1.5	6:31	2.8
7 Sat	0:20	28.3	12:57	24.6	7:13	2.5	7:09	5.6
8 Sun	1:08	26.6	2:04	22.9	8:04	3.4	7:58	8.4
9 Mon	2:08	24.9	3:52	22.4	9:06	3.9	3:16	10.5
10 Tue	3:13	23.8	5:19	23.8	10:20	3.5	10:48	10.6
11 Wed	4:18	23.6	6:14	25.5	11:37	2.3	.....	.....
12 Thu	5:20	24.3	6:56	26.7	0:02	9.1	12:36	0.7
13 Fri	6:11	25.5	7:29	27.4	0:53	7.5	1:23	-0.6
14 Sat	6:55	26.9	7:57	28.0	1:34	6.0	2:04	-1.4
15 Sun	7:34	28.1	8:26	28.6	2:11	4.8	2:42	-1.7
16 Mon	8:13	29.1	8:58	29.1	2:48	3.7	3:17	-1.6
17 Tue	8:51	29.5	9:29	29.4	3:24	2.8	3:49	-1.3
18 Wed	9:28	29.5	9:59	29.6	4:01	2.1	4:19	-0.7
19 Thu	10:06	29.0	10:27	29.6	4:39	1.5	4:49	0.0
20 Fri	10:45	28.3	10:58	29.6	5:17	1.2	5:21	1.0
21 Sat	11:27	27.3	11:34	29.3	5:58	1.0	5:58	2.4
22 Sun	.....	.....	12:16	26.0	6:42	1.1	6:40	4.4
23 Mon	0:18	28.5	1:16	24.6	7:33	1.4	7:31	6.8
24 Tue	1:17	27.3	2:45	23.8	8:38	1.8	8:41	8.9
25 Wed	2:32	26.4	4:39	24.9	9:55	1.5	10:10	9.1
26 Thu	3:55	26.6	5:49	26.9	11:16	0.6	11:31	7.7
27 Fri	5:13	27.8	6:44	28.6	.....	.....	12:37	-0.9
28 Sat	6:16	29.3	7:30	29.6	0:50	5.5	1:36	-2.6
29 Sun	7:10	30.7	8:09	30.2	1:48	3.1	2:24	-3.5
30 Mon	7:57	31.6	8:44	30.6	2:36	1.3	3:06	-3.4
31 Tue	8:42	31.9	9:16	30.9	3:20	0.0	3:45	-2.7

7 15 23 29 — Lite Type = A.M. **Bold Type = P.M.**

13

ANCHORAGE DISTRICT — Anchorage, Knik Arm, Alaska

SEPTEMBER 04	HIGH TIDES A.M.	FT.	P.M.	FT.	LOW TIDES A.M.	FT.	P.M.	FT.
1 Wed	9:25	31.6	9:48	31.1	4:01	-0.6	4:19	-1.4
2 Thu	10:07	30.6	10:21	30.7	4:40	-0.5	4:50	0.3
3 Fri	10:48	29.1	10:53	29.8	5:18	0.0	5:20	2.3
4 Sat	11:29	27.3	11:24	28.3	5:54	0.9	5:50	4.4
5 Sun	12:15	25.3	11:56	26.4	6:31	1.9	6:24	6.9
6 Mon	.....	.....	1:16	23.6	7:13	3.0	7:07	9.6
7 Tue	0:44	24.2	2:40	22.7	8:06	4.1	8:16	11.9
8 Wed	2:18	22.5	4:38	23.6	9:23	4.5	10:23	11.5
9 Thu	3:41	22.3	5:38	25.5	10:47	3.6	11:35	9.6
10 Fri	4:57	23.5	6:21	26.9	11:58	1.9	.....	.....
11 Sat	5:54	25.3	6:55	27.9	0:25	6.6	12:51	0.2
12 Sun	6:37	27.1	7:24	28.7	1:07	4.7	1:34	-0.7
13 Mon	7:15	28.7	7:54	29.4	1:46	3.2	2:13	-1.0
14 Tue	7:53	29.9	8:24	30.2	2:24	1.9	2:48	-0.9
15 Wed	8:30	30.6	8:54	30.7	3:02	0.8	3:21	-0.4
16 Thu	9:08	30.7	9:23	31.1	3:41	-0.1	3:51	0.2
17 Fri	9:47	30.2	9:53	31.2	4:19	-0.6	4:23	1.1
18 Sat	10:27	29.3	10:26	30.9	4:59	-0.8	4:56	2.2
19 Sun	11:10	28.1	11:04	30.1	5:39	-0.5	5:33	3.9
20 Mon	12:00	26.6	11:51	28.7	6:22	0.1	6:16	6.0
21 Tue	.....	.....	1:08	25.1	7:12	1.1	7:09	8.3
22 Wed	0:52	26.9	2:54	24.8	8:16	2.1	8:32	10.0
23 Thu	2:15	25.5	4:21	26.1	9:38	2.3	10:15	8.9
24 Fri	3:56	25.9	5:28	28.0	11:05	1.5	11:39	6.1
25 Sat	5:14	27.5	6:22	29.5	.....	.....	12:23	-0.2
26 Sun	6:13	29.3	7:07	30.4	0:44	3.2	1:17	-1.6
27 Mon	7:02	30.6	7:44	30.7	1:36	0.9	2:03	-1.9
28 Tue	7:46	31.3	8:15	31.0	2:21	-0.5	2:42	-1.2
29 Wed	8:27	31.5	8:43	31.3	3:02	-1.1	3:18	0.0
30 Thu	9:06	31.2	9:11	31.3	3:40	-1.2	3:48	1.4

6 14 21 28 — Lat 61°14' N Lon 149°53'W

14

3.3 REMOVAL OF NON-HAZARDOUS DEBRIS

Non-hazardous debris will be lifted from the beach and loaded onto tracked vehicles for transport to the staging area. Large pieces of debris may be lifted using an excavator or other appropriate lifting device. Smaller pieces of debris that can easily be manually lifted will be loaded into all-terrain vehicle (ATV) trailers for removal from the beach. Efforts will be

made to remove loose soils from debris during lifting operations. All equipment will be operated to minimize impact to the beach area. With the exception of ATVs, all equipment operated in the beach area will be tracked rather than wheeled. Debris will be transferred to appropriate disposal containers (e.g., an end-dump, roll-off box, etc.) at the staging area for transport to an appropriate waste disposal facility. Debris will be transferred from the tracked vehicle to the disposal container over a liner, if necessary, to prevent small pieces of debris from falling on the ground. All non-hazardous debris will be transported to the Anchorage Municipal Landfill for disposal.

Based on the results of previous removal efforts, non-hazardous debris that may be encountered include:

- Scrap metal (wire, pipes, rebar, steel)
- Wood
- Vehicle parts
- Rubber products
- Pieces of melted metal
- Metallic slag
- Construction debris

All pieces of debris will be inspected for the presence of potentially hazardous materials (see Section 3.4) prior to removal from the beach.

3.4 HANDLING OF POTENTIALLY HAZARDOUS MATERIALS

All potentially hazardous materials will be managed according to their suspected hazard and the specific requirements for that hazard. The following sections detail the evaluation and handling of specific materials that may be encountered during the LF04 beach debris removal. Potentially hazardous materials will be appropriately containerized prior to removal from the beach. Potentially hazardous materials will be managed as discussed in the following sections.

3.4.1 Potential Unexploded Ordnance

Personnel working onsite at LF04 will attend unexploded ordnance (UXO) Recognition training to be provided by Elmendorf Explosive Ordinance Disposal (EOD). Those personnel who have previously attended this class will view a refresher UXO recognition and safety presentation prior to initiating any site work. In the event field personnel encounter objects suspected to be UXO or ordnance and explosive waste (OEW), all activities in the proximity of the suspect UXO/OEW will cease. A 20 feet diameter exclusion zone will be established surrounding the suspected material. The perimeter will be identified using yellow caution flagging tape. Elmendorf AFB Explosive Ordinance Disposal (EOD) personnel will be contacted and they will be responsible for positively identifying and removing any suspected UXO/OEW. No contractor personnel will disturb any suspected UXO in any manner. UXO is not anticipated at the site; however, any UXO discovered during field activities shall be reported immediately to the Base Point of Contact and Contracting Officer's Representative (COR). Work shall not recommence until the COR authorizes clearance.

3.4.2 Small Arms Casings

The locations of any small arms casings (i.e., smaller than .50 caliber) will be flagged with surveyor's marking tape and surveyed. If any casings larger than .50 caliber or caches of unfired whole rounds are found, Elmendorf AFB EOD will immediately be notified, and are responsible for removing and disposing of these materials from the beach area.

Any cylinders that are encountered during debris removal will be treated as potentially hazardous and dangerous and thus will not be handled or disturbed. An exclusion zone will be established around the cylinder. Any visible identification marks will be noted. The discovery will be reported to the CEVR project manager and the AFCEE contracting officer technical representative as soon as possible.

3.4.3 Drums and Containers

Containers or drums that are encountered during removal activities will be visually and physically inspected to determine if they contain materials. Evaluation and handling of drums is discussed below. Other containers will be handled in the same manner. The visual inspection will include observing drum conditions (crushed, visible holes, rust, bulging ends,

bung or ring seals), labels and markings, and the condition of the surrounding area (staining, sheen). Drums will be physically inspected to determine if they contain materials, the

quantity of material, and whether the material is a liquid, solid, or semi-solid. Approaching and handling unknown containers and drums can be hazardous and health and safety precautions identified in Appendix B will be strictly followed.

If the drum integrity is visibly compromised (crushed, large visible holes) and the drum is empty, the drum will be disposed of as non-hazardous debris. If the drum integrity is visibly compromised and the drum appears to contain a small amount of water, it is likely this is rainwater or salt water and the contents will be discharged at a location above the beach and the drum will be disposed of as non-hazardous debris.

Drums that are intact and contain material (liquid or solid) will be containerized, sampled, and transported from the site for disposal. If the drum is not suitable for transport, it will be carefully transferred into an 85-gallon overpack container. For drums that cannot be overpacked, the liquid in the drum will be transferred to a new drum using a hand-activated siphon or pump. Once a drum is fully drained, it will be dry decontaminated or transported to the Environmental Staging Facility (ESF) located near the corner of 9th Avenue and Jerstad Avenue on Elmendorf AFB, where it will be steam cleaned. Damaged drums will be cut open, if necessary, for adequate cleaning. Following decontamination, the drums will be disposed of as non-hazardous debris.

Samples will be collected for field screening and analytical laboratory analysis. A detailed description of field sampling methods and procedures is contained in Appendix A. The drums will be stored at the ESF until analytical results are received. After the analytical results are received, appropriate disposal will be determined and the disposal paperwork (profiles, manifests) will be completed. Non-hazardous drum contents will be disposed of at an offsite approved facility. Hazardous drum contents will be turned over the Elmendorf AFB Treatment, Storage and Disposal Facility (TSDF) or Defense Reutilization and Marketing Office (DRMO) for disposal.

3.4.4 Suspected Asbestos-Containing Materials

Possible types of asbestos containing material (ACM) that may be encountered at LF04 include pipe, floor tile, insulation and cement-asbestos board siding. The beach area will be inspected for suspect ACM prior to the beach debris removal. If an item is encountered that is suspected to be ACM, the item will be handled following specific protocols.

Employees involved with the handling of asbestos must have received training in the proper procedures and practices for handling ACM, and must have current accredited certification of asbestos training as required by state, federal and local regulations. These include Department of Labor approval, OSHA requirements (Title 29 of the Code of Federal Regulations, Parts 1910.1910 and .1926) and Alaska regulations found in 8 Alaska Administrative Code 61.620.

If material is encountered that is suspected to contain ACM based on the judgment of the field personnel, it may be handled by one of two methods. For small items or small quantities of material, it may be handled as ACM without verification sampling. A control zone will be established around the material and properly trained employees wearing proper personnel protective equipment will wet the material and place it into pre-printed 6-millimeter disposal bags. Each bag will then be placed into a second bag, labeled, and transported to the staging area. Approval will be obtained for disposal from the Anchorage Municipal Landfill and Elmendorf AFB and the suspect ACM material will be transported to the asbestos disposal cell at the Anchorage Municipal Landfill.

For larger items, an exclusion zone will be established around the item using yellow caution tape and samples will be collected in accordance with the SAP, Appendix A to confirm the presence of ACM. After the sample results are received, the material will either be disposed of as non-hazardous waste (based on a negative result) or double-bagged by trained personnel as described above, approval will be obtained, and the material will be transported to the asbestos disposal cell at the Anchorage Municipal Landfill.

3.4.5 Transformers and other Electrical Components

Electrical components may be encountered on the LF04 beach area. Potentially, these components contain mercury and/or polychlorinated biphenyls (PCBs). Suspected mercury-

containing items will be handled as Resource Conservation and Recovery Act waste. Electrical components suspected of containing PCBs will be placed in 55 gallon open top drums, and a yellow Toxic Substances Control Act (TSCA) label will be affixed to the drum and will be handled as TSCA waste. These containerized materials will be transported to the staging area for temporary storage. Disposal will be coordinated with 3 CES/CEVR and the TSDF/DRMO. These materials will not be sampled and will be turned over to the TSDF/DRMO for disposal.

3.4.6 Batteries

Batteries and any debris associated with the batteries will be collected and placed in plastic or poly containers and evaluated for recycling purposes. The containers will be labeled and transported to the staging area. Disposal will be coordinated with 3 CES/CEVR and the TSDF or DRMO. These materials will not be sampled and will be recycled or turned over to the TSDF or DRMO for disposal.

3.4.7 Suspect Medical Waste

If suspect medical waste is encountered, the location will be identified, photographed, and surveyed. These materials will be containerized separately, and disposed of at the Anchorage Municipal Landfill.

3.5 DATA QUALITY OBJECTIVES

To meet the project objectives identified in Section 1.1, several specific project DQOs have been established and are included in Table 3-1. In this table, each DQO is linked to specific data needs and the tasks that will be conducted to address these data needs. Finally, the rationale for addressing each need is presented by depicting how the data collected will be used to meet the program goals.

In order to meet the project DQOs the activities to be conducted at LF04 will generally include:

- Collection and documentation of data in accordance with the Operations and Management Plan (USAF 2003).

- Sampling and analysis of all suspected hazardous wastes

3.6 WASTE CHARACTERIZATION SAMPLING

All sampling of unknown material will be performed in a manner that minimizes the potential for personnel exposure.

Table 3-1
Project Data Quality Objectives - LF04 Elmendorf Air Force Base, Alaska

ISSUE/DECISION	SAMPLES/DATA TO BE COLLECTED	ANALYTES/PARAMETERS OF CONCERN	DATA USE	ACTION LEVEL/DISCUSSION
TASK: Data Collection and Documentation				
LOCATION: LF04 Beach and Bluff Area				
Collect and document data to support the Operations and Management Plan requirements and objectives. Can the origin of various waste stream types be located and attributed to specific landfill cells? What types of materials are contained in the landfill? Track the presence and potential migration of beach debris located on the LF04 beach area.	Describe and survey the location of all debris removed from the beach with GPS. Document and survey potentially hazardous items such as potential OEW/UXO, small arms casings, cylinders, drums, suspected medical waste, ACM, batteries, etc.	Location and description of beach debris. Survey information will be collected in Alaska State Plane, Zone 4 coordinate system. Digital photos will be taken of all unique debris and debris clusters in accordance with the procedure identified in the Operations and Management Plan.	Information will be used for debris tracking and to characterize the landfill for future site reviews.	Gather data to support Operations and Management Plan objectives. Debris type and location information over a period of time will be used to evaluate origins and migration of debris types.
TASK: Proper Disposal of all Potentially Hazardous Wastes Removed from Beach				
LOCATION: Beach/Landfill interface				
Do characteristics of waste require it to be handled as RCRA or TSCA hazardous waste?	Collect samples of all potentially hazardous waste and submit for fixed laboratory analyses	RCRA: VOCs, SVOCs, TCLP metals, pesticides, corrosivity, ignitability TSCA: PCBs, asbestos	RCRA waste determination TSCA waste determination	Compare data to RCRA or TSCA criteria for waste determination

Notes:
GPS = Global Positioning System
RCRA = Resource Conservation and Recovery Act
TCLP = toxicity characteristic leaching procedure
VOC = volatile organic compound

SVOC = semi-volatile organic compound
For additional definitions, see acronyms and abbreviations list.

3.6.1 Drum Contents

Drums that require sampling as determined in Section 3.4.4 will be sampled in accordance with the SAP, Appendix A. The actual analytical suite will be determined based on the waste matrix and field screening.

3.6.2 Suspected Asbestos-Containing Material

If material is encountered that is suspected to contain ACM and sampling is selected as discussed in Section 3.4.5, samples will be collected by personnel who are trained in the proper procedures and practices for handling ACM, and have current accredited certification of asbestos training as required by state, federal and local regulations.

3.7 DATA COLLECTION AND DOCUMENTATION

The following data will be recorded during the debris removal activities to support future operations and management of the site. Protocols and procedures for classifying and documenting debris is provided in the Operations and Management Plan. In general, the following data is required:

- Quantity and description of all potentially hazardous materials including: OEW/UXO, small arms casings, cylinders, suspected medical waste, ACM, batteries, electrical components, etc.
- Quantity and description of all non-hazardous debris removed from the site. May group debris clusters (i.e. similar debris removed from the same general vicinity).
- Physical description and dimensions of significant debris;
- Date debris was identified and unique features to assist in identification if the debris was observed previously;
- Photographs of debris removed from the site;
- Survey debris locations to support landfill cell location tracking; and
- Record evidence of human or ecological visitors such as footprints and recent debris left at the site.

3.8 SURVEYING

In conjunction with debris removal activities, debris locations will be surveyed using real-time kinematic Global Positioning System (RTK GPS). An RTK GPS is based on a transmitter set

on a known benchmark near the survey location and can achieve a horizontal accuracy of 1/10 inch. This survey will provide vertical and lateral coordinates for each debris location or general area of debris for use in site figures as well as for future tracking of general origins and migration pathways of debris eroding from the landfill. All potentially hazardous debris observed will be surveyed and all debris clusters will be surveyed. The following standards should be used for all surveying work on LF04:

- Projection: Universal Transverse Mercator Zone 6N;
- Format: World Geodetic System 84;
- Horizontal Datum: North American Datum 83;
- Vertical Datum: North American Vertical Datum 88; and
- Units: meters.

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4.0 PROJECT SCHEDULE

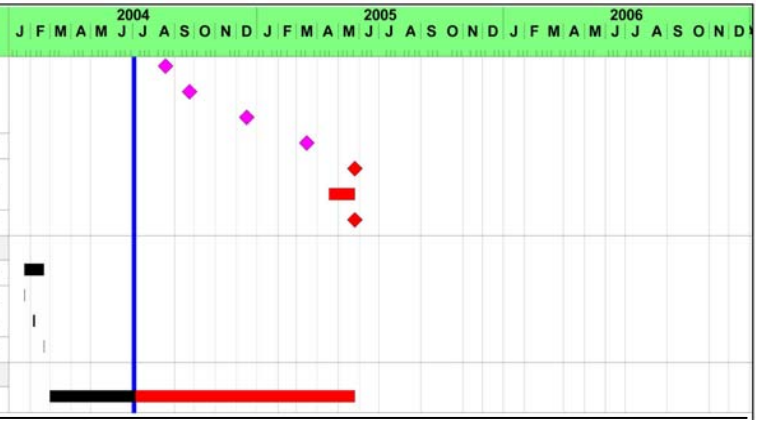
Figure 4-1 is a project schedule for LF04 activities.

Figure 4-1
LF04 Debris Removal and Monitoring

Activity ID	Activity Description	Orig Dur	Rem Dur	%	Early Start	Early Finish
TO 01 - Elmendorf LF04						
Task 1 - Planning and Meetings						
A10100	Task 1 - Meetings and Planning	331	244	26	01MAR04A	24JUN05
A10101	Meetings and Planning as Required	331	244	0	01MAR04A	24JUN05
Task 2 - Quality Control Plans						
A10200QCP	Task 2 - Quality Control Plans	49*	49*	0	06JUL04	14SEP04
A10201QCP	Prepare Draft Plans	15	15	0	06JUL04	26JUL04
A10202QCP	Government and Agency Reviews	23	23	0	27JUL04	26AUG04
A10203QCP	Prepare Final Plans	11	11	0	27AUG04	14SEP04
Task 3 - Field Work						
A10300FLD	Task 3 - Field Work	374*	338*	5	23MAY04A	24JUN05
A10300HOS	Home Office Field Support	143	71	0	23MAY04A	22SEP04
A10301FLD	Debris and Erosion Monitoring (1st event)	2	0	100	27MAY04A	28MAY04A
A10302FLD	Receptor Monitoring	100	71	33	23MAY04A	17SEP04
A10303FLD	Debris and Erosion Monitoring (2nd event)	2	2	0	15SEP04	16SEP04
A10304FLD	Beach Debris Removal	6	6	0	17SEP04	22SEP04
Task 4 - Technical Reports						
A10400RPT	Task 4 - Technical Reports	165*	165*	0	23SEP04	19MAY05
A10401RPT	Wait for Analytical Data	25	25	0	23SEP04	27OCT04
A10402RPT	Prepare Draft Report	30	30	0	28OCT04	13DEC04
A10403RPT	Government Review Report	22	22	0	14DEC04	17JAN05
A10404RPT	Prepare Final Report	22	22	0	18JAN05	16FEB05
A10405RPT	Prepare Fact Sheet	22	22	0	17FEB05	18MAR05
A10406RPT	Government Review Fact Sheet	22	22	0	21MAR05	19APR05
A10407RPT	Prepare Final Fact Sheet	22	22	0	20APR05	19MAY05
Task 5 - Data Management						
A10500DTA	Task 5 - Data Management	65*	65*	0	23SEP04	29DEC04
A10501DTA	Wait for Analytical Data	25	25	0	23SEP04	27OCT04
A10502DTA	Complete Data Evaluation	20	20	0	28OCT04	24NOV04
A10503DTA	Complete ERPIMS Deliverables	20	20	0	30NOV04	29DEC04
Task 6 - Task Order Management						
A10600PJM	Closed	1	0	100	01MAR04A	01MAR04A
A10600TOM	Task 6 Task Order Management	269*	226*	14	30APR04A	31MAY05
A10601PPC	Submit Initial Project Planning Chart	11	0	100	23JAN04A	06FEB04A
A10602PPC	Government Review PPC	5	0	100	09FEB04A	13FEB04A
A10603MR2	CPSMR June 04	0	0	0		21JUL04*

Figure 4-1
LF04 Debris Removal and Monitoring
(continued)

Activity ID	Activity Description	Orig Dur	Rem Dur	%	Early Start	Early Finish
A10603MR3	CPSMR July 04	0	0	0		18AUG04*
A10603MR4	CPSMR August 04	0	0	0		22SEP04*
A10603MR5	CPSMR November 04	0	0	0		15DEC04*
A10603MR6	CPSMR February 05	0	0	0		16MAR05*
A10603MR7	CPSMR Final	0	0	0		26MAY05*
A10604CLS	Project Close Out	28	28	0	19APR05	26MAY05*
A10605POP	Period of Performance	0	0	0		26MAY05*
Task 7 - Proposal Preparation						
A10700	Task 7 - Proposal Preparation	21*	0*	100	23JAN04A	20FEB04A
A10701	Submit Draft Proposal	1	0	100	23JAN04A	23JAN04A
A10702	Conduct and Conclude Negotiations	1	0	100	06FEB04A	06FEB04A
A10703	Task Order Award	1	0	100	20FEB04A	20FEB04A
Task Z - Fees						
A1FFEE	Task Z - Fees	312*	225*	10	01MAR04A	26MAY05



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UNITED STATES AIR FORCE
ELMENDORF AIR FORCE BASE, ALASKA

ENVIRONMENTAL RESTORATION PROGRAM

LF04 DEBRIS REMOVAL WORK PLAN
APPENDIX A - SAMPLING AND ANALYSIS PLAN
PART ONE: FIELD SAMPLING PLAN

FINAL

SEPTEMBER 2004

TABLE OF CONTENTS

SECTION **PAGE**

ACRONYMS AND ABBREVIATIONS iii
1.0 PROJECT DESCRIPTION 1-1
1.1 BACKGROUND 1-1
1.2 PROJECT OBJECTIVE 1-1
2.0 FIELD TEAM RESPONSIBILITIES 2-1
2.1 HEALTH AND SAFETY STAFF 2-1
2.2 FIELD TEAM LEADER 2-1
2.3 FIELD SAMPLERS 2-1
3.0 ANALYTICAL PROGRAM 3-1
3.1 LABORATORY ANALYSIS 3-1
3.2 WASTE CHARACTERIZATION 3-2
3.3 QUALITY ASSURANCE 3-3
4.0 FIELD INVESTIGATION ACTIVITIES 4-1
4.1 PREPARATION 4-1
4.2 SITE CLEARANCES/PERMITS 4-1
4.3 VISUAL INSPECTION 4-1
4.4 SAMPLING PROCEDURES 4-1
4.4.1 Drum Sampling 4-2
4.4.2 Suspect ACM Sampling 4-3
4.5 FIELD SAMPLE IDENTIFICATION 4-4
4.6 SAMPLE STORAGE AND TRANSPORT 4-4
4.7 FIELD DOCUMENTATION 4-5
4.8 SAMPLE CUSTODY DOCUMENTATION 4-6
4.9 DECONTAMINATION PROCEDURES 4-7
4.10 FIELD EQUIPMENT CALIBRATION 4-7
4.11 SURVEYING 4-7
5.0 REFERENCES 5-1

TABLE

Table 3-1 Waste Characterization Analyses Summary 3-3

TABLE OF CONTENTS
(continued)

ATTACHMENT

Attachment 1 Manufacturers' Field Instrument Documentation

ACRONYMS AND ABBREVIATIONS

AAC	Alaska Administrative Code
ACM	asbestos-containing material
AFB	Air Force Base
AFCEE	Air Force Center for Environmental Excellence
ATH	ambient temperature headspace
COR	Contracting Officer Representative
DQO	data quality objectives
EPA	U.S. Environmental Protection Agency
FSP	Field Sampling Plan
HSP	Health and Safety Plan
HSM	Health and Safety Manager
Jacobs	Jacobs Engineering Group Inc.
LF	Landfill
PID	photoionization detector
PCB	polychlorinated biphenyls
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RCRA	Resource Conservation and Recovery Act
SAP	Sampling and Analysis Plan
SOP	Standard operating procedures
SVOC	semi-volatile organic compound
TCLP	toxicity characteristic leaching procedure
VOC	volatile organic compounds

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1.0 PROJECT DESCRIPTION

1.1 BACKGROUND

This Field Sampling Plan (FSP) is the first of three parts of the Sampling and Analysis Plan (SAP) for the Landfill No. 4 (LF04) Debris Removal at Elmendorf Air Force Base (AFB), Alaska. This SAP addresses sampling and analysis activities only, refer to the Work Plan for details regarding other field activities.

This plan was developed to address sampling procedures in the event that suspected hazardous wastes are identified during debris removal activities. Potentially hazardous wastes that may be sampled include drummed materials and suspect asbestos-containing material (ACM). The objective of this FSP is to provide detailed procedures for waste characterization sampling, including equipment and instrument use, sample preservation and storage, maintenance of field records, sample transport and chain-of-custody protocols, and decontamination procedures. The FSP was prepared following the guidelines of the U.S. Environmental Protection Agency (EPA) Comprehensive Environmental Response, Compensation, and Liability Act program; Alaska Department of Environmental Conservation Contaminated Sites Remediation Program regulations found in Title 18 of the Alaska Administrative Code (AAC), Chapter 75; and Basewide policies and procedures for fieldwork at Elmendorf AFB as applicable to environmental restoration projects.

All quality assurance/quality control (QA/QC) aspects of the sampling and analytical program, including Data Quality Objectives (DQOs) and laboratory analytical requirements, can be found in the SAP Part Two: Quality Assurance Project Plan (QAPP), prepared in conjunction with the FSP.

1.2 PROJECT OBJECTIVE

The purpose of the LF04 Debris Removal waste characterization program is to implement sampling strategies and establish appropriate protocols for the sampling activities.

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2.0 FIELD TEAM RESPONSIBILITIES

Responsibilities of the field team members are described below.

2.1 HEALTH AND SAFETY STAFF

The Site Health and Safety Officer is responsible for implementing the provisions of the Health and Safety Plan (HSP) for all sampling activities. In addition, all health and safety aspects of the sampling activities will be coordinated with the Jacobs Engineering Group Inc. (Jacobs) Health and Safety Manager (HSM) or his designee. Details on the responsibilities of the HSM are presented in the HSP (Appendix B to the Work Plan).

2.2 FIELD TEAM LEADER

The Field Team Leader is responsible for overseeing and implementing elements of the field program and coordinating with ongoing field operations.

The Field Team Leader will also prepare laboratory task orders and coordinate with the laboratory; organize field data; direct and coordinate the field samplers; ensure that applicable QA/QC procedures are implemented; and implement applicable health and safety procedures.

The Field Team Leader is responsible for the coordination and effective use of all field personnel on site and for maintaining a record of field activities. The Field Team Leader is also responsible for field QC, including issuance and tracking of measurement and test equipment; the proper labeling, handling, storage, shipping, and chain-of-custody procedures used at the time of sampling; and control and collection of all field documentation (field activity log book, notebooks, data sheets, etc.) during field investigation activities.

2.3 FIELD SAMPLERS

Field samplers are required to be familiar with the specific requirements of this Work Plan for those activities associated with the field effort that they will perform. In addition, the HSP must be read and signed by each participating sampler. Samplers will assist the Field Team Leader in all activities required for a specific sampling event. A field sampler has the following responsibilities.

- Mobilize sampling equipment
- Organize sampling material
- Ensure equipment is in working order
- Collect samples
- Record field measurements
- Decontaminate sampling equipment
- Label and package samples
- Complete chain-of-custody forms
- Complete field forms
- Maintain field records (logbook entries, equipment calibration records, etc.)

A sampling team typically consists of a field team leader (lead sampler) and assistant field samplers, as necessary, who will perform the functions outlined above.

3.0 ANALYTICAL PROGRAM

Refer to the QAPP (SAP Part Two) for more information relating to the LF04 Debris Removal waste characterization program.

3.1 LABORATORY ANALYSIS

All laboratory analytical services for this project will be performed by:

Severn Trent Laboratories, Inc.
880 Riverside Parkway
West Sacramento, CA 95605
Phone: (916) 373-5600 / (916) 372-1059

Asbestos sampling and analysis will only be performed by qualified personnel in accordance with state, federal, and local regulations. Asbestos analytical services will be performed by:

White Environmental Consultants
731 I Street
Anchorage, AK 99501
Phone: 258-8661

Asbestos laboratory will be determined prior to finalization of this Work Plan.

The media to be sampled during implementation of this project may potentially include aqueous liquids, solids, or oils. Analytical methods are defined by EPA SW-846 (EPA 1986, 1994a,b, 1996).

Drum Contents

LiquidsWater / Oil

- SW6020/SW7470A, Resource Conservation and Recovery Act (RCRA) metals (8 inorganic constituents)
- SW8260B, Volatile organic compounds (VOC)
- SW8270C, Semivolatile organic compounds (SVOC)
- SW8081A, Organochlorine Pesticides
- SW8082, Polychlorinated biphenyls (PCB)
- 40CFR279.11, Oil Burning Specifications Constituents

Solids / Sludge

- SW1311/SW6010B/SW7470A, toxicity characteristic leaching procedure (TCLP) RCRA Metals
- SW1311/SW8260B, TCLP VOCs

- SW1311/SW8270C, TCLP SVOCs
- SW8081A, Organochlorine Pesticides
- SW8082, PCBs
- SW1311, Full Suite TCLP (SW6010B/SW7470A-RCRA Metals, SW8260B-VOCs, SW8270C-SVOCs)

Potential Asbestos Containing Materials

- EPA 600/R-93/116, Method for the Determination of Asbestos in Bulk Building Materials

3.2 WASTE CHARACTERIZATION

Field screening for VOCs will be conducted using a photoionization detector (PID) capable of detecting volatile organic vapors to a minimum of 1 part per million. PID field screening will be conducted near the opening and in the area surrounding the drum or container. The inside of the drum or container may also be field screened with a PID but only after it has been determined safe to open. All drum handling activities must be performed in accordance with the HSP, Appendix B. If stained soil is observed near the drum or container, soil samples will be field screened with a PID for VOCs. Ambient temperature headspace (ATH) PID results will be considered qualitative and used to evaluate whether VOCs are present. Elevated ATH/PID values not accompanied by odor may be considered potentially suspect due to interference from moisture or equipment malfunction.

Suspected hazardous materials maybe screened using the HazCat® Chemical Identification System. HazCat® testing, if performed, would be used to determine the proper analytical sampling regime and to characterize waste for possible consolidation. Based on HazCat® results and physical characteristics, the analytical sampling regime will be selected.

Laboratory analysis may include the analyses identified in Table 3-1. Actual analyses and quantities of analyses will depend on the number of waste types encountered during debris removal activities. It is anticipated that no more than 2 solid matrix waste samples and no more than 2 liquid matrix waste samples will be analyzed.

Table 3-1
Waste Characterization Analyses Summary

Liquid Waste	Solid Waste
RCRA Metals(SW6020/SW7470A)	TCLP RCRA Metals (SW1311/SW6010B/SW7470A)
VOCs (SW8260B)	TCLP VOCs (SW1311/SW8260B)
SVOCs (SW8270C)	TCLP SVOCs (SW1311/SW8270C)
Pesticides (SW8081A)	Organochlorine Pesticides (SW8081A)
PCBs (SW8082)	PCBs (SW8082)
Oil Burning Specifications Constituents (40CFR279.11)	SW1311, Full Suite TCLP (SW6010B/SW7470A-RCRA Metals, SW8260B-VOCs, SW8270C-SVOCs)

Notes:
1. Potential sample analyses are identified in Table 3-1. The actual sample regime will be selected in the field based on site observations and field screening.
2. It is estimated that two samples of liquid phase matrixes and two samples of solids will be required to characterize the materials in drums and allow for manifesting and proper disposal.
3. All liquid and solid waste characterization samples will be analyzed on a 7-day turn around time.
4. If appropriate, HazCat analysis may be used to consolidate materials prior to sampling and disposal.
5. Individual drums may contain multiple phases (non-aqueous liquids, aqueous liquids, and solids), each of which will require separate analysis.
6. RCRA 8 metals: As, Ba, Cd, Cr, Pb, Se, Ag by SW6020, Hg by SW7470A
7. Petroleum products will be analyzed for oil burning specifications. Oil burning specifications includes 4 RCRA metals (arsenic, cadmium, chromium, and lead), flash point, total halogens, and PCBs. If a sample fails to meet oil burning specifications it will also need to be analyzed for VOCs and the four RCRA metals (barium, selenium, silver, and mercury) not covered by oil burning specifications.

3.3 QUALITY ASSURANCE

Accurate and precise data will be achieved through the use of sampling and analytical procedures that minimize bias, standardized procedures, meticulous calibration of analytical equipment, and by implementing corrective action whenever measured accuracy and precision exceed pre-established limits. Information regarding specific QA procedures and sample management can be found in the SAP Part Two: QAPP.

The overall QA objective is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting that will provide sound scientific data of known and appropriate quality that satisfy project DQOs. DQOs are qualitative and quantitative statements that specify the quality of the data required ensuring that the work performed is consistent with the project objectives and end uses of the data. QA objectives provide procedures to:

- Control each step of the measurement process beginning with sample collection and proceeding through data interpretation.

- Ensure that data will be of known or acceptable precision, accuracy, representativeness, completeness, and comparability.

4.0 FIELD INVESTIGATION ACTIVITIES

4.1 PREPARATION

Prior to the start of field activities, the Project Manager will ensure that all logistics, equipment, administrative actions, and personnel are fully prepared to implement the field activities. Field personnel will clean, calibrate, and check all instruments and equipment for possible malfunction following the procedures provided in Attachment 1.

4.2 SITE CLEARANCES/PERMITS

All work and associated activities on Elmendorf AFB will be coordinated and approved by the Elmendorf AFB Project Manager prior to the start of field activities. Site access requirements are identified in Section 3.1 of the Work Plan.

Utility clearances and dig permits will not be necessary for the debris removal activity.

4.3 VISUAL INSPECTION

The beach area will be visually inspected for potentially hazardous materials prior to performing the debris removal activity. The inspection will include a site reconnaissance to look for potentially hazardous materials such as drums, containers, ACM, unexploded ordnance, cylinders, batteries, transformers, electrical components, etc. Any potentially hazardous materials identified will be marked and the Air Force Center for Environmental Excellence (AFCEE) Contracting Officer's Representative (COR) and Air Force Project Manager will be notified. A screening and sampling approach for drums and containers and suspect ACM found on the LF04 beach will be defined and discussed with the AFCEE COR and Air Force Project Manager. Once the approach is approved by the AFCEE COR and Air Force Project Manager, samples will be collected.

4.4 SAMPLING PROCEDURES

All samples will be collected with decontaminated tools. Disposable gloves will be worn and changed between sample collections. Only certified-clean sample containers will be used. The exterior of the containers will be wiped clean following sampling. Containers that have lost lids or are damaged will not be used for sampling. A chain-of-custody form will be

completed to document each batch of samples, as well as the name of each person assigned control of the sample and period of control, as described in Section 4.8.

4.4.1 Drum Sampling

If drums containing suspected hazardous materials are encountered, HazCat® testing may be used to characterize and segregate the contents of drums into the appropriate waste stream or group.

Methods and procedures identified in the LF04 Debris Removal HSP, Appendix B, will be followed when opening and sampling drums. Initial inspection shall include physical description of the drum or container including size, drum type, markings, and condition. Upon preliminary waste characterization testing, physical descriptions should be noted, including number of phases, physical state, color, clarity, homogeneity, and any other observations with respect to appearance.

Samples will be collected from drums for HazCat® (if applicable) and laboratory analysis. A 4-foot long, glass, Coliwasa tube "drum thief" will be used to collect a sample of the drum's liquid contents. Drum liquids will be captured quickly enough such that fluids of variable density (relative to water) will not be lost during extraction of the drum thief from the drum. The sample will be transferred to a clear field sample jar to observe phase separation. The bottom of the drum will be probed/stirred with the drum thief to confirm or deny the presence of possible residual sludges or solids and observe for fuel sheen. A different sampling/screening procedure will follow for phased liquids or solids/sludges, as follows:

1. Phased Liquids. If multi-phase liquid separations are evident, each phase of the sample may be evaluated using the HazCat® test kit. Multi-phase liquid separations indicate the presence of potentially hazardous light non-aqueous phase liquids and/or dense non-aqueous phase liquids. Drums containing these liquids (i.e., pure fuels, halogenated solvents) will be given extra attention in regards to the removal processes and characterization analytical parameters.
2. Sludges/Solids. If residual sludges/solids are encountered in the drum, a sample will be collected using a stainless steel scoop/ladle attached to a rigid staff. The "scoop" will be lowered through the opening in the top of the drum and scraped along the bottom until filled with sludge. The filled "scoop" will be lifted from the drum, excess water decanted, and the sludge transferred with a disposable sample scoop directly into a sample container. Solid/sludge samples obviously consisting of soil and/or botanical matter will be discounted as such. Residual sludges of on oil-based nature and other solids may be evaluated using the HazCat® field test kit and analytical samples will be collected.

HazCat® sample testing would be conducted by manufacturer-trained and certified personnel. The testing utilizes a chemical test analysis and combustion process to determine the general category of organic, inorganic, metals, reagents and combustibility for total oil and grease and total petroleum hydrocarbons. This kit contains many chemicals and reagents that if used improperly have the potential to cause harm; therefore, only properly trained individuals will be authorized to conduct the tests. Use of this kit even by properly-trained individuals may still generate potentially harmful vapors. For this reason, testing samples will only be conducted with the appropriate personnel protective equipment in a well ventilated area free from locations where vapors may accumulate. Tests will be conducted according to manufacturers' instructions.

Following completion of all HazCat® screening, drums and their contents will be bulked (if applicable) and laboratory analytical samples will be collected. Samples will be collected in the following order: 1) VOCs, 2) SVOCs, 3) Oil Burning Specifications, 4) PCBs/Pesticides, and 4) Metals. See Table 3-1 of this FSP for the assumed sample analyses for each phase. See Table 4-1 in the QAPP for a summary of appropriate waste sample containers and holding times.

4.4.2 Suspect ACM Sampling

If suspected ACM is encountered during the debris removal activities, it may be sampled to confirm the presence of asbestos, or asbestos hazard may be assumed, and the material handled and disposed of as ACM. Evaluation criteria to determine if the suspect ACM will be sampled is provided in Section 3.4.5 of the Work Plan. If it is determined that the suspect ACM will be sampled, it will be handled following specific protocols.

Employees involved with the handling of asbestos must have received training in the proper procedures and practices for handling ACM, and must have current accredited certification of asbestos training as required by state, federal and local regulations. These include Department of Labor approval, Occupational Safety and Health Administration requirements (Title 29 of the Code of Federal Regulations, Parts 1910.1910 and .1926) and Alaska regulations found in 8 AAC 61.620.

An exclusion zone will be established around the item and samples will be collected according to applicable procedures.

4.5 FIELD SAMPLE IDENTIFICATION

The field sample identification code provides the tracing of the sample from the location in the field, through laboratory analysis, and finally to data evaluation and presentation.

Each sample will be assigned a unique field sample identification code and labeled accordingly. This field sample identification code will contain information traceable to the hazardous material and other appropriate information unique to that sample. This code will be used for all references to this particular sample in all field and project documentation and reports.

Each sample container will be labeled with the sample number, date and time of sample collection, and sampler name.

Individual sample labels will be affixed to the sample containers. Waterproof, indelible ink will be used to ensure the integrity of the sample identification code. The following information will be included on each sample label for samples submitted for laboratory analysis:

- Collection Organization
- Sample ID
- Date and time of collection
- Analyses requested
- Sample collector name or initials
- Preservation
- Bottle Number

4.6 SAMPLE STORAGE AND TRANSPORT

Plastic bubble wrap will be used to line the bottom of shipping coolers. The samples will be put in individual, resealable plastic bags and wrapped in plastic bubble wrap prior to placement in the coolers. Samples will be placed upright in coolers. Completed chain-of-custody forms will be placed inside a resealable plastic bag and secured to the inside of

cooler lid. Space between samples in the coolers will be filled with packing material so that samples are protected and movement is limited. Cold packs will be placed around and on top of the samples to maintain the temperature goal of 4 degrees Celsius. A temperature blank consisting of at least 500 milliliters of water in a high-density polyethylene bottle will accompany each cooler transporting project samples to the laboratory. Coolers will be sealed with custody seals on the front right and back left corners. Additional packaging and shipping requirements are provided in Section 7.4 of the QAPP.

When a transfer of samples occurs, the chain-of-custody form will be completed with the name of the person relinquishing the samples, and the person receiving the sample will sign and date it. Copies of any shipping documentation will also be retained for the project files.

For all analyses (except ACM), sample coolers will be delivered to:

Severn Trent Laboratories, Inc.
880 Riverside Parkway
West Sacramento, CA 95605
Phone: (916) 373-5600 / (916) 372-1059

Sample receiving hours are scheduled from 8:00 a.m. to 6:00 p.m., Monday through Saturday. When a transfer of samples occurs, the chain-of-custody form will be completed with the name of the person relinquishing the samples, and the person receiving the sample will sign and date the form. A cooler receipt form will be completed. Copies of the chain-of-custody, the cooler receipt form, the custody seals, and laboratory logging information will be emailed to the Jacobs project chemist within 24 hours of sample receipt.

4.7 FIELD DOCUMENTATION

Field documentation will contain information pertinent to the field sampling program and the equipment preparation efforts. Field documentation will be on bound, numbered pages, and entries will be made in indelible ink. Corrections to any documentation will be made by drawing a single line through the incorrect entry and initialing the correction. No documentation pages will be removed from any field logbooks.

Field documentation will be maintained by the Field Team Leader during field activities and transferred to the project files for a record of sampling.

Field documents are described below; all field documentation will be bound into a numbered field logbook.

- Field activity logbooks. These logbooks are assigned to field team members to summarize daily field activities and to document required field briefings (such as health and safety briefings); to record the field team's activities and observations, the identifiers of the locations of samples collected that day, any unusual occurrences affecting the overall project, weather conditions, etc.; to document equipment calibration; to document decontamination; to document health and safety monitoring; and to document subcontractor activities (including performance, down time, etc.).

  Field activity logbooks or data sheets will contain the following:

  - Name and location of site
  - Date(s) and time(s) of sample collection or other fieldwork event
  - Name of the Field Team Leader
  - Names of the field team members and subcontractors
  - Name of sample collector
  - Weather conditions
  - Description of the day's field activities
  - Field observations (e.g., surface water features)
  - Summary of equipment preparation procedures
  - Number, type, and location of samples collected and sample identification numbers
  - Physical description
  - Type(s) of laboratory analyses requested
  - Field measurement readings from air monitoring equipment,
  - Calibration information
  - Explanations of any deviations from the Work Plan

4.8 SAMPLE CUSTODY DOCUMENTATION

Individual site samples will be entered on the chain-of-custody record following collection. Chain-of-custody record forms will be completed to document each sample sent for laboratory analysis. The chain-of-custody form summarizes sample information (project, sample location, date and time of sampling, sample identifier, and analyses required) and provides a complete record of sample custody, from the point of sampling through receipt by the analytical laboratory. Release of the samples will be the responsibility of the field team.

4.9 DECONTAMINATION PROCEDURES

In general, only pre-cleaned disposable sampling equipment will be used. Any non-disposable field sampling equipment coming in contact with potentially contaminated waste or used for sampling will be decontaminated before and after use.

Persons performing sampling or decontamination activities will wear clean, chemical-resistant gloves. Personnel decontamination procedures are presented in the HSP (Appendix B of the Work Plan).

4.10 FIELD EQUIPMENT CALIBRATION

Proper field equipment and instrument performance is necessary to obtain reliable data. Instruments and equipment used to gather, generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications or applicable Standard Operating Procedures (SOPs). All measuring and test equipment will be calibrated prior to use and regularly when in use. Calibration procedures provided by the manufacturer will be followed where applicable. Standard acceptable calibration methods or SOPs will be used where manufacturer guidelines are not available. Instruction manuals for all field instruments will be available on site. Preventive maintenance for field instrumentation will be performed according to manufacturer's instructions and applicable SOPs.

The Field Team Leader is responsible for implementing and documenting the calibration and preventative maintenance procedures. All calibrations and maintenance procedures will be recorded in the field logbooks. Preventative maintenance will be addressed through daily checks of equipment prior to initiation of field operations.

4.11 SURVEYING

The locations of beach debris will be surveyed using a real-time kinematic global positioning system receiver. The following standards should be used for all surveying and Global Positioning System work on Elemendorf:

- Projection: Universal Transverse Mercator Zone 6N;
- Format: World Geodetic System 84;

- Horizontal Datam: North American Datum 83;
- Vertical Datum: North American Vertical Datum 88; and
- Units: meters.

5.0 REFERENCES

AFCEE (Air Force Center for Environmental Excellence). 2001 (August). Quality Assurance Project Plan. Version 3.1.

AFCEE. 1997 (March). Model Field Sampling Plan.

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EPA. 1994a (February). USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review. Office of Emergency and Remedial Response. EPA 540/R-94/012.

EPA. 1994b (September). SW-846 Test Methods for Evaluating Solid Waste. Final Update II.

EPA. 1986. Test Methods for Evaluating Solid Waste. 3rd ed., SW-846.

USACE (U.S. Army Corps of Engineers). 1994 (September). Requirements for the Preparation of Sampling and Analysis Plans. EM 200-1-3.

USAF (U.S. Air Force). 1994 (December). Elmendorf Air Force Base, Alaska. Environmental Restoration Contractors Guide.

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ATTACHMENT 1

Manufacturers' Field Instrument Documentation

Chapter 2 Operation

2.1 OVERVIEW

MicroTIP measures the concentration of airborne ionizable gases and vapors and automatically displays and records these concentrations.

MicroTIP does not distinguish between individual pollutants. The reading displayed represents the total concentration of all photoionizable chemicals present in the sample.

```
Warming up now,
  please wait...
```

Turn the instrument on by pressing the back of the power switch. The pump will start and the message "Warming up now, please wait" will be displayed. Within three minutes the following information will appear on the display: instrument status, current detected concentration, Event number (if the datalogger is on), time, and date.

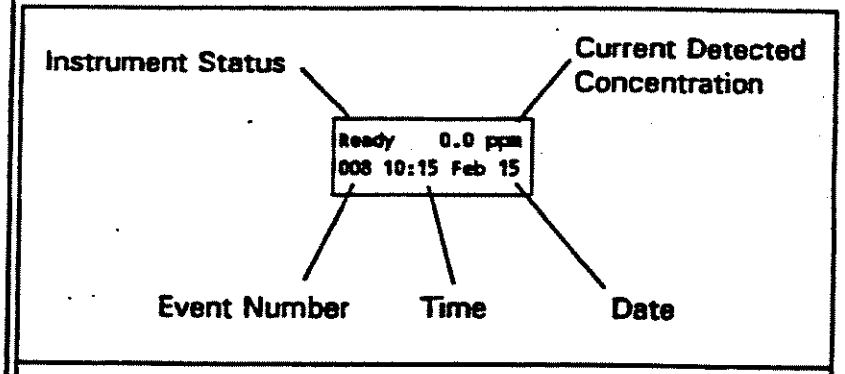


Figure 2 Normal Display

MicroTIP operates automatically. The user reads concentrations directly from MicroTIP's display. The display updates itself each half second.

The Minimum, Maximum, and Average concentrations measured in each 15-second period are automatically recorded in MicroTIP's datalogging memory. MicroTIP's memory holds 12 hours of concentration data.

Concentration data can be played back from memory on MicroTIP's display or sent to a printer or computer in either a tabular or a graphical format. Data are recorded by date,

time, and by a sequential Event number. Data are played back by the user specifying a start and a stop Event number.

The keypad is used to set up and calibrate MicroTIP, and allows the user to manipulate the concentrations measured and recorded by MicroTIP in various ways. MicroTIP has 16 clearly labelled keys for direct numeric entry and for using MicroTIP's functions.

All information entered from the keypad and stored in MicroTIP's memory is retained when MicroTIP is switched off. The clock and calender continue to operate and do not need to be reset the next time MicroTIP is used.

2.2 TUTORIAL SESSION

To assist the user in learning the key functions, MicroTIP has a built-in tutorial session which displays a two-line description of the function of each key. Pressing MicroTIP's TUTOR key begins a tutorial session and pressing the EXIT key twice ends the session. While in the tutorial session keypresses have no effect on MicroTIP's operation.

Press the TUTOR key and begin a tutorial session. Press each key and read the display. The tutorial display for each key is given in Table 1.

BATT	Shows battery V normally 6-8.5V	ALARM	Shows set-point for conc alarm
DISPLAY	Displays conc as graph or numeral	MAX	Displays highest conc measured
LIGHT	Shows intensity of detector lamp	SETUP	Sets date time & options for keys
AUDIO	Selects alarm or tone or no audio	EVENT	Sets options for recording data
PRINT	Prints table of recorded data	TUTOR	Press a key then read explanation

Table 1 TUTOR Displays

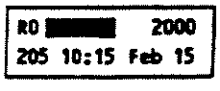
GRAPH	Prints graph of recorded data	CLEAR	Erases the last number pressed
PLAY	Replays recorded data on display	EXIT	Cancels key with no more changes
CAL	Calibrates with zero & span gas	ENTER	Confirms display then continues

Table 1 - continued

If there are no options to the function then the key acts immediately. If there are options, then the current option is displayed on the lower line. The user is prompted to display the other options by pressing the up arrow or down arrow keys. Pressing ENTER confirms that the displayed option is correct. If the function requires numeric input then the current value is displayed on the lower line. The user can change it on the display by pressing the numeric keys. Pressing ENTER confirms that the displayed value is correct.

Some functions have multiple steps for options and/or numeric inputs. These are arranged so that the most frequently changed inputs are displayed first. Once the desired changes have been made the user can bypass the rest of the steps by pressing EXIT.

Each key function is described in more detail in the following sections. Leave MicroTIP on and try each key in turn.



2.3 DISPLAY

If a numerical display is shown, pressing DISPLAY will change it to a bar graph. If the bar graph is shown, pressing DISPLAY changes it to a numerical display. The bar graph range is selected with the SETUP key.

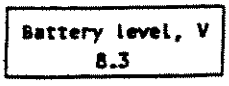
2.4 LIGHT

Pressing the LIGHT key switches the backlighting on to high intensity. The current intensity of the detector lamp is also displayed each time the LIGHT key is pressed. Pressing it again decreases the intensity and pressing it again turns the

backlighting off. The brighter backlighting consumes more power and is recommended for use only in very dark locations.

2.5 BATT

Pressing the BATT key displays the current battery level. The battery voltage will be shown for 15 seconds and then the display reverts to normal. The normal operating voltage range is 6 to 8.5 volts.



When LoBat is displayed there is approximately 10 minutes of operation left. The battery pack must be replaced by a fully charged pack and the discharged pack should be recharged. See Section 1.2.

If operation is continued with a low battery pack another message will appear indicating that the batteries are critically low. MicroTIP will now turn off the detector lamp. This reduces deep discharging of the battery pack and possible memory loss.

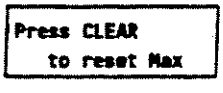
Note: Deep discharging of the battery pack will result in loss of recorded data and setup parameters. To avoid this, replace the battery pack with a fully charged one and recharge the old one for at least 8 hours.

Do not remove, replace or charge the battery pack in a hazardous location.

2.6 MAX

Press the MAX key. The maximum concentration, the Event during which it was encountered, the time and the date of the occurrence will be displayed. This is shown for 15 seconds and then the display reverts to normal.

Pressing any key and then CLEAR will reset the Max register. "Max Cleared" will be displayed with the current date and time. After 15 seconds the display reverts to normal.



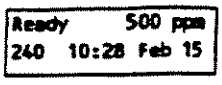
Recording of real time data is not interrupted when the MAX key is pressed or when the Max register is cleared.

2.7 CLEAR

CLEAR erases the last numerical entry. If a number is entered in error press CLEAR to erase the entry and re-enter the correct number. CLEAR used in conjunction with the MAX key resets the Max register.

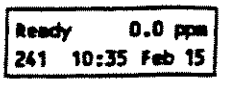
2.8 EVENT

Events may be used to identify a particular sample or sampling location in memory. Recorded data are played, printed and removed from the datalogger by specifying a start and stop Event number.

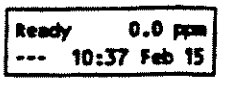


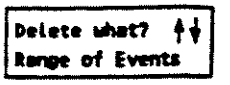
The EVENT key controls MicroTIP's datalogger. When MicroTIP is turned on the datalogger will begin recording and the Event number will be incremented.

Press the EVENT key to see the Event options. The first Event option is Advance Event. To increment the current Event number press ENTER.

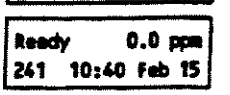


Move to the next Event option by pressing the arrow keys. The datalogger can be turned off selecting the "Stop recording" option and pressing ENTER. MicroTIP will continue to display the current detected concentration but no data will be recorded. There will be no event number shown on the normal display. To begin recording again, press EVENT and then ENTER. The Event number is automatically incremented by one when the datalogger is turned on.





Press the arrow keys to view the next option. The user can delete the current Event, all recorded Events or a range of Events. Press ENTER then use the arrow keys to select the desired option and press ENTER. If a range of Events is to be deleted, MicroTIP will ask for the start and stop Event numbers. To reset the Event counter to 001, delete all the events in the datalogger. After Event 255, MicroTIP resets the Event counter to zero automatically.



Ensure the correct delete option and Event numbers have been selected. Deleted information cannot be recovered. It is a good idea to playback or print the contents of the datalogger before deleting any information.

Note: MicroTIP only stores the last Event number seen in a 15 second period. To assign an Event number to a sample, the Event number should be advanced only once every 15 seconds. If the Event number is advanced more than once in a 15 second period lower Event numbers will not be stored.

MicroTIP can record continuously for a period of 12 hours. After this time it begins to overwrite existing data one Event at a time. For example: 6 Events of 2 hours each are recorded. Event #7 will overwrite event #1 if it is 2 hours or less in length. If Event #7 is greater than 2 hours it will completely overwrite Event #2 as well. Let's say Event #7 is 3 hours, then Events #3, #4, #5, #6 and #7 are now in the recorder.

If it is necessary to retain a copy of recorded data, the data should be printed or stored in a computer at least once every 12 hours of operation. This will prevent loss of information when events are overwritten.

2.9 EXIT

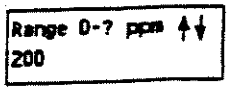
The EXIT key terminates all MicroTIP functions except DISPLAY. When EXIT is pressed the display reverts to normal. Most functions exit automatically if no key is pressed for 15 seconds.

When EXIT is pressed during printing or graphing, MicroTIP stops sending information to the printer or computer. The printer will continue to print until its buffer is empty.

2.10 SETUP

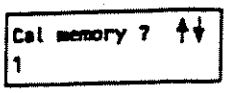
The SETUP key allows MicroTIP to be set up for a specific application. The current date and time are also set with the SETUP key.

Press SETUP and step through the options. Press ENTER to accept the displayed data or enter a numerical value using the keypad and then press ENTER. If no values are entered the display reverts to normal. To set up the instrument:



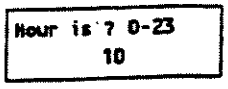
1. Press SETUP.

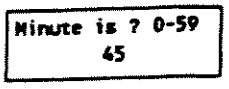
2. The first option sets the full scale range for the bar graph display, the graph output, the audio output, and the 1 volt analog output. Use the up and down arrow keys to select the 20, 200 or 2000 parts per million (ppm) range.

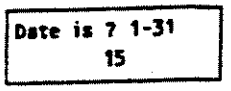


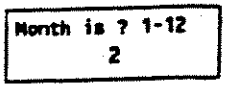
3. Next the Cal Memory is selected. MicroTIP has 10 Cal Memories for regular operation and one for High Sensitivity operation. Only one Cal Memory can be used at a time. Select Cal Memory 1 with the up and down arrow keys and press ENTER.

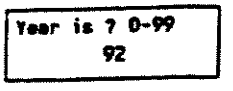
   No matter which Cal Memory is selected, MicroTIP's response is not specific to any one compound. The reading displayed represents the total concentration of all ionizable compounds in the sample.









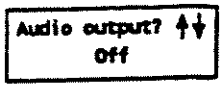


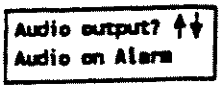
4. Next enter the correct values for the current time. Press ENTER after each value.

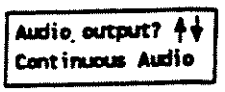
5. Enter the numerical values for the day, month and year. Again press ENTER after each selection.

2.11 AUDIO

To connect the headset remove the dust cap from the I/O connector and plug in the headset. If a headset is being used with MicroTIP press AUDIO and use the arrow keys to select one of three options for audio output and press ENTER.



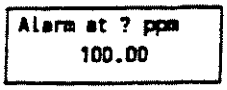




Audio output can be turned off altogether, set so there is audio output during an alarm condition only, or a continuous audio signal with the tone frequency being proportional to the detected concentration. The volume is controlled by a knob on the headset.

2.12 ALARM

The ALARM key displays the current alarm level and allows a new alarm level to be entered.



1. Press ALARM to display the current alarm. If this value is correct, press EXIT to return to the normal display.

2. If a new value is to be set, enter the value, and press ENTER.

When an alarm condition is detected the instrument status changes to "Alarm" and an audio signal is heard through the headset (only if "Audio on Alarm" is selected) and remains on until the alarm condition has passed or until it is turned off with the AUDIO key.

2.13 PLAY

The PLAY key plays back previously recorded data. If either "Audio on Alarm" or "Continuous Audio" is selected the playback audio output (not the real time output) is heard through the headset. To enable playback audio output, press AUDIO and select the desired output before pressing the PLAY key.

1. Press PLAY. Two options are available. Pressing ENTER begins playback where it was last stopped. Press the SETUP (*) key to set the playback options.

2. Enter the start Event. If this Event is not available MicroTIP begins at the next higher Event. An Event may not be available if the Event number was advanced more than once in 15 seconds, or if the selected Event has been deleted or overwritten.

3. Next select which value is to be displayed, either the Minimum, the Average, or the Maximum, with the arrow keys and press ENTER.

4. The data can be played back in either numerical or graphical display by pressing the DISPLAY key.

When MicroTIP is playing back recorded data it is also measuring and recording real time concentrations even though the instrument status is "Play". If, during playback, an instrument status with a priority higher than that of "Play" is encountered in real time operation it will be displayed, but MicroTIP will continue to play back.

Playback speed and direction can be selected using the arrow keys. The speed can be increased or decreased and the information can also be viewed in the opposite direction. A forward arrow (>) appears in the display if data are being played forward or a backward arrow (<) if the data are being played in reverse.

Press ENTER to freeze the display at any time and use the arrow keys to resume playback. Press EXIT to return to the normal display.

The PLAY function provides a speed search to find the desired start and stop Event numbers for printing or graphing.

2.14 CAL

MicroTIP must be calibrated in order to display concentration in units equivalent to ppm. First a supply of zero air, which contains no ionizable gases or vapors, is used to set MicroTIP's zero point. Then, span gas, containing a known concentration of a photoionizable gas or vapor, is used to set the sensitivity.

Usually clean ambient air will be suitable as zero air. If there is any doubt, use a commercial source of zero grade air and a second sampling bag. Span gas of the desired compound and concentration, required for calibration, may be obtained from a specialty gas supplier. See Appendix B.

Isobutylene at 100 ppm in air is recommended as span gas. To calibrate the instrument use the Calibration Kit (Photovac Part No. 390033) as follows:

1. Connect the supplied regulator to the span gas cylinder. Hand tighten the fittings. Observe proper handling techniques for all gases.

2. Open the valve on the gas bag by turning the valve stem fully counterclockwise.

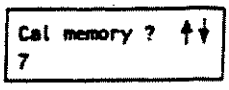
3. Attach the nut to the regulator. Hand tighten the fittings.

4. Turn the regulator knob counterclockwise about half a turn to start the flow of gas.

5. Fill the gas bag about half full and then close the regulator fully clockwise to turn off the flow of gas.

6. Disconnect the bag from the adapter and empty it. Flush the bag a few times with the span gas and then fill it.

7. Close the gas bag by turning the valve clockwise.

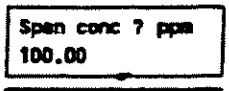


8. Press SETUP and select the desired Cal Memory with the arrow keys and press ENTER. Press EXIT to leave Setup.

9. Press CAL and enter the desired response factor. Use Table 2 to find the correct response factor. If the compound is not in Table 2 or you are not looking specifically for one compound then enter 1.00.

The concentration detected by MicroTIP will be multiplied by the response factor before it is displayed and logged.

10 Expose MicroTIP to zero air. Press ENTER and MicroTIP sets its zero point.



11. MicroTIP then asks for the span gas concentration. Enter the known span gas concentration and then connect the span gas bag adapter to the inlet.

12. Press ENTER and MicroTIP sets its sensitivity.

13. When MicroTIP's display reverts to normal, MicroTIP is calibrated and ready for use. Remove the span gas bag from the inlet.

MicroTIP has 10 Cal Memories and can be calibrated with 10 different span gases or response factors if desired. Only one Cal Memory can be used at a time. Each memory stores a different response factor, zero point and sensitivity. To program the Cal Memories:

1. Press SETUP and select the desired Cal Memory (1 to 10) with the arrow keys.

2. Exit from SETUP and press the CAL key.

3. Enter the desired response factor and press ENTER.

Note: It does not matter which Cal Memory is selected or which response factor is entered, MicroTIP's response is not specific to any one compound. The reading displayed represents the total concentration of all photoionizable compounds in the sample.

4. Follow the displayed calibration instructions. When the calibration is completed it is automatically stored in the selected Cal Memory. The span gas concentration entered here is specific to the selected Cal Memory.

Whenever the instrument is calibrated, MicroTIP updates the selected Cal Memory only. The instrument should be calibrated at least once a day.

2.15 PRINT

MicroTIP was designed to be used with an Epson® FX-80 or 100% compatible printer with an RS232 serial interface. If an Epson compatible printer is to be used, a different printer cable may be required. See Section 3.1 for details on the type of cable required.

The printer must be set to 8 data bits and 1 stop bit to communicate with MicroTIP. MicroTIP's baud rate and parity must be set depending on the printer requirements. Refer to the printer user's manual for more information.

MicroTIP is not UL-classified for use in hazardous locations with printers.

To print recorded data:

1. Use the printer cable and suitable adapter (Photovac Part No. 395006) to connect the MicroTIP I/O connector to the printer.

2. Press the PRINT key and then the SETUP (•) key to select the desired setup options.

3. MicroTIP will ask for the number of the start and stop Events. Enter the desired values and press ENTER.

4. MicroTIP will then ask if the selected data are to be formatted to fit on one 8½" x 11" page or if all recorded data between the selected start and stop Events are to be printed. Use the arrow keys to select the desired option and press ENTER.

5. Enter an ID number if desired. Any number up to 16 digits long may be entered as an ID number. The ID number can be used to differentiate between users or instruments. If more than one user is using a single instrument, each user will use an individual number for printed reports. If more than one MicroTIP is being used, each instrument can have its own ID number on printed reports.

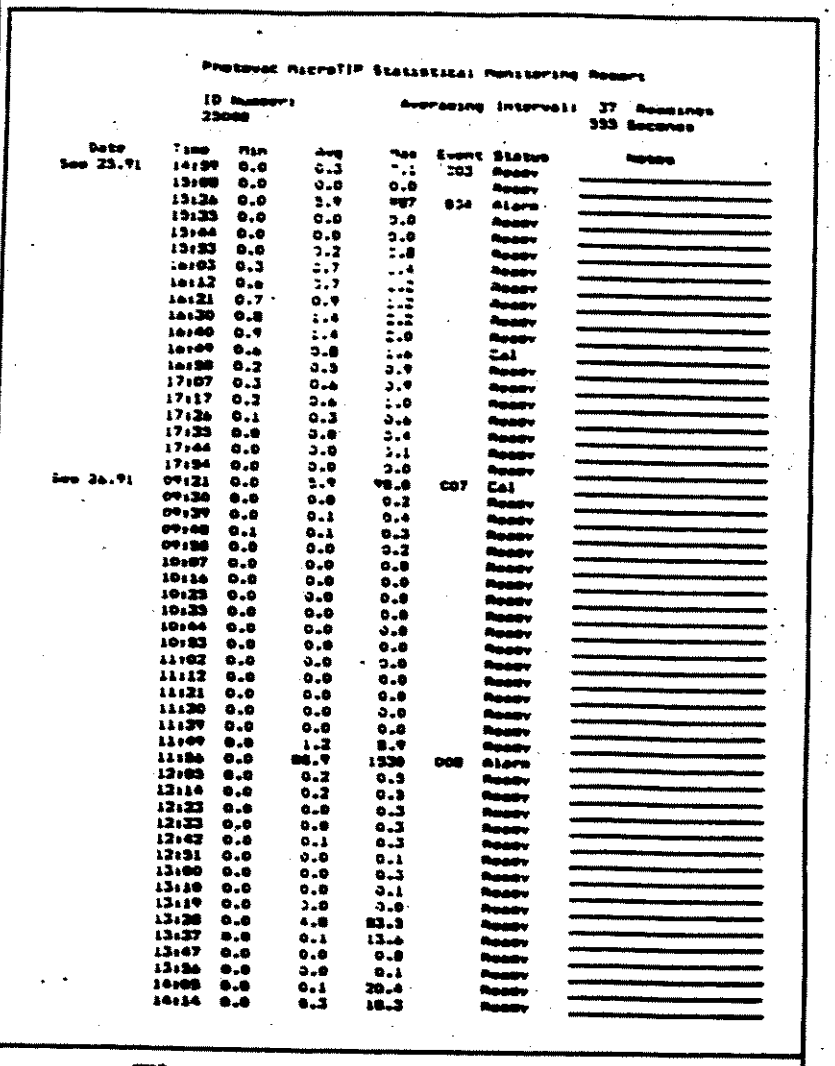
   If an ID number is not required, leave this option blank and move onto the next option by pressing ENTER.

6. Enter the baud rate and parity. These values are specific to the printer being used and must be set correctly. Again, refer to the printer user's manual to determine the correct baud rate and parity.

7. When the setup is correct, ensure the printer is on line and press ENTER.

If "Fit on one page" is selected, MicroTIP will divide the selected data into 54 averaging intervals. One interval is printed on each line.

MicroTIP stores one set of readings (Min, Avg and Max) each 15 seconds. In each averaging interval the printed minimum is the minimum of all the stored readings in that interval. The printed Avg is the average of all the recorded average readings and the Max is the maximum of all the recorded maximum readings.



Protocol MicroTIP Statistical Monitoring Report

ID Number: 23000 Averaging Interval: 37 Readings 555 Seconds

Date	Time	Min	Avg	Max	Event	Status	Notes
Dec 25.91	14:59	0.0	0.3	7.1	203	Ready	
	15:00	0.0	0.0	0.0		Ready	
	15:26	0.0	2.9	987	834	Alarm	
	15:33	0.0	0.0	0.0		Ready	
	15:44	0.0	0.0	0.0		Ready	
	15:53	0.0	0.2	1.8		Ready	
	16:03	0.3	0.7	1.4		Ready	
	16:12	0.6	0.7	1.2		Ready	
	16:21	0.7	0.9	1.2		Ready	
	16:30	0.8	1.4	2.2		Ready	
	16:40	0.9	1.4	2.0		Ready	
	16:49	0.6	0.8	1.6		Cal	
	16:58	0.2	0.3	0.9		Ready	
	17:07	0.3	0.4	0.9		Ready	
	17:17	0.2	0.4	1.0		Ready	
	17:26	0.1	0.3	0.6		Ready	
	17:35	0.0	0.0	0.4		Ready	
	17:44	0.0	0.0	0.1		Ready	
	17:54	0.0	0.0	0.0		Ready	
Dec 26.91	09:21	0.0	2.9	98.0	C07	Cal	
	09:30	0.0	0.0	0.2		Ready	
	09:39	0.0	0.1	0.4		Ready	
	09:48	0.1	0.1	0.3		Ready	
	09:58	0.0	0.0	0.2		Ready	
	10:07	0.0	0.0	0.0		Ready	
	10:16	0.0	0.0	0.0		Ready	
	10:25	0.0	0.0	0.0		Ready	
	10:35	0.0	0.0	0.0		Ready	
	10:44	0.0	0.0	0.0		Ready	
	10:53	0.0	0.0	0.0		Ready	
	11:02	0.0	0.0	0.0		Ready	
	11:12	0.0	0.0	0.0		Ready	
	11:21	0.0	0.0	0.0		Ready	
	11:30	0.0	0.0	0.0		Ready	
	11:39	0.0	0.0	0.0		Ready	
	11:49	0.0	1.2	8.9		Ready	
	11:56	0.0	86.9	1330	008	Alarm	
	12:05	0.0	0.2	0.9		Ready	
	12:14	0.0	0.2	0.8		Ready	
	12:23	0.0	0.0	0.3		Ready	
	12:33	0.0	0.0	0.3		Ready	
	12:42	0.0	0.1	0.3		Ready	
	12:51	0.0	0.0	0.1		Ready	
	13:00	0.0	0.0	0.3		Ready	
	13:10	0.0	0.0	0.1		Ready	
	13:19	0.0	2.0	3.0		Ready	
	13:28	0.0	4.8	83.3		Ready	
	13:37	0.0	0.1	13.4		Ready	
	13:47	0.0	0.0	0.0		Ready	
	13:56	0.0	0.0	0.1		Ready	
	14:05	0.0	0.1	20.4		Ready	
	14:14	0.0	0.3	18.3		Ready	

Figure 3 Printed Output

The following information is printed:

a. The number of readings in an interval and the length of the interval are printed at the top of the page. In Figure 3 there are 37 readings in an interval and the interval is 555 seconds long.

b. The interval start time. The first interval in Figure 3 begins at 14:59.

c. The lowest Event number in the interval, only if the Event number has changed.

d. The highest priority instrument status of the interval.

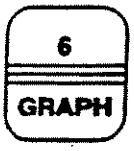
e. Space for the user to add Notes to the report. Notes could include identification of particular samples or sampling location based on Event numbers.

If "Output all data" is selected the header, containing the title, averaging interval and column headings, will only be printed on the first page of the printed output. Each of the following pages will contain 66 lines of data.

To print all 12 hours of recorded data will require about 45 pages and take about 10 minutes. The actual printing time will depend on the printer and print quality. While the information is being printed, the display shows that printing is in progress. The keypad will not accept commands until the present print job has been completed.

Printing now
please wait...

Pressing EXIT during printing stops the job and the display reverts to normal. The printer will continue to print until its buffer is empty.



2.16 GRAPH

Pressing the GRAPH key also prints the recorded data but in graphical format. See Figure 4.

MicroTIP is not UL-classified for use in hazardous locations with printers.

To graph recorded data:

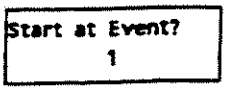
Range 0-? ppm ↑↓
200

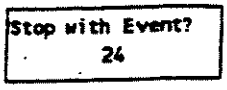
1. Press SETUP to set the range for the graph. Use the arrow keys to select the 20, 200 or 2000 ppm range.

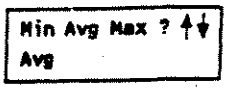
2. Use the printer cable and suitable adapter (Photovac Part No. 395006) to connect the MicroTIP I/O connector to the printer.

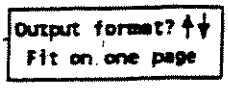
ENTER to Graph
* for Options

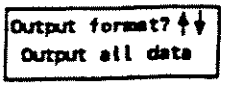
3. Press the GRAPH key and then the SETUP (*) key to select the desired setup options.

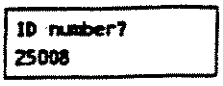












4. MicroTIP will ask for the number of the start and stop Events. Enter the desired values and press ENTER.

5. Select which values are to be graphed. Use the arrow keys to select from:

a.	Min	e.	Min & Max
b.	Avg	f.	Avg & Max
c.	Max	g.	Min & Avg & Max
d.	Min & Avg		

6. MicroTIP will then ask if the selected data are to be formatted to fit on a single 8½" x 11" page or if all recorded data between the selected start and stop Events are to be graphed. Use the arrow keys to select the desired option and press ENTER.

7. Enter an ID number if desired. Any number up to 16 digits long may be entered as an ID number. The ID number can be used to differentiate between users or instruments. If more than one user is using a single instrument, each user will use an individual number for printed reports. If more than one MicroTIP is being used, each instrument can have its own ID number on printed reports.

   If an ID number is not required, leave this option blank and move onto the next option by pressing ENTER.

8. Enter the baud rate and parity. These values are specific to the printer being used and must be set correctly. Again, refer to the printer user's manual to determine the correct baud rate and parity.

9. When the setup is correct, ensure the printer is on line and press ENTER.

If "Fit on one page" is selected, MicroTIP will divide the selected data into 600 averaging intervals. Sixteen intervals are graphed on each line.

MicroTIP always stores one set of readings (Min, Avg and Max) each 15 seconds. In each averaging interval the

graphed mininum is the minimum of all the stored readings in that interval. The graphed Avg is the average of all the recorded average readings and the Max is the maximum of all the recorded maximum readings. The following information is printed:

a. The number of readings in an interval and the length of the interval are printed at the top of the page. In Figure 4 there is 1 reading in an interval and the interval is 15 seconds long.

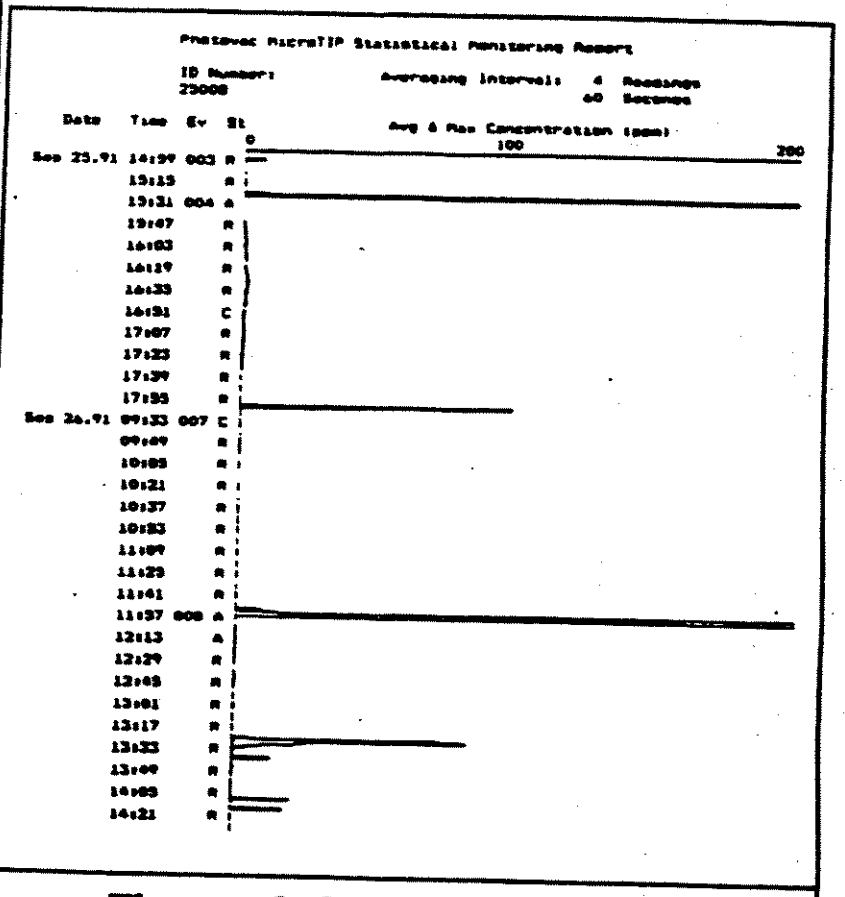


Figure 4 Graphed Output

b. Time is printed once every 16 intervals or every 16 minutes for the example in Figure 4. This time will be the start time of the next 16 intervals.

c. The lowest Event number of the 16 intervals is printed, only if it has changed from the previous set of 16 intervals.

d. The highest priority instrument status code of the 16 intervals is printed.

If "Output all data" is selected the header, containing the title, averaging interval and column headings, will only be printed on the first page of the graphed output.

To graph all 12 hours of recorded data will require about 4 pages and take about 10 minutes. The actual printing time will depend on the printer and print quality.

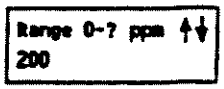
While the information is being printed, the display shows that printing is in progress. The keypad will not accept commands until the present print job has been completed.

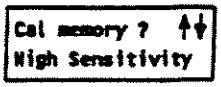
Pressing EXIT during printing stops the job and the display reverts to normal. The printer will continue to print until its buffer is empty.

2.17 HIGH SENSITIVITY OPERATION

MicroTIP can be used as a high sensitivity leak detector. In High Sensitivity operation, MicroTIP does not read directly in ppm but displays a reading proportional to the total concentration of ionizable gases and vapors detected.

During calibration, no span gas is required. MicroTIP zeros its reading with zero air and then sets itself to the maximum sensitivity.



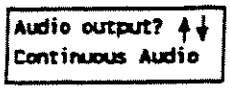


1. Press SETUP. Select the 0-20 ppm display range with the arrow keys and press ENTER.

2. Select High Sensitivity with the arrow keys and press ENTER.

3. Press EXIT. Select the bar graph with the DISPLAY key.

4. Press CAL and calibrate MicroTIP with zero air. High Sensitivity operation does not require span gas.



5. Press AUDIO and select "Continuous Audio" with the arrow keys.

As MicroTIP samples air closer to the leak, the length of the shaded area on the display increases. When used with the optional headset (Photovac Part No: 395030), the frequency of the tone increases as air closer to the leak is sampled, and the user need not watch the display.

MicroTIP's 3 second response time and detection limit of 0.1 ppm isobutylene permit fast detection of small leaks.

2.18 RESPONSE FACTORS FOR GASES AND VAPORS

In situations where only a single pure compound is present in air, MicroTIP should be calibrated with a standard of that specific compound as span gas. MicroTIP's 10 Cal Memories can be used to store calibration information for 10 different span gases.

MicroTIP's reading will always be influenced by any other photoionizable compounds present in the air sample. Even if MicroTIP has been calibrated with a specific compound, its response is not specific and the presence of another impurity may render the numerical result invalid.

It is often impractical to carry a range of different standards into the field. Approximate results can be obtained by calibrating MicroTIP with the recommended span gas and entering the appropriate response factor. The response factor is based on the ratio of the response of the specific compound to the response of the span gas. The response factor multiplies MicroTIP's reading then displays and records it (if the datalogger is on).

Table 2 gives response factors from which approximations can be made for guidance purposes. Data extrapolated from the use of response factors must be regarded as interim and approximate only. Table 2 should be used only for concentrations up to 100 ppm of the specific compound, because response factors change with concentration.

To use the data in Table 2:

1. Press the CAL key and enter the response factor for the specific compound.

2. Calibrate MicroTIP with zero air and 100 ppm span gas as described in Section 2.14.

3. Expose MicroTIP to the sample. The displayed reading is the approximate concentration of the specific compound.

Compound	Response Factor
Acetone	
Benzene	
Butyl Acetate	
Cyclohexane	
Cyclohexanone	
1,2-Dichlorobenzene	
Ethyl Acrylate	
n-Heptane	
Methyl Ethyl Ketone	
Methyl Isobutyl Ketone	
Methyl Methacrylate	
n-Octane	
Perchloroethylene	
Styrene	
Toluene	
Trichloroethylene	

Table 2 Response Factors

Note: These response factors serve as a guide to concentrations measured by MicroTIP with a 10.6 eV lamp. Results are expected to be accurate to within +/- 10ppm or +/-25% of result, whichever is greater. Accuracy of response factors to other gases and vapors may differ from that stated.

These responses are measured relative to isobutylene span gas.

UNITED STATES AIR FORCE
ELMENDORF AIR FORCE BASE, ALASKA

ENVIRONMENTAL RESTORATION PROGRAM

LF04 DEBRIS REMOVAL WORK PLAN
APPENDIX A - SAMPLING AND ANALYSIS PLAN
PART TWO: QUALITY ASSURANCE PROJECT PLAN

FINAL

SEPTEMBER 2004

TABLE OF CONTENTS

SECTION **PAGE**

ACRONYMS AND ABBREVIATIONS v
1.0 PROJECT DESCRIPTION 1-1
1.1 BACKGROUND 1-1
1.2 OBJECTIVE AND SCOPE 1-1
1.3 INTENDED DATA USAGE 1-2
1.3.1 Screening Data 1-2
1.3.2 Definitive Data 1-4
1.4 APPLICABILITY 1-4
2.0 ORGANIZATION AND RESPONSIBILITIES 2-1
2.1 PROJECT ORGANIZATION 2-1
2.2 PROJECT RESPONSIBILITIES 2-1
2.2.1 Jacobs Personnel 2-1
2.3 LABORATORY ORGANIZATION AND PERSONNEL 2-2
3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA 3-1
3.1 QUANTITATIVE QA OBJECTIVES 3-1
4.0 SAMPLING PROCEDURES 4-1
4.1 SAMPLING PROCEDURES DEFINED 4-1
4.2 SAMPLE CONTAINERS 4-1
4.2.1 Sample Preservation and Holding Times 4-1
4.3 SAMPLING EQUIPMENT DECONTAMINATION 4-1
5.0 CALIBRATION PROCEDURES AND FREQUENCY 5-1
6.0 ANALYTICAL PROCEDURES 6-1
6.1 Laboratory Analytical Data 6-1
7.0 SAMPLE CUSTODY 7-1
7.1 SAMPLE CUSTODY DEFINITION 7-1
7.2 SAMPLE CUSTODY DOCUMENTATION 7-1
7.2.1 Responsibilities and Procedures 7-2
7.3 FIELD DOCUMENTATION 7-2
7.4 PACKAGING AND SHIPPING REQUIREMENTS 7-2
8.0 INTERNAL QUALITY CONTROL CHECKS 8-1
8.1 FIELD QUALITY CONTROL SAMPLES 8-1
8.1.1 Equipment Blanks 8-1

TABLE OF CONTENTS
(continued)

SECTION **PAGE**

8.1.2 Trip Blanks ... 8-1
8.1.3 Temperature Blank Samples ... 8-1
8.2 LABORATORY QUALITY CONTROL SAMPLES ... 8-1
8.2.1 Blanks ... 8-2
8.2.2 Matrix Spike and Matrix Spike Duplicate Samples ... 8-2
8.2.3 Surrogate Spikes ... 8-2
8.2.4 Laboratory Control Samples (LCS) ... 8-3
8.2.5 Matrix Duplicate Sample Analysis ... 8-3
9.0 CALCULATION OF DATA QUALITY INDICATORS ... 9-1
9.1 ESTIMATION OF PRECISION, ACCURACY, AND COMPLETENESS ... 9-1
9.2 PERFORMANCE AND SYSTEM AUDITS ... 9-2
9.2.1 Field Audits ... 9-2
9.2.2 Laboratory Audits ... 9-2
9.2.3 Documentation Audit ... 9-3
10.0 PROCEDURES USED TO ASSESS DATA QUALITY ... 10-1
10.1 LABORATORY DATA REDUCTION ... 10-1
10.2 DATA VERIFICATION PROCEDURES ... 10-1
10.3 DATA VALIDATION PROCEDURES ... 10-1
10.4 ELECTRONIC DATA MANAGEMENT SYSTEMS ... 10-2
10.5 DATA REPORTING ... 10-3
11.0 CORRECTIVE ACTION ... 11-1
11.1 CRITERIA FOR DATA ACCEPTABILITY ... 11-1
11.2 RESPONSIBILITY AND AUTHORITY ... 11-1
11.2.1 Project Activities ... 11-1
11.2.2 Field Activities ... 11-2
11.3 LABORATORY ACTIVITIES ... 11-2
11.3.1 Documentation and Distribution ... 11-4
12.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT ... 12-1
12.1 RESPONSIBILITY ... 12-1
12.2 QUALITY ASSURANCE REPORTS ... 12-1
13.0 REFERENCES ... 13-1

TABLE OF CONTENTS
(continued)

SECTION **PAGE**

TABLES

Table 1-1 Descriptive Data Categories 1-3
Table 3-1 Toxicity Characteristic Leaching Procedure (TCLP) Fixed Laboratory Reporting Limits 3-3
Table 4-1 Sample Containers, Sample Preservation, and Holding Times 4-2

ATTACHMENT

Attachment 1: Laboratory Variance Letter

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ACRONYMS AND ABBREVIATIONS

AFCEE	Air Force Center for Environmental Excellence
CoC	chain-of-custody
COELT	Corps of Engineers Loading Tool
DAR	Data Assessment Report
DOT	U.S. Department of Transportation
DQO	data quality objective
EDD	electronic data deliverables
EPA	U.S. Environmental Protection Agency
FSP	Field Sampling Plan
GC/MS	gas chromatography/mass spectrometry
Jacobs	Jacobs Engineering Group Inc.
LCS	laboratory control sample
LECL	laboratory-established control limits
LF	landfill
MB	method blank
mL	milliliter
MS	matrix spike
MSD	matrix spike duplicate
PB	preparation blank
PCB	polychlorinated biphenyl
QA	quality assurance
QAO	quantitative QA objectives
QC	quality control
QAPP	Quality Assurance Project Plan
SAP	Sampling and Analysis Plan
SOP	standard operating procedure
TCLP	toxicity characteristic leaching procedure

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1.0 PROJECT DESCRIPTION

1.1 BACKGROUND

This Quality Assurance Project Plan (QAPP) is the second of three parts of the Sampling and Analysis Plan (SAP) for the Landfill No. 4 (LF04) Debris Removal at Elmendorf Air Force Base, Alaska.

This plan was developed to detail quality assurance (QA) procedures in the event that suspected hazardous wastes are identified during debris removal activities. Sources of potentially hazardous wastes that may be sampled include drummed materials. The objective of this QAPP is to provide detailed procedures that assure data of sufficient quality is acquired for waste characterization and disposal purposes.

1.2 OBJECTIVE AND SCOPE

The LF04 Debris Removal Project includes the removal and appropriate disposal of debris from the beach area. To meet this objective, all potentially hazardous materials encountered during the debris removal activities must be characterized for proper disposal. Tasks necessary for achieving the waste characterization goal are as follows:

- Segregate waste streams
- Collect representative samples of each waste stream.
- Request appropriate laboratory analytical tests
- Obtain comparable and compatible data from sampling activities by following applicable guidance in the Air Force Center for Environmental Excellence (AFCEE) QAPP.

The purpose of this QAPP is to provide appropriate QA procedures and quality control (QC) measures to be applied to all activities related to the sampling of potentially hazardous materials, with particular emphasis on:

- Sample collection and preservation
- Sample handling and documentation
- Laboratory analyses
- Data validation and interpretation
- Data presentation

The Field Sampling Plan (FSP, Part One of the SAP) details waste characterization field activities. In addition, the FSP details field sampling procedures, field documentation requirements, sampling equipment decontamination procedures, and sample collection summaries. This QAPP references the applicable sections of the FSP where appropriate.

1.3 INTENDED DATA USAGE

Data Quality Objectives (DQOs) are qualitative and quantitative statements that specify the quality of the data required to ensure that work performed is consistent with the project objectives and end uses of the data. Different data uses may require different categories of data quality.

Two descriptive data categories (EPA 1993) have been developed to address various data uses and the QA/QC elements required to achieve the desired level of quality. Table 1-1 summarizes the characteristics and data QA/QC elements of the descriptive data categories. These DQO levels are described below.

1.3.1 Screening Data

Data generated by screening instrumentation and procedures involve less precise measurement (than laboratory analysis) with rapid results available in real time or within hours. Less rigorous sample preparations than are used to generate definitive data (i.e., extractions, digestions, and cleanup procedures) are employed to generate rapid results. Screening data is also often used for health and safety monitoring at the site and to locate areas for subsequent and more accurate analyses.

Suspected potentially hazardous materials may be screened using the HazCat® Field Detection Kit

Table 1-1
Descriptive Data Categories

Descriptive Data Categories	Characteristics	Data QA/QC Elements
Screening Data	• Rapid, less precise methods. • Less rigorous sample preparations involving extraction, digestion, cleanup procedures. • Analyte identification. • Semiquantitative (less precise) to quantitative. • Results in real time or within hours.	• Completed field logbook. • Sample documentation. • Chain-of-custody forms. • Sampling Design Approach (systematic, random, judgmental, etc.). • Initial and Continuing Calibrations. • Determination and documentation of detection limits. • Analyte(s) identification. • Analyte(s) quantification. • Analytical Error Determination. – Appropriate number (defined in QAPP) of replicate analysis (minimum 1) from homogenized sample for determination of analytical bias and precision. • Definitive Confirmation. – Minimum 10 percent of screening data are confirmed by Definitive Data Category. – Minimum 3 screening samples reported above an applicable action level and 3 screening samples reported below action level (can be non-detects: ND) confirmed by Definitive Data Category.
Definitive Data	• Rigorous Analytical Methods (EPA,). • Quantitative. • Qualitative with confirmation of identity. • Analyte-specific. • Raw data documentation is generated. • Fixed laboratory.	•Completed field logbook. •Sample documentation. •Chain-of-custody forms. •Sampling Design Approach (systematic, random, judgmental, etc.). • Initial and Continuing Calibrations. • Determination and documentation of detection limits. • Analyte(s) identification. • Analyte(s) quantification. • QC Blanks (trip, method, rinsate). • Matrix Spike recoveries (MS/MSD). • Performance Evaluation samples (when specified). • Analytical Error Determination. – Appropriate number (defined in QAPP) of replicate analysis (minimum 1) from homogenized sample for determination of analytical bias and precision. Comparisons are made to method-specific performance criteria. • Total Measurement Error Determination. – Appropriate number (defined in QAPP) co-located samples submitted "blind" to laboratory are analyzed and precision determined. Comparisons are made to measurement error goals.

For definitions, see Acronyms and Abbreviations section.

1.3.2 Definitive Data

Data generated as definitive data involve rigorous U.S. Environmental Protection Agency (EPA) reference methodology. Data results will be quantitative with a known and documented analytical precision and accuracy. The compound identity or qualitative results will be confirmed by method-specific requirements. Hardcopy raw documentation is generated as a basis for the data validation process and preparation of a data assessment report (DAR).

All analytical data for this waste characterization will be generated as definitive data. Rigorous SW-846 analytical procedures (EPA 1986) and updates to methodology (EPA 1994, 1996) will be utilized to produce data applicable to risk-based evaluation (EPA 1990) and for comparability with past data collection activities. Data validation procedures in accordance with AFCEE QAPP version 3.1 will be utilized (AFCEE 2001).

1.4 APPLICABILITY

This QAPP is applicable to all project activities associated with the organization, laboratory, and field activities performed in support of data collection activities. Project organization, objectives, functional activities, and specific QA and QC activities are described in this document as follows:

- Section 2.0 Organization and Responsibilities
- Section 3.0 Quality Assurance Objectives for Measurement Data
- Section 4.0 Sampling Procedures
- Section 5.0 Calibration Procedures and Frequency
- Section 6.0 Analytical Procedures
- Section 7.0 Sample Custody
- Section 8.0 Internal Quality Control Checks
- Section 9.0 Calculation of Data Quality Indicators
- Section 10.0 Procedures Used to Assess Data Quality
- Section 11.0 Corrective Action
- Section 12.0 Quality Assurance Reports to Management
- Section 13.0 References

2.0 ORGANIZATION AND RESPONSIBILITIES

2.1 PROJECT ORGANIZATION

This section describes the organizational structure, lines of authority, and responsibilities of key individuals for the project. The organizational structure is designed to provide clear lines of responsibility and authority for the following:

- Identifying lines of communication and coordination
- Monitoring project schedule and performance
- Coordinating support functions such as laboratory and data management

2.2 PROJECT RESPONSIBILITIES

Responsibilities of the key positions for the LF04 Debris Removal project are described below.

2.2.1 Jacobs Personnel

Jacobs Engineering Group Inc. (Jacobs) is responsible for implementing the project, to include: SAP design; sample collection; requesting analytical services; data processing, interpretation, and presentation; and the QA procedures and QC measures associated with these activities.

- Project Manager: The Project Manager has overall responsibility for ensuring proper completion of the agreed-upon scope of work. The Project Manager assists in resolving any technical, contractual, financial, or scheduling problems.
- Field Team Leader: The Field Team Leader is responsible for implementing the field investigation in accordance with the SAP and maintaining field logbooks. This individual also provides technical advice and support to the Project Manager. The Field Team Leader is responsible for the completeness and accuracy of all project data. This includes, but is not limited to, chain-of-custody (CoC) forms and laboratory data. The Field Team Leader will assure that sample documentation and tracking is performed in accordance with the SAP. The Field Team Leader will conduct field audits of the field efforts that will cover sample identification, sample control, CoC procedures, field documentation, and sampling operations.
- Project Chemist: The Project Chemist is responsible for ensuring that project activities meet the requirements of the SAP and fulfill the objectives for which they were designed. The Project Chemist is involved in sample collection and analysis designs, procurement, and the documentation of records. The Project Chemist is responsible for ensuring that appropriate project procedures are developed with the necessary QA provisions. The

Project Chemist will assist in completing data verification procedures and overseeing data transfer from field and laboratory output to data management systems. In addition, the Project Chemist will review the data documentation for completeness, track sample status by reconciling CoC forms and laboratory results returned from the laboratory, and perform data verification activities.

- Field Samplers: The Field Samplers' responsibilities include collecting samples and field measurements, and documenting field activities in accordance with procedures stated in the SAP and the corresponding operating procedures. Field Samplers are responsible for sample labeling and logging; CoC documentation; assuring that sample containers, preservation, and holding times are as described in the SAP; and preparing samples for delivery to the analytical laboratory.

2.3 LABORATORY ORGANIZATION AND PERSONNEL

Laboratory analytical services will be performed by:

Severn Trent Laboratories, Inc.
880 Riverside Parkway
West Sacramento, CA 95605
Phone: (916) 373-5600 / (916) 372-1059

- Laboratory Manager: The Laboratory Manager is responsible for all activities of the laboratory and for ensuring that the necessary personnel are dedicated to the project to complete the project as required by this QAPP. The Laboratory Manager is also responsible for keeping the Jacobs Project Manager and Project Chemist informed as to the status and preliminary results of samples sent to the laboratory and for authorizing the release of the final results from the analyses completed.
- Laboratory QA Officer: The Laboratory QA Officer is responsible for reviewing all QA parameters associated with the analytical method used by the laboratory for the project and subsequent QA data generated in the analysis; ensuring that the laboratory standard operating procedures for analysis are followed; and instituting corrective action and reanalysis of effected samples, if necessary, to keep analysis and reported results within established QC goals.
- Laboratory Project Manager: The Project Manager is responsible for understanding the needs of the client and communicating this information to the project staff. The Project Manager handles all client interactions regarding project specifications. He or she also maintains status of all project analyses during analytical and review processes.
- Laboratory Sample Custodian: The Laboratory Sample Custodian will be responsible for issuance of sampling kits to the Jacobs Project Chemist or designee, inspection and log-in of incoming samples, and control of sample storage at the laboratory.
- Laboratory Analyst: The Laboratory Analyst is responsible for the analysis of samples for the requested parameters utilizing the methods prescribed by this QAPP.

3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The overall QA objective is to develop and implement procedures for field sampling, CoC, laboratory analysis, and reporting that will provide sound scientific data of known and appropriate quality that satisfy the DQOs. QA objectives provide procedures to:

- Control each step of the measurement process beginning with sample collection and proceeding through data interpretation.
- Ensure that data will be of known or acceptable precision, accuracy, representativeness, completeness, and comparability.

All analytical data for the LF04 Landfill Debris Removal waste characterization will be generated as definitive data as described by EPA (1993). Rigorous SW-846 analytical procedures (EPA 1986, 1994, 1996) and Alaska Department of Environmental Conservation (2002) methodology will be utilized to produce data usable for risk-based analysis and for comparability with past data collection activities.

3.1 QUANTITATIVE QA OBJECTIVES

Quantitative QA objectives (QAOs) of measurement data are determined by assessment of the data quality indicators of precision, accuracy, completeness, and sensitivity of reported results. The fundamental QAO – with respect to accuracy, precision, and sensitivity of laboratory analytical data – is to achieve the QC acceptance criteria of the analytical protocols.

Accurate and precise data will be achieved through the use of sampling and analytical procedures that minimize biases, through the use of standard procedures, through the meticulous calibration of analytical equipment, and by implementing corrective action whenever measured accuracy and precision exceed pre-established limits.

QAOs for EPA methodology are adapted from the Version 3.1 of the AFCEE QAPP (AFCEE 2001).

QC samples will be included into the analytical scheme to assess data quality. The QAOs for the QC samples included into the analytical scheme – laboratory control sample (LCS),

and LCS duplicate – are defaulted to laboratory generated control limits. Details of samples to be collected and the sample frequency are described in Section 8.0.

Sensitivity goals (reporting limits) shall be of sufficient sensitivity for waste disposal determination. Table 3-1 contains the maximum reporting limits for toxicity characteristic leaching procedure (TCLP) waste characterization analyses.

Table 3-1
Toxicity Characteristic Leaching Procedure (TCLP)
Fixed Laboratory Reporting Limits

Parameter	Method	Analyte	Maximum Reporting Limits Aqueous (mg/L)
Toxicity Characteristic Leaching Procedure (TCLP)	FED. REG. VOL. 55 NO. 61 29 MAR 90 Extraction: SW1311 Analysis: SW3020/SW6010 or SW7000 Series	Arsenic	2.5
		Barium	50
		Cadmium	0.25
		Chromium	0.5
		Lead	0.5
		Mercury	0.02
		Selenium	0.1
		Silver	0.5
	SW8260B Volatile Organic Compounds (VOCs)	Benzene	0.05
		Carbon Tetrachloride	0.05
		Chlorobenzene	10.0
		Chloroform	0.6
		1,4-Dichlorobenzene	0.75
		1,2-Dichloroethane	0.05
		1,1-Dichloroethylene	0.07
		Methyl Ethyl Ketone	20.0
		Tetrachloroethylene	0.07
		Trichloroethylene	0.05
		Vinyl Chloride	0.02
	SW8270C Semivolatile Organic Compounds (SVOCs)	o-Cresol	20.0
		m-Cresol	20.0
		p-Cresol	20.0
		2,4-Dinitrotoluene	0.013
		Hexachlorobenzene	0.013
		Hexachloro-1,3-butadiene	0.05
		Hexachloroethane	0.3
		Nitrobenzene	0.2
		Pentachlorophenol	10.0
		Pyridine	0.5
		2,4,5-Trichlorophenol	40.0
		2,4,6-Trichlorophenol	0.2
	SW8081A Chlorinated Pesticides	Chlordane	0.003
		Endrin	0.002
		Heptachlor	0.0008
		Lindane	0.04
		Methoxychlor	1.0
		Toxaphene	0.05

Note:
mg/L = milligrams per liter

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4.0 SAMPLING PROCEDURES

The work plan includes rationale for waste characterization sampling.

4.1 SAMPLING PROCEDURES DEFINED

Sampling procedures to be followed in this LF04 Debris Removal waste characterization are described in Section 4.0 of the FSP.

Table 4-1 presents the requirements for sample containers and volume, preservation, and holding times for the waste analyses.

Project requirements for QC samples are described in Section 8.0 of this QAPP. The QA/QC sample requirements are also indicated in Table 4-1 to ensure that sufficient containers are available to collect the additional required sample volume.

4.2 SAMPLE CONTAINERS

Glass sample containers are obtained "precleaned" to EPA Protocol A specifications from the laboratory and are obtained with verification of that level of integrity.

4.2.1 Sample Preservation and Holding Times

Samples will be adequately preserved to ensure their stability from collection in the field to laboratory analysis. Field personnel will ensure that necessary supplies, such as freeze packs and coolers, are on hand to preserve the samples after collection. Table 4-1 provides the preservation and holding times for the required analyses. Holding time specifications are consistent with the requirements outlined in the AFCEE QAPP.

4.3 SAMPLING EQUIPMENT DECONTAMINATION

Only clean disposable sampling and protective equipment will be utilized to potentially limit any possibility of cross-contamination between waste characterization sampling events.

Table 4-1
Sample Containers, Sample Preservation, and Holding Times

Parameter	Method Analysis	Sample Container Description*	Preservation of Sample	Maximum Holding Time
Drum Contents – Water, Oil, Solid/Sludge				
Metals (RCRA) (water)	6010B/6020/7470A	500 ml Polyethylene	Cool to 4°C $HN0_3$ to pH<2	180 days Mercury 28 days
VOCs (water)	5030B/8260B	3 40-ml VOA vials w/TLS	Cool to 4°C HCl pH <2	14 days
PCBs (water)	8082	2 1-L Amber Glass w/TLC	Cool to 4°C	7 days Pre-extraction 40 days Post-extraction
Oil Burning Specifications (oil)	40 CFR 279.11	8-oz. WM Glass	None	14 days except metals metals – 180 days
Volatile Organics (GC/MS) Capillary (Oil)	SW8260B	8-oz. WM Glass	None	14 days
Metals (RCRA) (oil)	6010B/6020/7470A	8-oz. WM Glass	None	180 days Mercury 28 days
TCLP Metals (Solid/Sludge)	1311/SW6010B/SW7470A	8-oz. WM Glass	Cool to 4°C	180 days Mercury 28 days
TCLP VOCs (Solid/Sludge)	1311/SW8260B	4-oz WM Glass w/TLC	Cool to 4°C	14 days Pre-extraction 14 days Post-extraction
PCBs (Solid/Sludge)	SW8082	8-oz WM Glass w/TLC	Cool to 4°C	14 days Pre-extraction 40 days Post-extraction
TCLP – Full Suite (Solid/Sludge)	1311/6010B – Metals 1311/7470A – Mercury 1311/8260B – VOCs 1311/8270C – SVOCs 1311/8081A – Pesticides	8-oz WM Glass w/TLC	Cool to 4°C	Metals – 180 days Mercury – 28 days Pre-extraction 28 days Post-extraction VOCs – 14 days Pre-extraction 14 days Post-extraction SVOCs – 14 days Pre-extraction 7 days Post-extraction Pesticides – 14 days Pre-extraction 7 days Post-extraction

Notes:

CFR = Code of Federal Regulations
GC/MS = gas chromatography/mass spectrometry
mL = milliliters
oz = ounce
PCB = polychlorinated biphenyl
RCRA = Resource Conservation and Recovery Act
SVOC = semivolatile organic compound
TLC = Teflon lined cap
TLS = Teflon-lined seta
VOA = volatile organic analysis
VOC = volatile organic compound
WM = wide-mouth container
°C = degrees Celsius
For additional definitions, see acronyms and abbreviations list.

5.0 CALIBRATION PROCEDURES AND FREQUENCY

This section describes procedures for maintaining the accuracy of all instruments and measuring equipment used for conducting field tests and laboratory analyses. Instruments and equipment should be calibrated prior to each use or on a scheduled periodic basis.

Proper field equipment and instrument performance is necessary to obtain reliable data. Instruments and equipment used to gather, generate, or measure environmental or waste characterization data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications. All measuring and test equipment will be calibrated prior to use and regularly when in use. Calibration of field instruments is governed by the specific Standard Operating Procedure (SOP) for the applicable field analysis method. Frequency will be based upon the type of equipment, inherent stability, manufacturer's recommendations, and intended use. If an internally calibrated field instrument fails to meet calibration/checkout procedures, it will be returned to the manufacturer for service. Calibration of field instrument is further discussed in the FSP.

The field team leader will be responsible for implementing and documenting the calibration and preventative maintenance procedures. All calibrations and maintenance procedures will be recorded in the field logbooks. Preventative maintenance will be addressed by daily checks of equipment prior to initiation of field operations.

Instruction manuals for all field instruments will be available on site. Critical spare parts such as lamps and batteries will be kept on site to minimize downtime. Preventive maintenance for field instrumentation will be performed according to manufacturer's instructions and applicable standard operating procedures.

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6.0 ANALYTICAL PROCEDURES

6.1 LABORATORY ANALYTICAL DATA

Analytical methods are defined by EPA SW-846 (EPA 1986, 1994, 1996). The following narrative describes the analytical technique, instrument detection, and modification to the methodologies.

- Volatile organic compounds will be assessed by gas chromatography/mass spectrometry (GC/MS) technique by SW-846 Method 8260B.
- Semivolatile Organic Compounds will be assessed by the GC/MS technique SW846 Method 8270C.
- Analyses of samples for polychlorinated biphenyls (PCBs) will be performed by GC techniques using SW-846 Method 8082.
- Analyses of chlorinated pesticides will be done utilizing method SW-846 8081A.
- Metals analyses (total concentrations) will include digestion by EPA Method 3005A for waters and 3050B for soils, with subsequent analysis by inductively coupled plasma spectroscopy/mass spectrometry by EPA SW846 series methods 6010B/6020/7470A/7471A to assess the analytes of arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver.
- Analysis of samples for Oil Burning Specifications will be performed by the following methods: flash point – SW1020, total halogens – American Society for Testing and Materials D 808, PCBs – SW-846 Method 8082, Metals - SW6020.
- Samples also will be analyzed for TCLP. This method involves utilizing a leaching procedure (SW1311) to create an aqueous leachate, then extracting and analyzing the leachate as an aqueous sample via the applicable method for water.

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7.0 SAMPLE CUSTODY

7.1 SAMPLE CUSTODY DEFINITION

Chain-of-custody is a term that identifies the sequential history of individuals who were in control or possession of a sample or group of samples. The CoC record is a written document that identifies and tracks a sample from the time it is collected until the time it is analyzed. A sample is under a person's custody in any of the following events:

- It is in that person's physical possession.
- It is in that person's view after being in that person's possession.
- It was in that person's possession and then he or she locked the sample in a cooler or refrigerator to prevent tampering.
- It has been placed in a designated or secure area by that person.

Each time the samples change possession, both individuals must sign, date, and provide time on the CoC record. The CoC protocol will follow procedures described in the document "National Enforcement Investigations Center Policies and Procedures," revised June 1985, EPA-330/9-78-110-R. A single form such as that shown in Figure 4-4 in the FSP is permissible for both CoC and sample analysis request purposes.

7.2 SAMPLE CUSTODY DOCUMENTATION

Individual site samples will be entered on the CoC record following collection. Chain-of-custody records will be unique for samples originating from a single site.

The following information will be included on the CoC record:

- Sample numbers (corresponding to the sample identification numbers on the sample labels)
- Project name/number
- Client name
- Sampler's signature
- Date/time of sample collection
- Type of samples (e.g., soil, groundwater)
- Analytical methods required
- Number and type of containers (e.g., 40-milliliter (mL) glass volatile organic analysis, 1-L amber jar)

- Remarks (e.g., samples filtered in the field)
- Laboratory designation
- Date/time samples relinquished
- Date/time samples received
- Receiving individual

Each shipment of samples will be accompanied in the cooler by the completed, signed, and dated CoC records. After sample collection and prior to shipment, samples will be packaged and preserved to ensure sample integrity during shipment per requirements in Section 4.9 of the FSP. The CoC record will be placed in a waterproof plastic bag and secured to the inside lid of the cooler shipping container.

The lid of the shipping container will be secured at a minimum of two locations with strapping tape. Signed custody seals will be affixed on the front-right and back-left of the cooler.

7.2.1 Responsibilities and Procedures

Relinquishment of the samples will be the responsibility of the field team members. The field team members will be responsible for the samples from the time they are collected until they are relinquished to the laboratory via shipment by overnight air. A sample custodian at TBD will receive the sample and initiate internal laboratory custody protocols.

7.3 FIELD DOCUMENTATION

Field sampling will be documented to assure data validity and facilitate analysis and evaluation. The specific identification and documentation requirements are identified in the following subsections. Field documentation requirements and sample identification codes are discussed in Section 4.0 of the FSP (SAP Part One).

7.4 PACKAGING AND SHIPPING REQUIREMENTS

Samples will be packaged and labeled for shipment according to United States Department of Transportation (DOT) regulations as promulgated in 49 Code of Federal Regulations 171 through 177.

Packaging and shipment of samples will also be consistent with requirements of sampling handling protocols in the AFCEE QAPP. Some of the requirements are described below.

- Volumes of all water samples contained in liter glass bottles will be marked with a grease pencil prior to shipment.
- All bottles will be enclosed in clear plastic bags, sealed, wrapped with plastic packaging material (bubble-wrap), and placed upright in the cooler for shipment.
- If used, chemical ice (blue-ice) for cooling preservation will additionally be placed and isolated in plastic bags.
- Samples designated as medium or high hazard must be placed in metal paint cans, packed with vermiculite and labeled according to DOT regulations.
- Drain on insulated cooler will be taped shut.
- Signed and numbered custody seals will be affixed to the front-right and back-left of cooler.

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8.0 INTERNAL QUALITY CONTROL CHECKS

Project QC samples will be collected in the field to assess precision and accuracy and determine errant contamination through sampling equipment or containers. Project QC samples will accompany project samples to the AFCEE approved laboratories and are referenced in Table 8-1.

8.1 FIELD QUALITY CONTROL SAMPLES

All field QC samples will be collected, handled, documented, preserved, packaged, and shipped using the same techniques as for all other samples. The following describes the field QC samples included in the analytical scheme. Waste characterization field duplicate samples are not included in this plan.

8.1.1 Equipment Blanks

Equipment blanks (also referred to as rinsate blanks) assess the contamination effects on accuracy due to the combined activities of sampling and analysis. An equipment rinsate blank sample will not be collected or analyzed for this field effort.

8.1.2 Trip Blanks

Trip blanks will not be prepared or analyzed for this waste characterization effort.

8.1.3 Temperature Blank Samples

A temperature blank consisting of at least 500 mL water in a high-density polyethylene bottle will accompany every cooler transporting project samples to the laboratory. The Laboratory Sample Custodian will record the temperature of the temperature blank sample and cooler during sample receipt procedures, and log the data on the CoC documentation in the cooler and on the cooler receipt form.

8.2 LABORATORY QUALITY CONTROL SAMPLES

Laboratory QC requirements are defined by the analytical methodology. The following describes the laboratory QC samples included in the analytical scheme.

8.2.1 Blanks

A method blank (MB) is used to monitor organic laboratory contamination. A preparation blank (PB) is used to monitor inorganic or general chemistry laboratory contamination. A sample of laboratory reagent water or soil matrix is treated with all the reagents and in the same manner as the sample (i.e., digested, extracted, distilled). The MB or PB must contain less than the method's quantitative limit for the compounds of interest. If this criterion is not met, then all sample processing will be halted until corrective measures are taken and documented. All samples processed with the out-of-control method blank will be re-extracted and re-analyzed.

One MB or PB will be prepared for each batch of no more than 20 samples processed (5 percent), and will be analyzed for all parameters.

8.2.2 Matrix Spike and Matrix Spike Duplicate Samples

Project bias or accuracy will be assessed by preparing and analyzing matrix spike (MS) samples. MS samples provide information about the effect of the sample matrix on the digestion and measurement methodology. MS samples will be prepared in the laboratory by fortifying a sample aliquot with known quantities of the targeted compounds of interest at concentrations within the range expected in the sample. This fortified aliquot (or MS) is then analyzed along with an unfortified aliquot. From the results for the fortified aliquot, percent recovery of each analyte within the representative sample matrix can be determined.

All MS samples are performed in duplicate for organic analysis with the duplicate sample referred to as a matrix spike duplicate (MSD) sample.

MS and MSD samples will be prepared in the laboratory and analyzed for one set out of every 20 samples.

8.2.3 Surrogate Spikes

Surrogate spikes assist in data quality assessments for GC analysis. Surrogate spikes will be used to fortify all project samples, MB, LCS, MS, and MSD samples prior to sample preparation and GC analysis.

The surrogate recovery, expressed as a percentage, will be calculated and compared to laboratory generated control limits. Corrective actions will be initiated if percent recovery exceeds method-specified and/or laboratory-generated established control limits.

8.2.4 Laboratory Control Samples (LCS)

The LCS is an internal QC check applied by the laboratory. Analytical measurement accuracy will be assessed by preparing and analyzing an LCS. The LCS will be prepared by fortifying a MB in the laboratory with known quantities of the targeted compounds of interest being analyzed at concentrations within the range expected in the sample. This fortified aliquot is then analyzed and the percent recovery calculated by the formula in Section 9.1 of this QAPP. All target analytes will be spiked.

An LCS will be prepared and analyzed with every preparatory batch of no more than 20 samples.

8.2.5 Matrix Duplicate Sample Analysis

Matrix duplicate analyses are indicators of laboratory precision based on each sample matrix for inorganic analysis.

Matrix duplicate sample analyses will be prepared in the laboratory and analyzed for a minimum of 5 percent of samples submitted for metals and general chemistry analyses.

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9.0 CALCULATION OF DATA QUALITY INDICATORS

9.1 ESTIMATION OF PRECISION, ACCURACY, AND COMPLETENESS

Precision and accuracy of the measurements will consider three potential sources of error:

- Gross errors
- Systematic errors
- Random errors

Data quality will be assessed using the following formulas:

- Precision for field replicates, LCS, and MSD

$$RPD = \frac{2|(D_1 - D_2)|}{D_1 + D_2} X\ 100$$

Where: D_1 = First sample value
D_2 = Second sample value (replicate)
RPD = relative percent difference

- Accuracy for LCS and MS samples

$$\%\ Recovery = \frac{(0 - X)}{T} X\ 100$$

Where: 0 = Measured quantity of analyte in sample plus spiked solution
X = Measured sample prior to spiking
T = Quantity of analyte spiked

- Completeness

$$\%C = 100\%\ X\ (V/n)$$

Where: %C = Percent completeness
V = Number of measurements judged valid
n = Total number of measurements necessary to achieve a level of confidence in decision making

9.2 PERFORMANCE AND SYSTEM AUDITS

Performance and system audits of both field and laboratory activities may be conducted to verify that sampling and analysis are performed in accordance with the procedures established in the SAP and this QAPP. The audits of field and laboratory activities include two separate, independent parts: internal and external audits.

9.2.1 Field Audits

Internal audits of the field activities may be implemented during the data collection activities. Additional audits may be conducted if problems are encountered. The audit will be conducted by the Field Team Leader and will cover sample identification, sample control, CoC procedures, field documentation, and sampling operations.

During the audit, the Field Team Leader will maintain a record of the audit with written field notes. Upon completion of the audit, the Field Team Leader will develop an audit report that summarizes areas requiring corrective measures. This report will be submitted to the Project Manager, and resolution of final action as described under Section 12.0 of the QAPP will be subsequently implemented.

9.2.2 Laboratory Audits

A laboratory audit may be scheduled by Jacobs. The approved AFCEE contract laboratory is assumed to have undergone detailed system and performance audits for inclusion list of AFCEE approved laboratories.

The laboratory is expected to conduct routine audits of facilities, processes, and procedures according to written protocols established by the laboratory QA program. These audits are assumed to be conducted by the Laboratory QA Officer, and the results will be documented in written reports.

Prior to any sampling activities at the site, the Project Chemist may assess the laboratory's QC procedures and method performance data to ensure that they will meet the DQOs for this project. The internal QA systems of SOPs, sample custody procedures, instrument

calibration, preventative maintenance, QC checks, and corrective action procedures will be reviewed.

9.2.3 Documentation Audit

The Project Manager will monitor and provide peer review of all deliverables for inclusion in the final report.

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10.0 PROCEDURES USED TO ASSESS DATA QUALITY

10.1 LABORATORY DATA REDUCTION

Analytical data submitted by the laboratory will have been reviewed by the Laboratory QA Officer or designee to verify that appropriate units are assigned to all concentration values, equations used to calculate concentrations are correct, GC/MS detected compounds are correctly identified, and QC sample results are appropriately summarized and within established control ranges.

10.2 DATA VERIFICATION PROCEDURES

Data verification procedures will be performed to ensure the competency of the reported results. The Project Chemist or designee will verify data sets at the frequency of 100 percent. Laboratory identification numbers will be cross-checked with field identification numbers to verify CoC documentation. Each laboratory value will be reviewed and checked to account for traceability from the data report through the laboratory and the field collection. Missing information regarding any QC elements (surrogates, LCS, MS, duplicates, etc.) will be noted. All identified discrepancies from data verification procedures will be corrected through requested correspondence with the laboratory.

Laboratory data will be presented in hardcopy and computerized format consistent with Corps of Engineers Loading Tool (COELT) Version 1.2a. The hardcopy laboratory data will be compliant with the AFCEE QAPP and be complete to the extent that a thorough data review is possible.

10.3 DATA VALIDATION PROCEDURES

Analytical data will be generated for this project as definitive data (EPA 1993). The validation effort applied for definitive data is described as:

- Verification of sample container identifications
- Verification of holding times, CoC forms, and sample identification
- Confirmation of 10 percent of the samples collected and submitted for analysis for precision, accuracy, method detection limit, and error determination

- Evaluation of results of the samples in the analytical data packages for all of the elements listed under SAP and QAPP
- Review of blank contamination and detection capability for the remaining samples

Jacobs will review the analytical data package received from the laboratory, but will not perform data validation procedures on the analytical results.

Data review decisions will result in "flags" being applied to the dataset to indicate uncertainty associated with inaccuracy, imprecision, or likely or probable introduced contamination from laboratory or field sources. These flags are defined in the AFCEE QAPP.

Subsequent recommendation for the qualification of data will be made by comparison of the QC sample results to laboratory-established control limits (LECL).

- LCS QC sample results will be compared to laboratory sample accuracy control limits for spiked samples.
- Surrogate compound recoveries will be compared to LECL for EPA methodologies.

An assessment of errant method and/or field-introduced contamination will be determined from laboratory blank samples with subsequent recommendation for the qualification of data.

The review effort will consist of the following:

- Reviewing laboratory QC samples and field QC samples at 100 percent frequency
- Reviewing data for adherence to the project quantitative QA objectives specified in this QAPP
- The Project Chemist will prepare a brief DAR to document data review findings and assess data quality.

Procedures for handling corrective actions are discussed in Section 11.0 of this QAPP.

10.4 ELECTRONIC DATA MANAGEMENT SYSTEMS

Analytical result electronic data deliverables (EDD) in COELT v1.2a will be requested from the laboratory to be delivered with the hardcopy data documentation. The Project Chemist or designee will be responsible for verification procedures to include a cross-checking of the EDD with hardcopy analytical results. Changes to the EDD will be requested from the laboratory if found during verification procedures.

10.5 DATA REPORTING

Data reporting deliverables will include the following:

- Spreadsheets of the compiled, verified, and validated result database by site
- Data Assessment Report

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11.0 CORRECTIVE ACTION

11.1 CRITERIA FOR DATA ACCEPTABILITY

QA procedures are incorporated into the project to ensure the generation of quality and representative data. Therefore, monitoring adherence to these procedures, in part, forms the basis for acceptability of the data. The major project review for data acceptability falls under routine procedures for assessing data quality.

Identification of nonconformances or deficiencies from observations and feedback by technical staff and project personnel will result in the initiation of corrective actions. These procedures are outlined in the following subsections.

11.2 RESPONSIBILITY AND AUTHORITY

When a nonconformance or deficiency is identified during routine QC review procedures or during routine observations by technical staff and project personnel, corrective action will be initiated by the appropriate manager, such as the Laboratory QA Officer. The initiating manager will complete documentation of nonconformance and provide this information to the appropriate personnel and the project files.

The schedule and timing for corrective action will be in accordance with the implementation procedures described below. No staff member will initiate corrective action without prior communication of his or her findings through the proper channels, as specified by the QAPP. A non-conformance report will be filed for all non-laboratory-related deficiencies that may potentially impact the quality of the data, as described below.

11.2.1 Project Activities

Technical staff and project personnel will be responsible for reporting all suspected technical or QA non-conformances or suspected deficiencies of any activity or issued document by reporting the situation to the Project Manager. The Project Manager will be responsible for assessing the suspected problems and making a decision based on the potential impact on the quality of the data. If the Project Manager determines that the situation is a reportable

nonconformance requiring corrective action, the Project Manager will initiate a nonconformance report.

11.2.2 Field Activities

Field personnel will be responsible for reporting any suspected technical or QA deficiencies to the Field Team Leader. The Field Team Leader will be responsible for assessing the suspected deficiency and for determining, in consultation with the Project Chemist and Project Manager, the impact on the quality of the data.

Corrective actions will be implemented and documented in the field logbook. Corrective action for field measurements may include the following:

- Repeat the measurement to check the error
- Check for all proper adjustment for ambient conditions such as temperature
- Check the batteries
- Recalibrate equipment
- Check the calibration
- Replace the instrument or piece of equipment
- Stop work

11.3 LABORATORY ACTIVITIES

The laboratory will have a QA program in place and functioning.

Sample receipt problems identified by the Laboratory Sample Custodian during laboratory sample receipt procedures will initiate corrective action procedures. The Project Chemist will submit to the Project Manager a resolution of the identified problem or documentation discrepancy within 48 hours of the samples arriving at the laboratory.

The initial responsibility to monitor the quality of an analytical system lies with the laboratory analyzing the sample. Laboratory personnel are alerted that corrective actions may be necessary if:

- QC data are outside the warning or acceptable windows for precision and accuracy.
- Blanks contain target analytes above acceptable levels.

- Undesirable trends are detected in spike recoveries or relative percent difference between duplicates.
- There are unusual changes in detection limits.
- Deficiencies are detected by the QA department during internal or external audit or from the results of performance evaluation samples.
- Inquiries concerning data quality are received.

Corrective action procedures may be handled at the bench level by the analyst, who will review preparation or extraction procedures for possible errors and check instrument calibration, spike and calibration mixes, instrument sensitivity, etc. If the problem persists or cannot be identified, the matter will be referred to the Laboratory Manager and Laboratory QA Officer for further investigation. Once resolved, full documentation of the corrective action will be filed with the QA department.

The laboratory will verify that all QC procedures are followed and results of analysis of QC samples are within acceptance criteria. The laboratory is required to assess the following items, as appropriate:

- Sample preparation procedure
- Initial calibration
- Calibration verification
- Laboratory duplicate analysis
- Laboratory control standard

If the assessment reveals that any of the QC acceptance criteria are not met, the analyst must immediately assess the analytical system to correct the problem. The analyst will notify the Laboratory Manager and Laboratory QA Officer of the problem and, if possible, identify potential causes and corrective action.

The nature of the corrective action depends on the nature of the problem. For example, if a continuing calibration verification is determined to be out of control, the corrective action may require recalibration of the analytical system and re-analysis of all samples since the last acceptable continuing calibration standard.

When the appropriate corrective action measures have been defined and the analytical system is determined to be "in control," the analyst will document the problem, the corrective

action, and the data demonstrating that the analytical system is in control. Copies of the documentation are provided to the Laboratory Manager and Laboratory QA Officer.

Specific corrective measures pertaining sample loss or breakage are discussed below:

- Samples: If problems are identified by the Laboratory Sample Custodian during laboratory sample receipt procedures (i.e., insufficient sample volume for analysis, sample temperature exceedances, incomplete documentation, and sample shipping problems), the Project Chemist and Project Manager will be notified by FAX or email transmission. A determination may be made to collect an additional waste characterization sample. The analysis report for the sample batch containing the affected sample will clearly note in the discussion section that a replacement sample was taken. Notification of sample receipt will be done for each sample delivery group.
- Quality Control Samples: If a solvent blank or method blank is lost or broken during analysis, a replacement QC sample will be sampled and analyzed. The analysis report will clearly note that a replacement QC sample was analyzed.

11.3.1 Documentation and Distribution

Corrective actions will be documented by nonconformance reports, which will be filed for all nonconformances. Nonconformance reports will be completed by the project staff member responsible for execution or supervision of the corrective action. Nonconformance reports will consist of, at a minimum, the following information:

- Name and title of reporter
- Date of filing of report
- Description of nonconformance
- Description and date of follow-up action and/or corrective action, if necessary
- QA approval signature(s) and date (indicating completion of follow-up/corrective action)
- Specific distribution list

12.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

12.1 RESPONSIBILITY

The proper maintenance of QA records is essential to provide support in evidentiary proceedings and to ensure the overall quality of the investigation. Comprehensive QC records will be maintained in the project files to provide evidence of the QA activities. Records of QC program implementation will be written and retained on file, and QA documents will be archived in the project files. Pertinent information, including that received from contractors and other outside sources or developed during the project, will be maintained.

12.2 QUALITY ASSURANCE REPORTS

A QA report may be provided if initiated through corrective actions of field operations as the result of field audits or as identified through data validation procedures (Section 10.3 of this QAPP).

The QA reports will include, but are not limited to, the following information:

- A summary of the laboratory QA activities for the reporting period
- Results of laboratory external and internal performance and system audits
- Summaries of corrective action taken in the laboratory to remedy out-of-control situations during the reporting period
- Recommendations, if any, for revisions in laboratory procedures to improve the analytical systems.
- Results of field procedures audits
- Data control summary reports
- DAR report

The Project Chemist will provide written documentation to the Project Manager of any deviations from the QAPP or corrective actions initiated in the field that could affect project QA/QC.

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13.0 REFERENCES

AFCEE (Air Force Center for Environmental Excellence). 2001 (August). Quality Assurance Project Plan (QAPP). Version 3.1.

EPA. (United States Environmental Protection Agency). 2002 (July). USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review. Office of Emergency and Remedial Response. EPA 540/R-94/013.

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EPA. 1996 (December). Test Methods for Evaluating Solid Waste. Final Update III, SW-846.

EPA. 1994 (September). SW-846 Test Methods for Evaluating Solid Waste. Final Update II.

EPA. 1993 (September). Data Quality Objectives Process for Superfund. Office of Solid Waste and Emergency Response (OSWER), EPA540-R-93-071.

EPA. 1986. Test Methods for Evaluating Solid Waste. 3rd ed., SW-846.

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ATTACHMENT 1

Laboratory Variance Letter

STL Sacramento Technical Approach to AFCEE QAPP, Version 3.1

STL Sacramento proposes the following clarification, additions and changes to the AFCEE Quality Assurance Project Plan (QAPP), Version 3.1.

Table 7.2.5-1 RLs for Method SW8081A

Parameter	Method	Analyte	STL Sacramento Water (ug/L)	AFCEE Water (ug/L)
Organochlorine Pesticides	SW8081	Toxaphene	2.0	1.0

Justification: Our MDL for Toxaphene is 0.51 ug/L.

Table 7.2.5-2 QC Acceptance Criteria for Method SW8081A

STL Sacramento does not include the Chlordane compounds or toxaphene as part of the spike list, due to co-elution issues.

Table 7.2.9-1 RLs for Method 8260B

Parameter	Method	Analyte	STL Sacramento Water (ug/L)	AFCEE Water (ug/L)	STL Sacramento Soil (ug/kg)	AFCEE Soil (ug/kg)
VOCs	SW8260B	1-Chlorohexane	2.0	1.0	10.	5.0
		1,1,2,2-Tetrachloroethane			5.0	3.0
		1,1,1,2-Tetrachlorethane			5.0	3.0
		1,2-Dichloroethane			5.0	3.0
		1,3-Dichloropropane	0.5	0.4	5.0	2.0
		1,4-Dichlorobenzene			5.0	2.0
		cis-1,3-Dichloropropene			5.0	3.0
		Benzene	0.5	0.4	5.0	2.0
		Bromodichloromethane			5.0	2.0
		Chlorobenzene			5.0	2.0
		Chloroform	0.5	0.3	5.0	2.0
		Dibromochormethane			5.0	3.0
		Hexachlorobutadiene			5.0	3.0

Justification: Requested RLs are below STL Sacramento calibration range.

Table 7.2.9-2 QC Acceptance Criteria for Method SW8260B

Isopropylbenzene is associated with IS 2 instead of IS 3. MIBK is associated with IS1 instead of IS3. Justification is based on retention time and SW-846 assignment criteria.

Table 7.2.16-1 RLs for Method SW6020

Parameter	Method	Analyte	STL Sacramento Water (mg/L)	AFCEE Water (mg/L)	STL Sacramento Soil (mg/kg)	AFCEE Soil (mg/kg)
ICP/MS	SW6020	Thallium	0.001	0.0002	0.1	0.02

Justification: STL Sacramento MDL for Thallium is 0.00025 mg/L and 0.025 mg/kg

Table 7.2.11-1 RLs for Method SW8290

Parameter	Method	Analyte	Water [1] (ng/L)	Soil [2] (pg/g)
Dioxins/Furans	SW8290	Dioxins		
		1,2,3,7,8-PeCDD	0.05	5.0
		1,2,3,4,7,8-HxCDD	0.05	5.0
		1,2,3,6,7,8-HxCDD	0.05	5.0
		1,2,3,7,8,9-HxCDD	0.05	5.0
		1,2,3,4,6,7,8-HpCDD	0.05	5.0
		OCDD	0.1	10
		Furans		
		1,2,3,7,8-PeCDF	0.05	5.0
		2,3,4,7,8-PeCDF	0.05	5.0
		1,2,3,4,7,8-HxCDF	0.05	5.0
		1,2,3,6,7,8-HxCDF	0.05	5.0
		1,2,3,7,8,9-HxCDF	0.05	5.0
		2,3,4,6,7,8-HxCDF	0.05	5.0
		1,2,3,4,6,7,8-HpCDF	0.05	5.0
		1,2,3,4,7,8,9-HpCDF	0.05	5.0
		OCDF	0.1	10

Note: "Totals" values are available upon client request. Sample specific-detection limits may also be reported upon request.

[1] = Based upon 1 liter sample aliquot. Sensitivity of the method depends on the level of interference rather than instrumental limitations. Typical waste samples may have higher reporting limits and may require additional cleanup techniques.
[2] = Based upon 10 gram sample aliquot. Maximum RLs for samples "as received." Correction for moisture content may raise reporting limits above these levels. Typical waste samples may have higher reporting limits and may require additional cleanup techniques.

UNITED STATES AIR FORCE
ELMENDORF AIR FORCE BASE, ALASKA

ENVIRONMENTAL RESTORATION PROGRAM

LF04 DEBRIS REMOVAL WORK PLAN
APPENDIX A – SAMPLING AND ANALYSIS PLAN
PART THREE: WASTE MANAGEMENT PLAN

FINAL

SEPTEMBER 2004

TABLE OF CONENTS

SECTION **PAGE**

ACRONYMS AND ABBREVIATIONS iii
1.0 INTRODUCTION 1-1
2.0 ANTICIPATED WASTE STREAMS 2-1
3.0 GENERAL WASTE MANAGEMENT PROCEDURES 3-1
3.1 WASTE TRACKING 3-1
3.2 WASTE STAGING 3-1
3.3 WASTE CHARACTERIZATION 3-2
3.4 TURN-IN OF WASTE TO DRMO 3-2
4.0 MANAGEMENT OF SPECIFIC WASTE STREAMS 4-1
4.1 DRUM CONTENTS 4-1
4.1.1 HazCat® Evaluation for Waste Bulking 4-1
4.1.2 Drum Content Characterization 4-4
4.2 ASBESTOS CONTAINING MATERIAL 4-4
4.3 TRANSFORMERS AND ELECTRICAL COMPONENTS 4-5
4.4 BATTERIES 4-5
4.5 DECONTAMINATION WATER 4-5
4.6 MISCELLANEOUS SOLID WASTE 4-5
4.7 HAZCAT FIELD TEST KITS 4-6
5.0 REFERENCES 5-1

TABLES

Table 1-1 Waste Management Responsibilities 1-2
Table 2-1 Anticipated Waste Streams for the LF04 Debris Removal 2-2
Table 4-1 HazCat Initial Evaluation Summary 4-3

ATTACHMENTS

Attachment 1 Waste Inventory Sheet
Attachment 2 Waste Staging Area Inspection Checklist

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ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
CFR	Code of Federal Regulations
DOT	U.S. Department of Transportation
DRMO	Defense Reutilization and Marketing Office
ESF	Environmental Staging Facility
FSP	Field Sampling Plan
LF	landfill
mL	milliliter
PCB	polychlorinated biphenyls
POL	petroleum, oil, and lubricant
RCRA	Resource Conservation and Recovery Act
SAP	Sampling and Analysis Plan
TSCA	Toxic Substances Control Act
TSDF	treatment, storage, and disposal facility
WMP	Waste Management Plan

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1.0 INTRODUCTION

This Waste Management Plan (WMP) describes the wastes expected to require disposal as a result of the Landfill No. 4 (LF04) Debris Removal on Elmendorf Air Force Base (AFB), Alaska in 2004. This plan describes the waste disposal approach and waste management practices.

The WMP is the third of three parts of the Sampling and Analysis Plan (SAP) for the LF04 Debris Removal field effort. The debris removal effort includes removal and disposal of debris from the beach area. Characterization of potentially hazardous materials is discussed in the Field Sampling Plan (FSP), SAP, Part One. This WMP identifies waste that may be encountered during the debris removal. This plan specifically addresses staging procedures, methods for ultimate disposition of various waste types, and responsibilities for waste management.

Waste management procedures have been developed in accordance with Elmendorf AFB guidance, specifically the *3rd Wing OPLAN 19-3, Hazardous Waste, Used Oil, and Hazardous Material Management Plan (September 1998)* and the *Basewide Environmental Staging Facility Operations and Maintenance Plan (March 1993)*.

Responsibilities for waste management associated with the LF04 Debris Removal field program are outlined in Table 1-1.

Table 1-1
Waste Management Responsibilities

Organization	Responsibility
Jacobs Engineering Group Inc.	• Establish temporary staging area at LF04 during the field effort. • Containerize and label all waste. • Stage waste at the ESF pending receipt of analytical results. • Coordinate in advance with Elmendorf AFB TSDF and DRMO personnel to identify potentially hazardous waste and prearrange waste turn-in procedures. • Characterize waste to determine appropriate disposal method. • Prepare waste profiles and manifests for Air Force representative signature • Deliver hazardous waste to DRMO for subsequent management and disposal. • Dispose of non-hazardous waste via offsite contractor. • Clean drums removed from the site and drums used for storage of waste; recycle or stage drums for reuse as directed by 3CES/CEVR. • Remove all waste from the ESF by October 15, 2003.
Elmendorf AFB Environmental Flight (3CES/CEV)	• Serve as the waste generator for purpose of manifest and turn-in documentation signatures. • Coordinate with Elmendorf AFB, TSDF, and DRMO as applicable for turn-in of hazardous waste.
Elmendorf AFB TSDF Personnel	• Provide guidance on hazardous waste turn-in requirements.
DRMO	• Accept hazardous waste for storage and ultimate disposal.

Notes:

3 CES/CEVR	3rd Civil Engineer Squadron/Civil Engineer Environmental Restoration
DRMO	Defense Reutilization and Marketing Office
ESF	Environmental Staging Facility
TSDF	treatment, storage, and disposal facility

For additional definitions, see the acronyms and abbreviations list.

2.0 ANTICIPATED WASTE STREAMS

During the LF04 Debris Removal field program, it is anticipated that several waste streams may be generated. Table 2-1 outlines the anticipated waste streams and anticipated quantity to be generated. If quantities of waste are generated in excess of the quantities listed in Table 2-1, the Air Force Center for Environmental Excellence Contracting Officer Representative and the Air Force project manager will be notified.

Table 2-1
Anticipated Waste Streams for the LF04 Debris Removal

Waste Type	Source	Anticipated Constituents	Approximate Quantity	Proposed Disposal Location
Non-hazardous Debris	LF04 Landfill – Items removed from LF04 Beach	Metal, wood, rubber, melted metal, construction debris	Up to 35 tons	Anchorage Municipal Landfill
Soil/Sludge, water, oil from drums	LF04 Landfill - Drums removed from the LF04 beach	Petroleum hydrocarbons, metals, PCBs, pesticides	Up to 5 drums	Non-hazardous – Appropriate offsite facility Hazardous – TSDF/DRMO
Suspect or confirmed Asbestos Containing Material (ACM)	LF04 Landfill – ACM removed from the LF04 beach.	Asbestos	Up to 2 pieces	Anchorage Municipal Landfill with prior approval.
Transformers and Electrical Components (switches, etc.)	LF04 Landfill – Removed from LF04 beach	Mercury or PCBs	Not anticipated to be encountered	TSDF/DRMO
Batteries	LF04 Landfill – Removed from LF04 beach	Lead Acid	Not anticipated to be encountered	TSDF/DRMO
Potential UXO / Small Arms Casings	LF04 Landfill	Potential UXO	Not anticipated to be encountered	Stop Work, Contact EOD. Do not disturb.
Cylinders	LF04 Landfill	Unknown	Not anticipated to be encountered	Stop Work, Contact EOD. Do not disturb.
Decontamination water	Decontamination activities	Petroleum hydrocarbons, metals, PCBs, dioxins, pesticides	50 gallons	Non-hazardous – Appropriate offsite facility Hazardous – TSD/DRMO
Miscellaneous solid waste (e.g., used PPE and disposable sampling equipment)	All fieldwork	Petroleum hydrocarbons, metals, PCBs, dioxins, pesticides	2 garbage bags	Non-hazardous – Appropriate offsite facility Hazardous – TSD/DRMO
Expended HazCat Test Kits	HazCat Field Test Kits	Methanol, Hexane	< 30 samples	Appropriate offsite facility.

Notes:

ACM = asbestos containing material
DRMO = Defense Reutilization and Marketing Office
EOD = explosive ordnance disposal
PCB = polychlorinated biphenyl
PPE = personal protective equipment
TSDF = treatment, storage, and disposal facility
UXO = unexploded ordnance
For additional definitions, see the Acronyms and Abbreviation section.

3.0 GENERAL WASTE MANAGEMENT PROCEDURES

3.1 WASTE TRACKING

As waste is generated during the LF04 Debris Removal fieldwork, a waste inventory will be maintained, as required by Elmendorf AFB (USAF 1993). The inventory will include information on each item and will allow for tracking the status of waste collection and final disposition. An example of a waste inventory tracking sheet is provided in Attachment 1 to this Waste Management Plan. Multiple pieces of non-hazardous debris may be tracked together (i.e. 20 pieces non-hazardous debris from location X).

Each item of potentially hazardous material will have a unique identification number to facilitate tracking. Containers will be clearly marked to show information regarding the contents, origin, date of generation, point of contact name and telephone number, and other relevant information.

3.2 WASTE STAGING

The temporary onsite staging area for the 9-day field effort will be centrally located as identified in the work plan and will be used for temporary staging of debris and potentially hazardous materials. Drums and other containers that contain waste will be placed on pallets and covered with plastic sheeting. Each pallet will hold no more than 4 drums, and drums will not be stacked. Fifty-five-gallon drums used for holding liquid waste will be placed on a pallet inside a containment device or lined area.

The temporary onsite staging area for the 9-day field effort will be inspected at a minimum of once every week. Since waste will only be in the temporary onsite staging area for 9 days, personnel will be on site during regular work hours and can inspect the temporary onsite staging area more frequently. During the inspection, the condition of drums and other containers will be noted; in the event of damage to a drum or container, the contents will be transferred into another drum that is in good condition or into an 85-gallon overpack drum. Staging area inspections will be documented using a checklist such as that provided in Attachment 2 to this WMP.

Waste will be removed periodically during the fieldwork or will remain at the temporary onsite staging area until the completion of fieldwork (9 days). All non-hazardous debris will be removed for disposal at the completion of the fieldwork. Potentially hazardous material will be transported to the Elmendorf Staging Facility (ESF) pending receipt of analytical results used to characterize the waste. The ESF is located near the corner of 9th Avenue and Jerstad Avenue on Elmendorf AFB. This staging area will be inspected once every week in accordance with 40 Code of Federal Regulations (CFR) 261.34. When waste is properly characterized and its final disposition determined, arrangements will be made for waste to be removed from the ESF and transported to its final destination (e.g., offsite disposal facility, Defense Reutilization and Marketing Office [DRMO]). Every effort will be made to remove waste from the ESF in as timely a manner as possible. All waste must be removed from the ESF by October 1, 2004.

3.3 WASTE CHARACTERIZATION

Drums found on the LF04 beach may be sampled for HazCat® analysis to assist in selecting the appropriate laboratory analysis. Samples will be collected for analytical laboratory analysis to determine proper disposal. Decontamination water will be characterized based on results from drum samples. Laboratory analyses under the LF04 field program will occur in a seven-day turn-around time for drum contents. Upon receipt of analytical results, data will be evaluated to determine appropriate waste disposition. It is anticipated that this will occur in a timeframe of approximately 10 to 60 days from waste generation, which includes any necessary interpretation or coordination with Elmendorf AFB. Until waste disposition is determined, potentially hazardous waste will remain at the ESF. Details on characterization of specific waste streams are outlined in Section 4.0 of this WMP.

3.4 TURN-IN OF WASTE TO DRMO

Any waste determined to be a hazardous waste will be turned in to DRMO for subsequent management and disposal. Any waste to be turned in to DRMO will be placed in a drum or other acceptable container; it is anticipated that U.S. Department of Transportation (DOT) - approved 1A2 55-gallon drums will be used for soil or other solid waste, DOT –approved 1A1 55-gallon drums will be used for liquid waste. A hazardous waste label will be provided by the Elmendorf AFB treatment, storage, and disposal facility (TSDF) and will be affixed to each drum. With the assistance of Elmendorf AFB TSDF personnel, waste turn-in to DRMO

will be prearranged. Drums will then be transported to DRMO. At turn-in, all drums will have the following items:

- container log
- containers in good condition
- properly filled-out hazardous waste labels adhered to the container
- proper DOT markings and labels
- completed Air Force Form 2005
- copy of Material Safety Data Sheet , if applicable

TSDF and DRMO personnel will complete additional forms and weigh each container.

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4.0 MANAGEMENT OF SPECIFIC WASTE STREAMS

Management of potentially hazardous waste materials is discussed below. Non-hazardous debris will be transported to Anchorage Municipal Landfill.

4.1 DRUM CONTENTS

Drums removed from the LF04 beach will be containerized in overpacks or the contents will be transferred to new drums. Drums will be staged at the ESF for storage pending receipt of analytical results. Empty drums will be decontaminated at the ESF and recycled or stored at a location designated by Elmendorf AFB for reuse. HazCat analysis may be performed for waste characterization and to determine if wastes can be consolidated. Laboratory analytical results for drum contents will be used to characterize the waste for disposal.

4.1.1 HazCat® Evaluation for Waste Bulking

HazCat® evaluation of drum contents may be conducted to identify materials with hazardous characteristics and to allow for waste bulking. If HazCat® analysis is believed to be cost effective, HazCat procedures will be conducted in accordance with the HazCat® Users' Manual and FSP Addendum (Appendix A, Part One). Each waste material will be evaluated through a series of field tests and segregated into the following waste types: potential Resource Conservation and Recovery Act (RCRA) waste, based on flammability, oxidizing potential, peroxide, and pH extremes; potential Toxic Substances Control Act (TSCA) of 1976 waste, based on polychlorinated biphenyls (PCB); non-RCRA, non TSCA, petroleum, oil, and lubricant (POL)-type waste; and non-hazardous waste. Any waste showing a RCRA or TSCA characteristic will be left in its original container (if in a drum), sampled for laboratory analysis, overpacked, and segregated appropriately in the waste staging area.

If bulking is conducted, non-RCRA, non-TSCA wastes will be tested to determine compatibility with already bulked material of the same waste. An aliquot of each waste to be bulked (in proper relative proportions) will be mixed together. Wastes will not be bulked if compatibility tests result in noticeable chemical reactions that emit heat, vapor, or flocculation. Incompatible wastes will be segregated appropriately. Compatibility testing is performed by mixing an aliquot of the waste in question with a sample of a previously bulked material. The proportions used in the tests should equal the proportions of the waste in

question and the bulked waste. For example, if 20 gallons of waste are in question, and 200 gallons of wasted are bulked, one part of the waste in question will be mixed with 10 parts of the bulked waste for compatibility testing. It is anticipated that the majority of waste encountered will be non-RCRA, non-TSCA, POL-type waste. Once these wastes are determined to be compatible, they will be bulked in DOT-approved drums or containers. It is not anticipated that RCRA or TSCA wastes will be bulked. Table 4-1 lists the HazCat® initial evaluation summary parameters, criteria, and actions to be taken.

Table 4-1
HazCat Initial Evaluation Summary

Test Parameter	Criteria	Action
Oil		
1. PCBs by Clor-n Oil Determine if oil contains PCBs above TSCA-regulated limits.	<50 ppm non-hazardous >50 ppm TSCA hazardous	Bulk with non-TSCA oil, if compatible. Collect laboratory analytical samples, and segregate in TSCA waste cell of staging area.
Liquid and Solid		
2. Solubility Test to determine if sample is soluble in water or organic solvent.	Test with separate solutions of water and hexane.	Bulk, as appropriate, if not potentially hazardous (based on other field testing).
3. Flammability (ignitable) Determine if material is ignitable (high TOC).	Test indicates ignitability (high TOC) characteristic if material ignites at a temperature <140°F (D001-High TOC).	Bulk as appropriate after conducting other field testing for other potential hazardous characteristics.
4. pH Materials outside the acceptable pH range are corrosive (D002).	2<pH<12.5	Segregate, verify acid/base constituents, and determine compatibility before bulking wastes (potentially explosive reactions could occur).
5. Oxidizing Potential Determine if material is oxidative with test strip.	Test indicates ignitability (oxidizer) if potassium iodide strip turns black (D001-Low TOC).	Segregate, verify oxidizing constituents, and determine compatibility before bulking wastes (potentially explosive reactions could occur).
6. Peroxide Determine if material is oxidative with test strip.	Test indicates ignitability (oxidizer) characteristic if strip turns blue (D001-Low TOC).	Segregate, verify oxidizing constituents, and determine compatibility before bulking wastes (potentially explosive reactions could occur).
7. Reactivity Determine if material is water reactive, yields reactive cyanides (CN^-), or reactive sulfides (S^{-2}).	Test indicates reactivity characteristic if 1) the material reacts with water, 2) Cyanide gas is liberated with the addition of an acid, or 3) Hydrogen Sulfide gas is liberated with the addition of an acid. (Reactivity – D003)	Segregate, verify reactive constituents and by-products, and determine compatibility before bulking wastes (potentially explosive reactions could occur).
8. Total organic halogens (TOX) by Chlor-d-Tect ® Determine if fuels/oils contain chlorination>1,000 ppm.	Test indicates presence or absence of halogens at 1,000 ppm concentration.	Recycle if test <1,000 ppm (or) analyze at offsite laboratory for SW8260B to identify halogenated compounds.

Notes:

D00# refers to EPA Hazardous Waste Number (40 CFR 261.20)
ppm = parts per million TOX = total organic halogens
TOC = total organic carbon °F = degrees Fehrenheit
For additional definitions, see the Acronyms and Abbreviations section.

.

4.1.2 Drum Content Characterization

Laboratory analytical samples will be collected according to Section 2 of the FSP Addendum. Analytical laboratory results and HazCat analysis will be used to determine waste disposition.

4.1.2.1 Hazardous Wastes

A material that is determined to be a RCRA hazardous waste or a TSCA hazardous waste will be disposed of at the Elmendorf TSDF/DRMO.

- Non-aqueous liquids will be subject to the requirements of 40 CFR 279.11, Used Oil Specifications. Non-aqueous liquids (oil/petroleum products) will be analyzed for oil burning specifications, which includes: four RCRA metals (arsenic, cadmium, chromium, and lead), flash point, total halogens, and PCBs. Results will be compared to the specification levels in 40 CFR 279.11, Table 1.If the material fails to meet oil burning specification requirements, it will be analyzed for volatile organic compounds and four additional RCRA metals (barium, selenium, silver, and mercury) and compared to 40 CFR 261.24 to determine proper disposal.
- Sludge, solid, and liquid wastes will be subject to the requirements of 40 CFR 261.20. A solid waste is regulated under RCRA 40 CFR 261.20 if it exhibits the characteristics of ignitibility, corrosivity, reactivity, or toxicity. HazCat analysis will be used to evaluate ignitibility, corrosivity, and reactivity. To determine toxicity, analytical data will be compared to 40 CFR 261.24, Table 1. A waste is subject to the requirements of TSCA, 40 CFR 761.20(e), for PCBs.

Analytical results will be reviewed with Elmendorf AFB TSDF personnel to identify drums containing a hazardous waste. As the designated laboratory turn-around time for chemical analysis is seven days, it is anticipated that Jacobs Engineering Group Inc. will consult with TSDF personnel in a timeframe of 10 to 20 days from waste generation.

4.1.2.2 Non-Hazardous Wastes

Non-hazardous wastes (not regulated by RCRA or TSCA) will be disposed of at an off-site treatment facility according to applicable laws and regulations.

4.2 ASBESTOS CONTAINING MATERIAL

If a material is confirmed or presumed to be asbestos containing, it will be disposed of at the Anchorage Municipal Landfill. Prior approval will be obtained for disposal from the Anchorage Municipal Landfill and the Air Force Project Manager.

4.3 TRANSFORMERS AND ELECTRICAL COMPONENTS

Transformers and other electrical components suspected to be hazardous will be placed in containers suitable for transport and turned over to the TSDF/DRMO for disposal. Analytical samples will not be collected.

4.4 BATTERIES

Batteries and battery components will be placed in appropriate containers and transported to the TSDF/DRMO for disposal. Analytical samples will not be collected.

4.5 DECONTAMINATION WATER

Analytical results for drum contents will be used to determine disposal of decontamination water. If hazardous wastes are identified according to the requirements of Section 4.1, decontamination water will be considered hazardous also. If hazardous wastes are identified at this site, the decontamination water will be disposed of at the TSDF/DRMO. If hazardous wastes are not identified, decontamination water will be treated in the carbon treatment system at the ESF or transported to an off-base disposal facility for treatment in accordance with applicable laws and regulations. Both options will be evaluated at the time of disposal to determine the most cost-effective option for the quantity generated.

4.6 MISCELLANEOUS SOLID WASTE

Disposable protective clothing, disposable sampling equipment, and other similar supplies will be presumed to be non-hazardous. The waste will be bagged or otherwise containerized for subsequent disposal in an Elmendorf AFB dumpster or directly at the Municipality of Anchorage solid waste landfill. Every precaution will be taken to ensure that this miscellaneous solid waste is not intermixed with other waste streams that have specific management procedures. If HazCat field testing indicates PCBs at the site, personal protective equipment associated with that source will be bagged and consolidated with that source for disposal at the TSDF/DRMO.

4.7 HAZCAT FIELD TEST KITS

Expended HazCat field test kits will be handled in accordance with manufacturer procedures and applicable laws and regulations. Methanol will be consolidated in a glass jar in quantities $\leq$ 500 milliliters (mL), sealed well to prevent leakage, and submitted to SGS Analytical Services Inc., the analytical laboratory, for disposal. Hexane will also be consolidated in a glass jar in quantities $\leq$ 500 mL, sealed well to prevent leakage, and submitted to SGS Analytical Services Inc for disposal. Manufacturer's directions will be followed for field test kits that utilize sulfuric acid. In this process, the reagent immobilizes the mercury so that it passes U.S. Environmental Protection Agency toxicity characteristic leaching procedure criteria. If PCBs are detected, the PCB test kit will be treated as a PCB waste and disposed of through the Elmendorf TSDF with drum contents.

5.0 REFERENCES

ADEC (Alaska Department of Environmental Conservation). 2003a. Oil and Hazardous Substances Pollution Control Regulations, Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances, 18 AAC 75, Article 3. As amended through January.

ADEC. 2003b. Underground Storage Tanks Regulations, 18 AAC 78. As amended through January.

ADEC. 2002. *Underground Storage Tanks Procedures Manual – Guidance for Remediation of Petroleum – Contaminated Soil and Water and Standard Sampling Procedures*. November.

Wing OPLAN 19-3, *Hazardous Waste, Used Oil, and Hazardous Material Management Plan*.

USAF. 1993 (March). *Basewide Environmental Staging Facility Operation and Maintenance Plan.* Environmental Restoration Program, Elmendorf Air Force Base, Alaska. Final.

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ATTACHMENT 1

Waste Inventory Sheet

LF04 Debris Removal Field Program
Waste Inventory

Drum No.	Contents	Source (Location, Depth, etc.)	Date Generated	Current Disposition	Disposal Facility

ATTACHMENT 2

Waste Staging Area Inspection Checklist

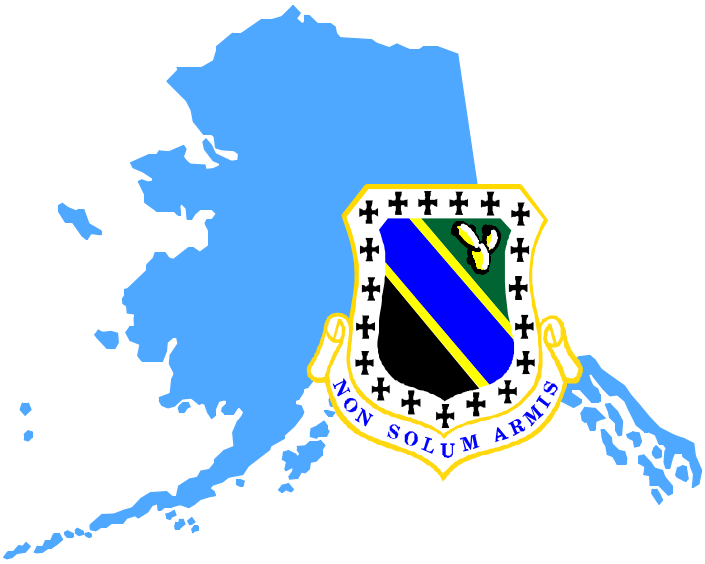
LF04 Staging Area Inspection Checklist

Item	Evaluate	Date and Initials	Comments[a]
Drums	• Are drums in good condition (e.g., no corrosion or leaking evident)?		
	• Is each drum labeled to show drum ID number, contents, origin, date of generation, and POC?		
	• Are drums free of extraneous/old labels?		
	• Are top of drums free of any pooled water?		
	• Are drums closed/sealed?		
	• Are drums situated on pallets?		
	• Are drums situated on even/stable surface?		
	• Is there sufficient aisle space (3 feet) between drums to allow for inspection of each drum?		
	• Are drums positioned so labels can be easily read?		
	• Are drums covered with plastic sheeting, and is sheeting sufficiently anchored to withstand wind?		
	• Are all drums or other containers listed on the IDW inventory?		
Liner and Containment	• Is the liner in good condition (e.g., no rips, tears, holes)?		
	• Are all drums staged on top of a liner or other containment device?		
Water Tank	• Is tank in good condition (e.g., no sign of leakage or breaches)?		
	• Is the tank discharge bunghole (if any) properly sealed and free of leakage?		
	• Is the tank staged on top of a liner or other containment device?		
Nonhazardous debris	• Is nonhazardous debris (e.g., concrete, scrap metal) neatly staged and covered with plastic sheeting?		
Other			

Note a: If the answer to any question is "no," please comment on the condition.

APPENDIX B

Health and Safety Plan



UNITED STATES AIR FORCE
ELMENDORF AIR FORCE BASE, ALASKA

ENVIRONMENTAL RESTORATION PROGRAM

LF04 DEBRIS REMOVAL WORK PLAN
APPENDIX B - HEALTH AND SAFETY PLAN

FINAL

SEPTEMBER 2004

TABLE OF CONTENTS

SECTION **PAGE**

ACRONYMS AND ABBREVIATIONS v
1.0 INTRODUCTION 1-1
2.0 SCOPE OF WORK 2-1
2.1 SITES COVERED BY THIS HSP 2-1
2.2 SUMMARY OF ANTICIPATED FIELDWORK 2-1
2.3 PROJECT HEALTH AND SAFETY RESPONSIBILITIES 2-2
2.3.1 Jacobs Personnel 2-2
2.3.2 Subcontractor Personnel 2-6
2.3.3 Site Visitors 2-6
3.0 HAZARD ASSESSMENT 3-1
3.1 MATERIALS OF CONCERN 3-1
3.1.1 Potential Exposure Pathways for Site Workers 3-2
3.1.2 Hazards Associated with the Materials of Concern 3-4
3.1.3 Hazardous Substances Brought On Site by Contractors 3-8
3.2 PHYSICAL HAZARDS 3-8
3.2.1 Ordnance and Chemical Warfare Materials 3-8
3.2.2 Back Safety 3-8
3.2.3 Heat Stress 3-9
3.2.4 Cold Stress 3-9
3.2.5 Working in Tidal Areas / Mud Flats 3-10
3.2.6 Bluff Landslides and Falling Debris 3-10
3.2.7 Medical Waste 3-10
3.2.8 Hazards Associated with Drums 3-10
3.2.9 Wildlife 3-11
4.0 AIR MONITORING 4-1
4.1 MONITORING GUIDELINES 4-1
4.2 CALIBRATION AND RECORD KEEPING 4-2
5.0 PERSONAL PROTECTIVE EQUIPMENT 5-1
5.1 PROTECTIVE CLOTHING AND EQUIPMENT 5-1
5.1.1 Hearing Protection 5-2
5.1.2 Eye Protection 5-2
5.1.3 Hard Hats 5-2

TABLE OF CONTENTS
(continued)

SECTION **PAGE**

5.1.4 Clothing 5-2
5.2 RESPIRATORY PROTECTION 5-3
5.3 OTHER SAFETY EQUIPMENT 5-4
6.0 PROTECTIVE MEASURES 6-1
6.1 GENERAL SAFETY MEASURES 6-1
6.2 DEBRIS REMOVAL PRECAUTIONS 6-1
6.3 SAFETY PRECAUTIONS IN DECONTAMINATION 6-1
6.4 PREVENTION OF HEAT STRESS 6-2
6.5 PREVENTION OF COLD STRESS 6-2
6.6 FORKLIFT SAFETY 6-3
6.7 DRUM HANDLING PRECAUTIONS 6-4
7.0 DECONTAMINATION 7-1
7.1 PERSONAL DECONTAMINATION 7-1
7.2 HEAVY EQUIPMENT DECONTAMINATION 7-2
8.0 SITE CONTROL 8-1
8.1 GENERAL SITE CONTROL REQUIREMENTS 8-1
8.2 DESIGNATION OF ZONES 8-1
8.2.1 Exclusion Zone 8-2
8.2.2 Contamination Reduction Zone 8-2
8.2.3 Staging Area and Support Zone 8-2
9.0 TRAINING/MEDICAL SURVEILLANCE 9-1
9.1 TRAINING 9-1
9.2 HEALTH AND SAFETY BRIEFINGS 9-1
9.3 MEDICAL SURVEILLANCE 9-1
9.4 HAZARD COMMUNICATION 9-2
10.0 EMERGENCY RESPONSE/ACCIDENT INVESTIGATION 10-1

TABLES

Table 3-1 Summary of 8-Hour TWAs and 15-Minute STELs for Hazards that Field Personnel May Encounter 3-2
Table 10-1 Emergency Response Contacts and Telephone Numbers 10-2

TABLE OF CONTENTS
(continued)

SECTION **PAGE**

FIGURES

Figure 2-1 LF04 Landfill Beach and Bluff Area 2-3
Figure 3-1 Potentially Completed Pathways 3-3
Figure 10-1 Hospital Locations and Routes 10-3

ATTACHMENTS

Attachment 1 HSP Acceptance Sheet
Attachment 2 HSP Record of Change Form
Attachment 3 Material Safety Data Sheets
Attachment 4 Safe Plan of Action
Attachment 5 Site Tailgate Meeting Form and Exclusion Zone Entry Log
Attachment 6 Accident/Incident Investigation Form
Attachment 7 Working Safely Around Wild Animals
Attachment 8 Heat Stress
Attachment 9 Cold Stress

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ACRONYMS AND ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
AFB	Air Force Base
AFCEE	Air Force Center for Environmental Excellence
CFR	Code of Federal Regulations
CHSP	Corporate Health and Safety Procedure
COC	contaminant of concern
COR	Contracting Officer Representative
CWM	chemical warfare materials
DOSH	Division of Occupational Safety and Health
EOD	Explosive Ordnance Disposal
FS	Feasibility study
HSP	Health and Safety Plan
HSM	Health and Safety Manager
IDLH	Immediately Dangerous to Life or Health
Jacobs	Jacobs Engineering Group Inc.
LEL	lower explosive limit
LF	Landfill
mg/m^3	milligrams per cubic meter
MSDS	Material Safety Data Sheet
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PAH	polynulear aromatic hydrocarbons
PCB	polychlorinated biphenyls
PEL	permissible exposure limit
PID	photoionization detector
PM	project manager
PPE	personal protective equipment
ppm	parts per million
PRG	preliminary remediation goal
RI	Remedial Investigation
SSHO	Site Safety and Health Officer
STEL	short-term exposure limits
TLV	threshold limit values

ACRONYMS AND ABBREVIATIONS
(continued)

TWA	time weighted average
$\mu g/ m^3$	micrograms per cubic meter
UXO	Unexploded Ordnance
°C	degrees centigrade
°F	degrees Fahrenheit

1.0 INTRODUCTION

This Health and Safety Plan (HSP) has been prepared to establish the health and safety procedures required to minimize potential risks to personnel while conducting fieldwork activities for the Air Force Center for Environmental Excellence (AFCEE) under Contract Number FA8903-04-D-8673, Task Order 0001. The provisions of this HSP directly apply to all Jacobs Engineering Group Inc. (Jacobs) and subcontractor personnel who may be potentially exposed to safety and/or health hazards through onsite work. Subcontractors are also responsible for complying with all applicable Occupational Safety and Health Administration (OSHA) General Industry and Construction Standards including, but not limited to, the wearing of personal protective equipment (PPE) and the use of respiratory protection. The procedures in this HSP have been developed by utilizing site-specific knowledge and laboratory data regarding the specific chemical and physical hazards known or reasonably anticipated to be encountered during debris removal operations conducted during this project.

This HSP has been written to comply with all requirements of Jacobs Corporate Health and Safety Procedures Manual. All activities covered by this HSP must be conducted in complete compliance with this HSP and with all applicable federal, state, and local health and safety regulations, including the OSHA General Industry Standards in 29 Code of Federal Regulations (CFR) 1910.120 and the OSHA Construction Industry Standards in 29 CFR 1926, as well as the State of Alaska Department of Labor Administration Division of Occupational Safety and Health (DOSH) standards. Specifically, the Alaska DOSH (formerly OSHA) *Hazardous Waste Operations and Emergency Response Standard*, effective June 18, 1987 (amended August 28, 1991), has been used in preparation of this HSP. Personnel covered by this HSP who cannot or will not comply with these requirements will be excluded from site activities.

All personnel working on this site must sign a "signoff" sheet provided in Attachment 1 prior to initiation of any site work. Subcontractors must submit a "signoff" sheet from their own, equally stringent HSP or, if choosing to follow this HSP, they must also sign the form in Attachment 1. Any changes to this HSP must be recorded on the record of change form (Attachment 2) and approved by the Health and Safety Manager; changes must also be coordinated through the AFCEE Contracting Officer Representative (COR). Additional

requirements found in specific Corporate Health and Safety Procedure (CHSPs) may apply to work conducted under this HSP.

2.0 SCOPE OF WORK

2.1 SITES COVERED BY THIS HSP

This HSP covers all fieldwork to be conducted during the Landfill No. 4 (LF04) beach debris removal on Elmendorf Air Force Base (AFB). The removal of beach debris includes the removal of all LF04 material that has fallen onto the beach that can be reasonably collected for disposal, as well as debris on the bluff slope or other low-lying areas that can be accessed and removed without hazard. Source area LF04, the Knik Bluff Landfill, is located on the west side of Elmendorf AFB (Figure 2-1) and is one of six different source areas within Operable Unit No. 6 (OU6).

2.2 SUMMARY OF ANTICIPATED FIELDWORK

Specific field activities associated with this investigation will include:

- Pre-mobilization coordination, access to the secure area, unexploded ordnance (UXO) recognition training, subcontractor pre-mobilization coordination and meetings
- Mobilization and site setup
- Travel of debris removal equipment from the staging area to the beach
- Debris removal
- Waste sampling, handling, and disposal
- Surveying of debris location
- Site and debris photography
- Demobilization and organization of field data for post-fieldwork reporting

The annual removal of beach debris includes the removal of all LF04 landfill debris material that has fallen onto the beach and can be reasonably collected for disposal. Additionally, debris on the bluff slope or other low-lying areas that can be accessed and removed without hazard shall also be removed. Hazardous materials encountered during the debris removal will be sampled, handled, and disposed of according to appropriate regulations. Only debris that can be handled without disturbing bluff soils will be removed.

2.3 PROJECT HEALTH AND SAFETY RESPONSIBILITIES

2.3.1 Jacobs Personnel

The following sections describe the health and safety roles and responsibilities of Jacobs personnel.

2.3.1.1 Project Manager

The Project Manager (PM) is, by designation, the individual who has the primary responsibility for ensuring the overall health and safety of personnel associated with this project. The PM therefore has the primary responsibility for ensuring the implementation of the requirements of this HSP. The Jacobs field team leader, the person in charge of all field activities, may assume some of the health and safety duties of the PM. Some of the PM's specific responsibilities include the following:

- Ensuring that on-site personnel have read and understand this HSP and have completed the HSP sign-off sheet
- Ensuring that a Safe Plan of Action is completed and communicated to field personnel for all site activities
- Ensuring that all personnel have attended a briefing, prior to performing work on site, apprising them of the contents of the HSP and site-specific hazards, and that personnel understand the OSHA safety and health protection compliance information
- Ensuring that sufficient PPE, as required by this HSP, is available on site to field personnel
- Ensuring that all subcontractor personnel submit the documentation of employee participation in a medical monitoring program and training program
- Ensuring that changes to this HSP are recorded on the record of change form (Attachment 2) and approved by the Health and Safety Manager (HSM)
- Maintaining a high level of health and safety consciousness among employees at the work site
- Maintaining regular communication with the HSM

Figure 2-1 LF04 Landfill Beach and Bluff Area

11 x 17 B&W

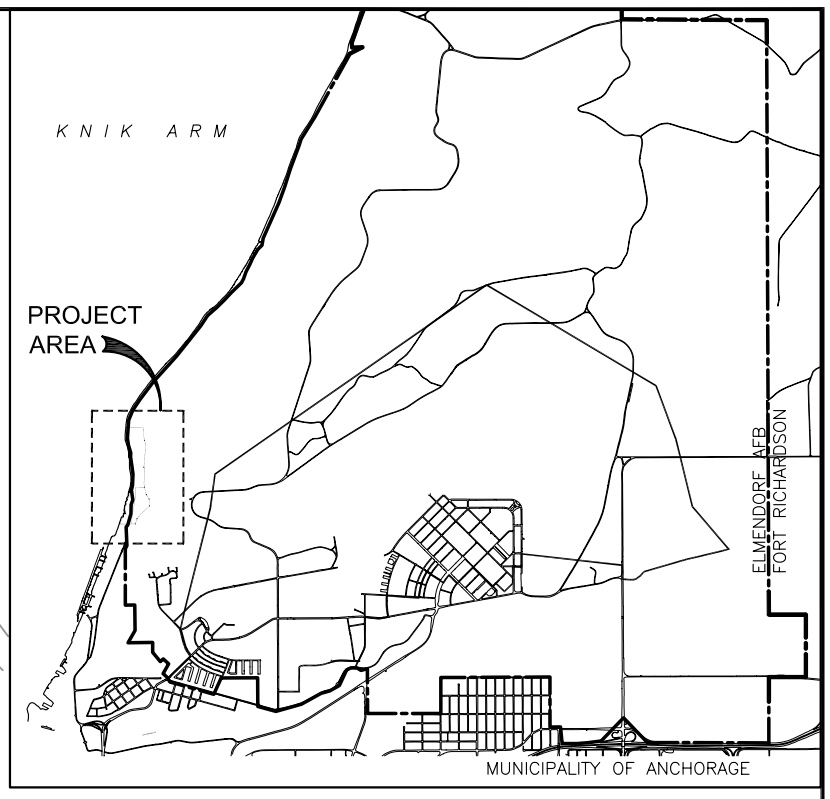
NORTH

LEGEND:

EXISTING POL PIPELINE

FORMER POL PIPELINE

MARSH / WETLANDS



CAIRN POINT

ELMENDORF AFB

LF04 NORTH/BEACH

LF04 SOUTH

KNIK ARM

26TH ST

ACCESS TO BEACH

ACCESS TO BEACH

PORT OF ANCHORAGE

LF04 BEACH AND BLUFF AREA

ELMENDORF AFB, ALASKA

PROJECT MANAGER: K. McGovern	FILE NAME: LF04 Staging Area.dwg	DATE: Sept. 8, 04
	LAYOUT TAB: Appendix B	FIGURE NO.: 2-1
JE DRAWN BY: BJP	FILE LOCATION: Elmendorf \ 05BM0101	

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2.3.1.2 Health and Safety Manager

The HSM is the individual responsible for the approval, interpretation, and modification of this HSP. Modifications to this HSP that may result in less stringent precautions cannot be undertaken by the PM or the Site Safety and Health Officer (SSHO) without the approval of the HSM. Specific duties of the HSM include the following:

- Advising the PM and Field Health and Safety Officer on matters relating to health and safety on site
- Recommending appropriate PPE and air monitoring instrumentation to protect personnel from site hazards
- Maintaining contact with the PM to regularly evaluate site conditions and review new information that might result in modifications to this HSP
- Assisting in the preparation of the HSP
- Working with the PM to ensure that sufficient PPE is available on site
- Performing field audits to monitor the effectiveness of this HSP and to assure compliance with it
- Monitoring where required and where deemed necessary to determine the adequacy of protective measures and PPE specified by this HSP
- Coordination of Jacobs employee training and medical monitoring program
- Supervising and monitoring the safety performance of all personnel to ensure that required safety and health procedures are followed, and correcting any deficiencies noted
- Conducting accident/incident investigations and preparing accident/incident investigation reports
- Conducting briefing meetings, when necessary, to apprise personnel of the contents of the HSP and the site hazards

2.3.1.3 Site Safety and Health Officer

The SSHO is responsible for enforcing the requirements of the HSP once on-site fieldwork begins. The SSHO has the authority to immediately correct all situations where noncompliance with this HSP is noted and to immediately stop work in cases where an immediate danger is perceived. Some of the SSHO's specific responsibilities include:

- Ensuring that a Safe Plan of Action is completed, communicated, and adhered by field personnel for all site activities
- Procuring and distributing the PPE needed for this project
- Verifying that all PPE and health and safety equipment is in good working order

- Monitoring workers exposure to hazardous substances/chemicals and activities as deemed necessary to determine appropriate engineering and administrative PPE requirements
- Establishing and enforcing site control
- Notifying the PM and the HSM of all noncompliance situations and immediate danger situations
- Initiating emergency response procedures

2.3.1.4 Field Personnel

All Jacobs personnel are responsible for following the health and safety procedures specified in this HSP and for performing their work in a safe and responsible manner. Some of the specific responsibilities of the field personnel are as follows:

- Obtaining a copy of the HSP and reading it in its entirety prior to the start of on-site work
- Relating any questions or concerns regarding the content of the HSP to the PM or, HSM prior to the start of fieldwork
- Following the requirement of the Safe Plan of Action and assisting in identification of activities and hazards that are not addressed on the Safe Plan of Action
- Reporting all accidents and incidents to the PM
- Complying with the requests of the SSHO

2.3.2 Subcontractor Personnel

Subcontractors shall ensure that all activities, hazards, and mitigating measures have been planned and identified in the Safe Plan of Action and ensure all personnel have been trained. Subcontractors are expected to read and adhere to the provisions outlined in this HSP. If Jacobs observes a subcontractor performing any activity that is immediately threatening to the health and safety of site workers, Jacobs will halt work activities and determine corrective actions in consultation with the subcontractor.

2.3.3 Site Visitors

Occasionally, visitors may arrive at the site during field activities. Most visitors can be accommodated by providing a viewing area in a safe location away from the active work zones and by presenting a briefing conducted by the field team leader.

In some instances, visitors (client or agency personnel) may require access to restricted zones of the site. If a visitor has a justified need for access to the site, the SSHO or the HSM will make arrangements for entry. The required level of PPE within the exclusion area will be strictly enforced. Visitors must be escorted at all times. Visitors who cannot show proof of 29 CFR 1910.120 training certificate and medical monitoring program will not be allowed to access the exclusion areas. If respiratory protection is required, visitors must furnish their own respirator that meets site requirements and show proof of respirator training and fit testing.

If an agreeable, safe arrangement cannot be made, or if the activities of the visitor jeopardize site personnel, the field team leader/SSHO should immediately contact the PM and the HSM.

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3.0 HAZARD ASSESSMENT

This Hazard Assessment is intended to provide a Health and Safety Design Analysis, as required to identify, assess, and evaluate the potential hazards involved in the various characterization subtasks needed to accomplish this work. This section addresses the material hazards and the physical and operational hazards that may be expected for all subtasks of this work. The specific subtasks were delineated in Section 2.2.

3.1 MATERIALS OF CONCERN

A human health and ecological risk assessment was performed as part of the OU6 Remedial Investigation (RI) / Feasibility Study (FS) in 1996. The results of the risk assessment are available in the RI/FS (USAF 1996). The contaminants of concern (COCs) at LF04 were developed from the results of the risk assessment and by considering preliminary remediation goals (PRGs). Each constituent having an individual carcinogen contribution greater than 1.0×10^{-6} risk or a hazard quotient greater than 0.1 when the cumulative hazard quotient for the site is greater than 1.0 was considered a COC. In addition, any constituent exceeding PRGs was also considered as a COC. The final COCs are identified in the OU6 and Source Area SS19 Record of Decision (ROD) (USAF 1997). In summary, the following COCs were identified:

- Groundwater: benzene, ethylbenzene, toluene, 1,2-Dichloroethane, and methylene chloride.
- Shallow: Soil: Exposed landfill waste.

Soil, sediment, and surface water samples were collected in December 2002. In general, it was concluded that contaminant concentrations have decreased and that there are no new COCs at LF04. However, potentially hazardous materials may be encountered during the debris removal that were not present during previous sampling efforts. Table 3-1 summarizes the contaminant that may be encountered during work covered by this HSP. This table lists the permissible exposure limits (PEL), threshold limit values (TLV), short-term exposure limit (STEL) or immediately dangerous to life or health (IDLH) values established by either OSHA or the American Conference of Governmental Industrial Hygienists (ACGIH) for these substances. These limits have been taken from: *TLVs, Threshold Limit Values and Biological Exposure Indices for 2002*, ACGIH, except where noted.

Table 3-1
Summary of 8-Hour TWAs and 15-Minute STELs
for Hazards that Field Personnel May Encounter

Substance	Time Weighted Average (ppmv)	Short-Term Exposure Limit (ppmv)
Petroleum Hydrocarbons		
Gasoline	300	500
Diesel/Jet Fuel	N/A	N/A
Site-Related VOCs VOCs are present in all fuel hydrocarbons and chlorinated solvents.		
- Benzene (OSHA)	0.5	2.5
- Ethylbenzene	100	125
- Toluene (OSHA)	50	150
- Xylene	100	150
Lead, Inorganic	0.050 mg/m^3	N/A
Arsenic	0.01 mg/m^3	N/A
Polynuclear Aromatic Hydrocarbons	0.2 mg/m^3	N/A
Polychlorinated Biphenyls	0.5 mg/m^3	N/A
Dioxins and Furans	NA	NA

Notes:
mg/m^3 = milligrams per cubic meter
ppmv = parts per million volume
VOC = volatile organic compound
For additional definitions, see acronyms and abbreviations list.

3.1.1 Potential Exposure Pathways for Site Workers

Due to the semi-intrusive activities involved with debris removal from the beach, the potential exists for site workers to be exposed to various hazardous chemicals via a number of pathways. Figure 3-1 presents an evaluation of the various routes of entry and identifies potential pathways of exposure for contamination associated with the LF04 beach area.

The debris removal process is the removal of debris objects from the beach. Site workers involved in the debris removal process could potentially be exposed to contaminated surface and subsurface soils, debris, and surface waters. The primary exposure pathways include ingestion, dermal contact, and inhalation.

Site workers will wear appropriate PPE and practice appropriate hygiene to minimize the potential for ingestion, inhalation, and dermal contact. If debris removal activities generate dust, steps must be taken to control dust generation and/or workers shall wear respiratory protection.

Figure 3-1 Potentially Completed Pathways

8 ½ x 11 B&W

Testing for the presence of polychlorinated biphenyls (PCB) and dioxins on debris was conducted in the Fall of 2002. The surfaces of glass, concrete, and ceramic debris were tested for the presence of PCBs and dioxins. Neither PCBs nor dioxins were detected on materials eroded from the landfill onto the beach area. However, the surface of an intact "7-up" bottle was recovered from the hillside and tested positive for the presence of dioxins.

3.1.2 Hazards Associated with the Materials of Concern

3.1.2.1 Gasoline

Gasoline primarily consists of a mixture of hydrocarbons, including aliphatic hydrocarbons, aromatic hydrocarbons, and a variety of branched and unsaturated hydrocarbons.

Extremely high levels of exposure, which are unlikely to occur at this site, could produce symptoms such as dizziness, coma, collapse, and death. Exposure to non-lethal doses is usually followed by complete recovery, although cases of permanent brain damage following massive exposure have been reported. In general, the toxicity is related to content of benzene and other aromatic hydrocarbons. ACGIH has established a time weighted average (TWA) exposure limit for gasoline of 300 parts per million (ppm) and a STEL of 500 ppm.

3.1.2.2 Diesel Fuel

Diesel fuel is generally considered to be of moderate to low toxicity. Federal or recommended airborne exposure limits have not been established for its vapor. However, inhalation of low concentrations of the vapor may cause mucous membrane irritation.

Inhalation of high concentrations of the vapor may cause extensive pulmonary edema (i.e., filling of the lungs with fluid). Aspiration of the liquid into the lungs will also result in severe pulmonary edema. Ingestion of small quantities of the liquid may produce nausea and vomiting, and ingestion of large quantities may produce pulmonary edema. Chronic skin contact with the liquid may produce primary skin irritation as a result of defatting.

Because of the relatively low vapor pressure of diesel fuel at standard temperature and pressure, overexposure to its vapors is not expected to occur in an outdoor environment. For obvious reasons, ingestion and aspiration of the liquid is not expected to occur.

Therefore, if exposure is to occur, the major route of exposure is likely to be via the skin through direct contact with contaminated soil.

Vapors of diesel fuel are significantly heavier than air (vapor density more than 4) and will tend to subside and accumulate in low-lying areas. The liquid is insoluble in water, is lighter than water (specific gravity less than 1), and will, therefore, float on the water's surface.

3.1.2.3 Volatile Organic Compounds (BTEX Compounds)

Benzene, toluene, ethylbenzene, and xylene, examples of volatile organic compounds, are colorless, aromatic liquids. In moderate to heavy exposures, they may produce headache, eye and throat irritation, narcosis, and anesthesia. Excessive exposures can also produce liver and kidney damage, and bone marrow depression. Xylene and toluene are generally more acutely toxic, but benzene is of more concern chronically. Benzene is associated with leukemia and aplastic anemia in chronic exposures and is, therefore, a primary substance of concern found in gasoline. For this reason, Draeger tubes, or other specific monitoring methods, should be used to verify that benzene is not present at concentrations greater than 0.5 ppm.

The OSHA PEL for benzene is 0.5 ppm, with a STEL of 2.5 ppm. Its olfactory detection level is 5 ppm. Benzene is very flammable, with flash points of 12oF. Ethylbenzene is also extremely flammable. Its PEL is 100 ppm (TWA), and its STEL is 125 ppm.

The current TLV for toluene is 50 ppm as an 8-hour average, and the STEL is 150 ppm. The odor of toluene is a strong, aromatic one, not as sweet as benzene. The OSHA PEL for xylene is 100 ppm, with a STEL of 150 ppm. The IDLH level is 1,000 ppm. Xylene has a flash point of 81oF.

3.1.2.4 Fuel Oil No. 2

Fuel oil no. 2 is generally considered to be of moderate to low toxicity. Federal or recommended airborne exposure limits have not been established for the vapors of fuel oil. However, inhalation of low concentrations of the vapor may cause mucous membrane irritation. Inhalation of high concentrations of the vapor may cause extensive pulmonary

edema. Chronic direct skin contact with fuel oils may produce skin irritation as a result of defatting.

Because of the relatively low vapor pressure of fuel oil, overexposure to their vapors is not expected to occur in the outdoor environment.

3.1.2.5 Polycyclic Aromatic Hydrocarbons

Polynuclear aromatic hydrocarbons (PAH) are various combinations of three or more closed (benzene) rings together with attached molecular structures. They occur naturally in coal, petroleum, tars, pitches, and woods, and may be formed in fires involving heavy hydrocarbon materials.

Examples of PAHs are anthracenes, benzo(a)pyrene, chrysenes, fluoranthene, naphthalene, and pyrenes, among many others. Many of the PAHs are carcinogenic. As a class, they should be treated as carcinogens and exposures kept to a minimum. There is no OSHA PEL for most of the specific compounds; however, the "Coal Tar Pitch Volatiles" PEL should be used (0.2 milligrams per cubic meter [mg/m3]). PAHs are generally solids and not very volatile, making dust or smoke the likely route of exposure.

3.1.2.6 Polychlorinated Biphenyls

PCBs are heavy, chlorinated oils. They vary somewhat in composition and in toxicity, as there are over 200 isomers. PCBs may irritate the skin, throat, and eyes. They have long been suspect carcinogens, although this has never been proven. Acute toxicity is rather low. Exposure has been associated with potential liver damage and a skin condition known as "chloracne."

PCBs are not very volatile; thus, they are seldom a respiratory hazard unless heated or agitated severely. The only approved respiratory protection for PCBs is supplied air.

PCBs will penetrate the intact skin; thus, care should be exercised to use impervious gloves and coveralls to prevent skin contact. Ingestion is also a potential mode of entry. Good decontamination and hygiene practices will avoid this problem.

The OSHA PEL and the ACGIH TLV exposure limits for the PCBs Chlorodiphenyl (43 percent Chlorine) and Chlorodiphenyl (54 percent Chlorine) for an eight-hour day are 1 mg/m^3 and 0.5 mg/m^3, respectively.

3.1.2.7 Lead, Inorganic

The early symptoms of lead poisoning, as a result of overexposure (either through ingestion or inhalation) include fatigue, sleep disturbance, a metallic taste, headache, aching bones and muscles, digestive irregularities, abdominal pains, and decreased appetite. Chronic overexposures to lead affect the blood cells, the central nervous system, the kidneys, and male and female reproductive systems. Lead has also been identified as a fetotoxin. The route with the greatest potential for absorption is that of inhalation, although ingestion is also dangerous.

The OSHA PEL for inorganic lead is 50 micrograms per cubic meter ($\mu g/m^3$) and is recommended to be 40 $\mu g/m^3$ if workers are of reproductive age.

3.1.2.8 Dioxins and Furans

Studies have shown that exposure to dioxins at high enough doses may cause a number of adverse health effects. Because dioxins exist throughout the environment, almost every living creature, including humans, has been exposed to dioxins. The health effects associated with dioxins depend on a variety of factors including: the level of exposure, when someone was exposed, and how long and how often. Because dioxins are so widespread, we all have some level of dioxins in our bodies.

The most common health effect in people exposed to large amounts of dioxin is chloracne. Chloracne is a severe skin disease with acne-like lesions that occur mainly on the face and upper body. Other effects of exposure to large amounts of dioxin include skin rashes, skin discoloration, excessive body hair, and possibly mild liver damage.

One of the main health effects in question for dioxins is the risk of cancer in adults. Several studies suggest that workers exposed to high levels of dioxins at their workplace over many years have an increased risk of cancer. Animal studies have also shown an increased risk of cancer from long-term exposure to dioxins.

Finally, based on data from animal studies, there is some concern that exposure to low levels of dioxins over long periods (or high level exposures at sensitive times) might result in reproductive or developmental effects.

3.1.3 Hazardous Substances Brought On Site by Contractors

A material safety data sheet (MSDS) must be available for each hazardous substance that the contractor(s) bring on the property. This includes solutions/chemicals that will be used to decontaminate sampling equipment or calibration gases for monitoring instrumentation. All containers of hazardous materials must be labeled in accordance with OSHA's Hazard Communication Standard 29 CFR 1910.1200.

3.2 PHYSICAL HAZARDS

3.2.1 Ordnance and Chemical Warfare Materials

The potential exists for UXO and Chemical Warfare Materials (CWM) to be present at LF04. All contractor field personnel will have UXO recognition training. All personnel will be observant for suspicious objects and aware at all times of the possible presence of UXO/CWM in walking and sampling areas. Depart the immediate area and notify Elmendorf Explosive Ordnance Disposal (EOD) immediately if a suspicious item is encountered. Elmendorf EOD will clear the site prior to conducting any further activities in the immediate area.

3.2.2 Back Safety

Using the proper techniques to lift and move heavy pieces of equipment is important to reduce the potential for back injury. The following precautions should be implemented when lifting or moving heavy objects.

- Bend at the knees, not the waist. Let your legs do the lifting.
- Do not twist while lifting.
- Bring the load as close to you as possible before lifting.
- Be sure the path you are taking while carrying a heavy object is free of obstructions and slip, trip, and fall hazards.
- Use mechanical devices to move objects, such as drums of investigation-derived wastes or generators that are too heavy to be moved manually.

- If mechanical devices are not available, ask another person to assist you.

3.2.3 Heat Stress

Heat stress may occur on this site due to use of impervious coveralls or other protective equipment. Heat stress may appear in the form of heat exhaustion or heat stroke. Heat stress prevention measures are outlined in Section 6.4.

3.2.3.1 Heat Exhaustion

(a) Symptoms: Usually begins with muscular weakness, dizziness, nausea, and a staggering gait. Vomiting is frequent. The bowels may move involuntarily. The victim is very pale, his skin is clammy, and he may perspire profusely. The pulse is weak and fast, the breathing is shallow. The victim may faint unless he lies down. This may pass, but sometimes it continues and death could occur.

(b) First Aid: Immediately move the victim to a shady or cool area with good air circulation. Remove all protectiveouterwear. Call a physician. Treat the victim for shock. Make him lie down, raise his feet 6 to 12 inches, keep him cool, and loosen all clothing. If the victim is conscious, it may be helpful to give him sips of water. Transport victim to a medical facility as soon as possible.

3.2.3.2 Heat Stroke

(a) Symptoms: **A MEDICAL EMERGENCY!** This is the most serious of heat stress due to the fact that the body excessively overheats. Body temperatures are often between 107 degrees Fahrenheit (°F) to 110°F. The first symptoms are often pain in the head, dizziness, nausea, oppression, and the skin is dry, red, and hot. Unconsciousness follows quickly and death is imminent if exposure continues.

(b) First Aid: Immediately move the victim to a cool and shady area. Remove all protective outerwear and all personal clothing. Lay him on his back with the head and shoulders slightly elevated. It is imperative that the body temperature be lowered immediately. This can be accomplished by applying cold wet towels, ice bags, etc., to the head. Sponge off the bare skin with cool water or rubbing alcohol, if available.
The main objective is to cool, without chilling, the victim. Give no stimulants. Transport the victim to a medical facility as soon as possible.

3.2.4 Cold Stress

Cold stress may occur during site activities, and all personnel including contractors shall be properly protected from the cold weather when conditions warrant.

3.2.4.1 Hypothermia

Hypothermia is a cold injury against which personnel must be protected during the performance of field activities. The two factors that influence the development of a cold injury are ambient temperature and the velocity of the wind (wind chill).

Wind chill is used to describe the chilling effect of moving air in combination with low temperature.

3.2.5 Working in Tidal Areas / Mud Flats

Personnel entering the lower intertidal zone will exercise extreme caution and remain continuously aware of the dangers associated with getting stuck in the mud flats. Activities will be performed when the tide is out with sufficient time to depart the area before the tide comes back in. If personnel begin to get stuck they should immediately sit down and try to free their boots from the mud. The spotter will immediately call for help if necessary.

3.2.6 Bluff Landslides and Falling Debris

Due to periodic high rates of erosion of the LF04 bluff area, field personnel need to be cautious when working in proximity to the bluff area. Erosion rates appear to increase during periods of heavy rainfall. In some cases, the bluff is undercut by the tidal action, and personnel should avoid these areas.

3.2.7 Medical Waste

All personnel will be observant for suspicious objects and aware at all times of the possible presence of medical waste in walking and sampling areas. Maintain a safe distance from suspicious items.

3.2.8 Hazards Associated with Drums

The potential exists for drums with unknown contents to be present at LF04. Is a drum with contents that are not readily identifiable by markings or characteristics in encountered, the Jacobs PM and HSM will be notified. Upon notification, the Jacobs PM will notify the AFCEE COR and the Air Force Project Manager.

Opening the drum and characterizing the drum contents requires a higher degree of respiratory and skin protection. At a minimum level B protection will be utilized when opening and during sampling and characterization of drums with unknown contents. Drums with unknown contents will only be opened or disturbed by trained personnel with the appropriate level of protection.

Drums, when loaded with liquid or solid materials, may be very heavy. For this reason, proper equipment is necessary for moving loaded drums. Equipment used to handle and move drums must be operated safely and properly. Drums will need to be accessed with brass/beryllium non-sparking bung wrenches, cutting tools, and hammers.

If a drum with unknown contents is encountered, it will be handled as identified in the Work Plan and sampled as in the Field Sampling Plan, Appendix A. .

3.2.9 Wildlife

Several species of wildlife exist on Elmendorf AFB. Field personnel should be observant for wildlife and follow the procedures and guidelines in Attachment 7, Working Safely Around Wild Animals.

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4.0 AIR MONITORING

Monitoring will be conducted to verify that appropriate types and levels of PPE are being used by the field team. The type and extent of monitoring conducted will depend upon the site-specific conditions and the activities of the field team. The information contained in this section is provided for general background reference to the participants in this project. Under the guidance of the SSHO, air monitoring will be implemented that follows the guidelines in this section.

The information in Section 5.0, provides PPE recommendations for the expected level of substances that may be encountered by field personnel. Special circumstances, such as handling and sampling of unknown drums, may require upgrades of PPE as exposure levels warrant. The HSM, with the assistance of trained field personnel, will identify these conditions and may require additional PPE measures.

4.1 MONITORING GUIDELINES

Although hazardous levels of gases or vapors are not anticipated during LF04 activities, a photo-ionization detector (PID) or equivalent instrument equipped with a (minimum) 10.2 electron volt lamp may be used to monitor the breathing zone of workers performing activities associated with all tasks. A combustible gas indicator that measures percent of lower explosive limit (LEL) may also be used on site.

A sustained reading (15 minutes) of 0.5 PID unit or higher requires that a Draeger test be performed to test for the presence of benzene. If the Draeger test indicates 0.5 ppm or greater, respiratory protection, as specified in Section 5.0, must be worn by personnel.

An action level for combustible gas indicator readings will be set at 10 percent of the LEL and a minimum of 19.5 percent oxygen. The action level for the LEL is a conservative limit to help ensure that higher levels are not encountered in "pockets" or localized areas. Above 10 percent LEL, the work is considered "hot work" and requires special precautions. At less than 19.5 percent oxygen, the atmosphere is considered oxygen deficient and a supplied-air breathing apparatus is required.

In the absence of an identified gas or vapor hazard (benzene, etc.), an action limit of 20 PID units above background has been established. When the PID indicates sustained breathing zone vapor concentrations in excess of 20 units or more, respiratory protection, as described in Section 5.0 of this document, shall be worn. Indicated levels above 100 units (as well as a Draeger test result of 2.5 ppm or greater of benzene) shall require upgrade to full-face respirators. Levels over 1,000 units above background will require self-contained breathing apparatus. Confirmation that the contaminant producing such instrument readings is not exceeding its PEL will countermand these upgrades. This confirmation may be achieved by Draeger tube readings or other means. If site conditions require upgrade of respiratory protection, the AFCEE COR and the Air Force Project Manager will be notified.

There is no method for real-time monitoring for PCBs, metals, or dioxins. However, production of large amounts of contaminated airborne dust could contribute to exposure. Therefore, dust levels will be controlled to prevent exposure. However, if control is not possible, respiratory protection should be work when noticeable or irritating levels of dust are encountered.

4.2 CALIBRATION AND RECORD KEEPING

The combustible gas indicator will be calibrated by the instrument supplier to either a 50 percent LEL methane or pentane in air mixture. The oxygen meter will be calibrated to ambient air. The PID will be calibrated each day prior to use and as needed during the day (e.g., if PID drift is occurring). The PID will be calibrated in accordance with the owner's manual. All calibrations will be recorded in a field notebook or separate equipment calibration sheets. PID readings collected during soil sampling will be recorded in the field logbook or boring logs.

5.0 PERSONAL PROTECTIVE EQUIPMENT

The proper use of PPE is critical to the protection of workers from chemical exposure. PPE also includes foul weather clothing and other life-safety equipment and devices that are intended to promote worker safety.

5.1 PROTECTIVE CLOTHING AND EQUIPMENT

All workers involved in site activities are required to appropriately protect themselves from all chemical and physical hazards they are expected to encounter. In general, all field personnel will wear the following basic level of PPE:

- Eye protection
- Hearing protection as needed
- Hard hat
- Work gloves
- Long sleeve shirts
- Long pants or coveralls
- Steel-toed boots
- High-visibility reflective vest

Additional PPE (respirators, neoprene boots, impervious gloves, Tyvek®) may be required depending upon the site conditions, as described below.

Debris Removal: In addition to the items listed above, Tyvek®, and rubber booties or neoprene boots will be worn when participating in debris removal activities.

Drum Sampling: At a minimum level B protection will be utilized when opening and during sampling and characterization of drums with unknown contents. Drums with unknown contents will only be opened or disturbed by trained personnel with the appropriate level of protection. Level B includes the following PPE requirements:

- Supplied air respirator with escape bottle or organic vapor escape cartridge
- Chemical resistant Tyvek coveralls
- Tyvek booties or rubber boots taped to coveralls

- Gloves nitrile with leather gloves if handling sharp objects (nitrile taped to coverall sleeves)

A more detailed description of necessary PPE is listed below.

5.1.1 Hearing Protection

Adequate hearing protection is required in all areas that may expose workers to high levels of noise. A general rule of thumb for hearing protection is that hearing protection should be worn in any area in which workers have to raise their voices to be heard at arm's distance. These work areas may include those around aircraft runways or flight lines, heavy equipment, generators, compressors, and other noise-generating equipment or tools. Hearing protection measures include the following:

- Engineering controls, where feasible
- Ear plugs
- Ear muffs
- A combination of both ear plugs and muffs

5.1.2 Eye Protection

Eye protection is required in all work areas. Eye protection equipment includes the following:

- Safety glasses – minimum eye protection required to be worn on site
- Goggles – to be worn for protection against minimum splashes, dust, and foreign object protection
- Face shields – to be worn for maximum splash and foreign object protection

5.1.3 Hard Hats

Hard hats are required for workers who may be exposed to conditions where there is a potential overhead hazard (e.g., drilling area, or work around heavy equipment).

5.1.4 Clothing

Clothing sufficient to protect workers from contact with substances such as petroleum, as well as heat and cold, is required.

5.2 RESPIRATORY PROTECTION

Respiratory protection measures will be instituted based upon work site monitoring results, worker sensitivity, and pre-determined protection levels related to work conditions. The following guidelines for respirator use by field personnel should be used:

Hazard Level	Required Respiratory Protection
No Hazard	No respiratory protection required
First Upgrade (20 PID units or 0.5 to 2.5 ppm Benzene on Draeger tube)	Half mask, air purifying respirator (APR), organic vapor, acid gas, high efficiency particulate cartridges
Second Upgrade (100 PID units or up to 2.5 ppm Benzene on Draeger tube)	Full face APR with same cartridges as above
Third Upgrade (1,000 PID units or 2.5 to 25 ppm Benzene on Drager tube)	SCBA (is not expected on this project)
Drum Sampling	Level B – Supplied air respirator with escape bottle or organic vapor escape cartridge

Notes:
APR = air purifying respirator
SCBA = self-contained breathing apparatus
For additional definitions, see acronyms and abbreviations list.

No intrusive activities are planned for the debris removal activities. However, if volatile material are encountered, workers shall wear respiratory protection when the PID indicates sustained levels of 20 units or greater, or when noticeable dust levels occur.

If PID breathing zone readings are sustained below 20 units above background during site activity, and if benzenes are < 0.5 ppm, respiratory protection may be discontinued until such readings rise above these action levels.

Respiratory protection should be used if odors or dust levels become objectionable at any time. During periods of respirator use, cartridges are to be changed each day of use, whenever breakthrough is detected, or when dust loading makes breathing difficult, whichever occurs first. If any of these circumstances occur during the work shift, notify the HSM who will evaluate and update the cartridge change-out schedule.

If site conditions require respiratory protection upgrade (as described above), the AFCEE COR and the Air Force Project Manager will be notified.

5.3 OTHER SAFETY EQUIPMENT

The following additional safety equipment will be brought to the work sites and maintained in site vehicles:

- Portable eye wash
- First aid kits
- Type A-B-C fire extinguisher

6.0 PROTECTIVE MEASURES

6.1 GENERAL SAFETY MEASURES

The following measures are designed to augment the specific health and safety guidelines provided in this plan.

- The "buddy system" will be used by all field personnel. Field personnel will work in groups of two or more.
- Avoiding contact with contaminated materials is of the utmost importance. Whenever possible, avoid contact with contaminated (or potentially contaminated) surfaces or materials. Walk around (not through) puddles and discolored surfaces. Avoid sitting, kneeling, or resting equipment on contaminated surfaces.
- Ensure that all personnel and equipment are decontaminated properly before leaving the site.
- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases hand-to-mouth contact is prohibited in the work area.
- Hands and face must be thoroughly washed upon leaving the work area before eating, drinking, or any other activities.
- Fire extinguishers brought onsite by Jacobs and subcontractors will be visually inspected monthly and maintained as necessary in a ready state.
- The use of alcohol or drugs is prohibited during or prior to the conduct of field operations.
- Safety equipment described in Section 5.0 will be required for all field personnel unless otherwise approved by the HSM following a task hazard analysis.
- Drums will be moved only with "drum movers" or drum handling equipment, unless empty.

6.2 DEBRIS REMOVAL PRECAUTIONS

Prior to performing debris removal activities, the area around the debris will be visually inspected for hazardous materials. Periodic atmospheric testing will be conducted to ensure that personnel are not exposed to potentially hazardous atmospheres.

6.3 SAFETY PRECAUTIONS IN DECONTAMINATION

All personnel leaving the work area will decontaminate their equipment and themselves immediately (exceptions will be made for a seriously injured employee). The decontamination process is described in Section 7.0.

Decontamination will be monitored by the SSHO to ensure effectiveness.

6.4 PREVENTION OF HEAT STRESS

Field personnel should be aware of the signs and symptoms of heat stress. Employees will work in pairs so that they may observe each other for signs that may be indicative of a heat related illness. Workers experiencing heat strain symptoms will immediately take action to reduce heat stress.

The following recommendations may help reduce the possibility of heat stress.

- Identify a shaded, cool rest area, if possible.
- Rotate personnel and alternate their job functions as needed.
- Ensure that personnel consume enough water to replace the amount of moisture lost through perspiration. Most workers exposed to hot conditions drink less fluid than they need. Workers should consume at least 2 quarts of fluid in small amounts at regular intervals during an 8-hour workday.
- Schedule the most strenuous activities during the early morning or early evening hours to avoid the hottest part of the day.
- Discourage the off-site consumption of alcohol between work shifts during prolonged periods of heat. Alcohol usage intensifies dehydration.

Site personnel should also monitor their heart rate as an indicator of heat strain by the method described below:

- Radial pulse rates should be checked by using the fore and middle fingers and applying light pressure to the pulse in the wrist for 1 minute at the beginning of each rest cycle. If the pulse rate exceeds 110 beats/minute, the next work cycle will be shortened by one-third and the rest period will be kept the same. If, after the next rest period, the pulse rate still exceeds 110 beats/minute, the work cycle will be shortened again by one-third. The SSHO is responsible for recording pulse rates and altering the work-rest cycles as needed.

For additional precautions and procedures, refer to CHSP Number 11.5, Attachment 8.

6.5 PREVENTION OF COLD STRESS

Environmental monitoring shall be conducted when air temperatures are below 45°F.

Personnel with diseases or taking medication that interferes with normal body temperature should be excluded from work when temperature are below 30°F (0 degree Centigrade [°C]).

Personnel that become immersed in water or whose clothing becomes wet will change the wet clothing and shall be watched for symptoms of hypothermia when air temperature is at 35°F (2°C).

Personnel with continuous exposure should cover exposed skin when temperatures approach 30°F (-1°C) regardless of wind speed. If available clothing does not give adequate protection to prevent hypothermia or frostbite, work shall be modified or suspended until adequate clothing is made available or conditions improve.

Personnel handling fluids shall take precautions to prevent soaking the clothing and avoid skin contact.

For additional precautions and procedures refer to CHSP 11.4 Attachment 9.

6.6 FORKLIFT SAFETY

Only employees who are trained and certified in compliance with OSHA's Powered Industrial Truck standard (29 CFR 1910.178) may operate forklifts. Lift trucks must be visually inspected prior to each day's use; deficiencies must be corrected before use. The truck must have good tires, brakes, a working horn, and no fuel or oil leaks. If used in a flammable or hazardous location, the truck must be approved for that location. Overhead protection is required for high lifts. Lights must be functional for use in low light areas or after dark. Trained drivers will operate the truck as required in 29 CFR 1910.178, slowing down and sounding the horn at blind corners, and traveling with the load up-slope on grades of 10 percent or more. No one will pass beneath a raised load. Railroad tracks shall be crossed diagonally when possible. Fuel tanks shall not be filled while the truck is running. When left unattended (operator more than 25 feet away), the forks will be lowered, the wheels chocked (parked on a slope), and the engine switched off. Only the operator may ride on the lift truck. When traveling without a load, the forks will be lowered to a safe level. Personnel may not be lifted by the forklift unless a basket designed for that purpose is used and properly secured, and fall protection harnesses are worn. Dock or bridgeplates that the lift truck will cross must be secured. Only loads within the posted limit of the truck shall be lifted. Modifications to the lift truck require manufacturer's written approval.

6.7 DRUM HANDLING PRECAUTIONS

Drums may be moved using a "drum handler" hand truck, a "Tommie Lift" on a pickup truck, or various other powered lifting devices, such as a drill rig hoist or a forklift. Whatever device is used, it must have the proper attachment for lifting drums safely. No one may place any part of his or her body beneath a hoisted drum. If a drum slips loose, it may seriously injure anyone nearby and may also spray its contents over the area and nearby workers. "Chiming" of rolling drums on their bottom edge may be performed by trained and experienced employees only if the drum is not excessively heavy and can be moved safely over a smooth surface.

PPE for handling drums will include sturdy work gloves. Hands should NEVER be on the back edge of a drum as it is released from a hand truck near other drums or objects that may pinch fingers. Proper chemical protective clothing is necessary and may include impervious gloves, apron, Tyvek® and boots, as well as a face shield in case the drum breaches.

7.0 DECONTAMINATION

Decontamination will be required of all personnel and equipment coming into contact with beach debris and beach soil. A decontamination area will be established just above the high tide mark in Staging Area #2. All beach areas below the high tide mark, and all bluff areas above the beach should be considered the exclusion zone. Decontamination of personnel and equipment will be performed in the decontamination area. All personnel and equipment will be dry decontaminated prior to leaving the decontamination area. In the event that personnel or equipment come into contact with, and are subsequently contaminated with suspected hazardous materials, the more rigorous decontamination processes describe below will be performed.

7.1 PERSONAL DECONTAMINATION

Disposable PPE, such as such as booties and tyvek, will be removed and placed in waste containers. This PPE will be considered non-hazardous waste and disposed of accordingly. However, if PPE associated with suspect hazardous materials is generated, it will be stored at the Environmental Staging Facility in an appropriate container until analytical results are available.

Non-disposable PPE contaminated with suspected hazardous materials will be rinsed free of gross contamination, scrubbed clean in a detergent solution, and then rinsed with clean water. The following general procedures should be used when exiting the exclusion zone if personnel become contaminated with suspected hazardous materials:

- Dry-scrub boots with brush
- Decontaminate boots with detergent solution and tap water
- Decontaminate and remove outer gloves
- Remove Tyvek® coveralls (when worn)
- Remove inner gloves and wash hands

Soil dry-brushed from boots and gloves will be contained. In the event that additional PPE is worn, the disposable PPE (e.g., respirator cartridges, Tyvek® coveralls, and gloves worn during sampling) will be managed in the same way disposable equipment will be managed – discarded as solid waste. Respirators, if used, will be cleaned after each use with soap and

water or wipe pads, dried, and stored in plastic bags. For non-disposable PPE (e.g., rain suit, respirators), the same decontamination procedures listed above will be followed.

7.2 HEAVY EQUIPMENT DECONTAMINATION

Heavy equipment will be decontaminated via dry-decontamination methods prior to leaving the work site. Employees performing this task will wear appropriate protective clothing as specified in Section 5.0. To prevent both exposure to unprotected personnel and migration of contamination due to tracking by personnel or equipment, care must be taken to remove gross contamination from heavy equipment before moving equipment outside of decontamination zone.

All decontamination activities will take place in the designated decontamination area only.

8.0 SITE CONTROL

8.1 GENERAL SITE CONTROL REQUIREMENTS

To prevent exposure of unprotected personnel and contaminant migration, work areas and the associated PPE requirements will be clearly identified at the access point to the work area. Only authorized personnel will be allowed to enter the work area.

Operations will be conducted in a safe manner consistent with the policies and procedures outlined in this plan. As an administrative measure to limit personnel exposure to site hazards, the number of personnel allowed on-site will be restricted to the minimum needed to complete the required work.

Site access will be controlled to reduce the possibility of entry by unauthorized or unprotected individuals and to prevent the transfer of contaminants by personnel or equipment from the site. This will be accomplished through administrative controls, as physical barriers may not be practicable. Only Jacobs and subcontractor personnel will be allowed access to this area during field operations. Persons entering this zone are required to wear PPE as prescribed in Section 5.1 of this HSP.

The SSHO or a designee will be alert for persons attempting to enter work zones and will prohibit unauthorized or unprotected persons from entering these areas. Visitors wishing to enter the site must first receive site orientation with regards to the hazards present and the appropriate PPE, then sign in and out on the daily visitor log when assessing the area. Work zones may be modified or expanded by the SSHO depending upon changing wind and site conditions.

8.2 DESIGNATION OF ZONES

Work areas or zones will be designated as suggested in the *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities,* National Institute of Occupational Safety and Health/OSHA/U. S. Coast Guard/U. S. Environmental Protection Agency, November 1985. The guidance manual recommends that the vicinity around each of the work areas be divided into three zones:

- Exclusion or “hot” zone
- Contamination reduction zone

- Support zone

8.2.1 Exclusion Zone

The exclusion zone will consist of the beach area where debris removal takes place. This will be limited to the areas between the foot of the bluff and the low tide mark. One limit of this zone will be at the base of the access road at approximately the high tide mark. Decontamination equipment will be staged at this location, and decontamination of equipment and personnel leaving the beach area will occur at this location. All personnel entering these areas must wear the prescribed level of PPE.

8.2.2 Contamination Reduction Zone

The contamination reduction zone, or decontamination area, will be located at the lower end of the beach access road. Personnel will begin the sequential decontamination process in this area after exiting the exclusion zone. To prevent cross contamination and for accountability purposes, all personnel will enter and leave the exclusion zone through the contamination reduction zone. To help avoid tracking potentially contaminated materials off site, gloves, booties (if applicable), and Tyvek® coveralls (if applicable) should be removed when leaving the contamination reduction zone.

8.2.3 Staging Area and Support Zone

The support zone, located at both the top and bottom of the access road, will consist of equipment staging area, fenced waste-storage area, and lavatory facilities. Eating and drinking will be allowed in this area only.

9.0 TRAINING/MEDICAL SURVEILLANCE

9.1 TRAINING

All personnel who will perform field activities must have completed the training and medical surveillance requirements specified in the OSHA Hazardous Waste Operations and Emergency Response Standard [29 CFR 1910.120(e) and (f)]. Therefore, such personnel must have completed 40 hours of initial training or 8 hours of refresher training within the last year. After arriving at the work site, all personnel will receive orientation related to the specifics of the site including lead awareness training.

Managers or supervisors of personnel performing such activities must have completed the specified 8 hours of supervisor training in addition to the initial/refresher training, as well as the Jacobs Supervising for Safety training.

Personnel who will operate lift trucks or heavy equipment will have been properly trained and experienced in doing so. Additionally, key field personnel will attend Air Force-provided training in: UXO Awareness Class / CWM Awareness Class (2 hours).

9.2 HEALTH AND SAFETY BRIEFINGS

A pre-entry health and safety briefing an daily safety tailgate meetings will be held prior to commencing fieldwork. The SSHO will lead the briefing, at which site-specific hazards and prevention of injury will be discussed. Additional health and safety meetings shall be held whenever necessary (e.g., changes in activities). Attachment 4 contains the safe plan of action form to be completed for each work activity. Attachment 5 contains the health and safety briefing form to be used to document such meetings.

9.3 MEDICAL SURVEILLANCE

All field personnel must also have completed and passed an annual and/or baseline occupational medical-surveillance examination within the last year. Those employees who may be required to wear respirators on site must have passed a fit-test for the specific respirators that will be utilized and must have medical approval to wear a respirator.

Documentation of the above, in the form of a copy of each employee's training certificate(s) and summary letter from the occupational medical surveillance examination, must be on file prior to the employee performing project activities at the site.

9.4 HAZARD COMMUNICATION

For any hazardous material brought on-site, subcontractors will inform Jacobs and will submit an MSDS for that material. Jacobs will likewise inform the subcontractors of hazardous substances it intends to use on-site to which subcontractor employees may be exposed. All employees will be informed of the potential hazards of materials brought on-site and to which they may be exposed prior to the chemicals initial use.

Jacobs will submit to the Air Force an inventory and applicable MSDSs for any hazardous materials to be brought on-site.

10.0 EMERGENCY RESPONSE/ACCIDENT INVESTIGATION

The telephone numbers for contacting the police and fire departments, ambulance service, local hospitals, and Jacobs representatives are provided in Table 10-1. Elmendorf AFB Hospital personnel will respond to any medical emergency 911 calls on Base. Medical attention that does not warrant a 911 emergency response will be handled at a medical facility off Base. A map showing the locations of the local hospitals is provided in Figure 10-1.

Any accident/incident resulting in an OSHA-recordable injury or illness, treatment at a hospital or physician's office, property damage, or a near-miss accident requires that an accident/incident report be completed and submitted to the HSM in accordance with Jacobs Health and Safety Policy. The investigation will be initiated as soon as emergency conditions are under control. The purpose of this investigation is not to attribute blame but to determine the pertinent facts so that repeat or similar occurrences can be avoided. A copy of the Supervisor's Accident/Incident Investigation Report form is attached as Attachment 6 of this HSP. If required, Jacobs HSM will promptly notify OSHA in the event of any serious or fatal accident.

A first aid kit will be maintained in all vehicles on-site. It will contain gloves and a cardiopulmonary resuscitation shield for protection from blood-borne pathogens. A portable eye-wash station or sufficient eye wash bottles will also be maintained on-site.

The client representatives (Air Force and AFCEE) must be notified of any accident or injury. Copies of the Air Force notification forms are provided in Attachment 6 of this HSP.

Table 10-1
Emergency Response Contacts and Telephone Numbers

Emergency Response Organizations	
Ambulance	911*
Security	911*
Fire	911*
Elmendorf Hospital - Emergency	911*
Hospitals - Non-Emergency	
Alaska Regional Hospital	264-1222
Providence Alaska Medical Center	562-2211
National Response Center	1-800-424-8802
Poison Control	1-800-222-1222
CHEM-TEL Customer: ID #JAC001	1-800-255-3924
Alaska State Troopers	907-428-7200
LF04 Landfill Key Project Team Members	
Project Manager	751-3350 (wk)
Kelly McGovern	227-7833 (cell)
Health and Safety Representatives	
Health and Safety Manager, Anchorage, AK	751-3387 (wk)
Brad Burns	1-888-858-7243 PIN 107856 (pager)
Client Representatives	
AFCEE CO Linda Fellows	552-9762
AFCEE COR Kevin Thomas	552-4112
EAFB Project Manager Ellen Godden	552-7111

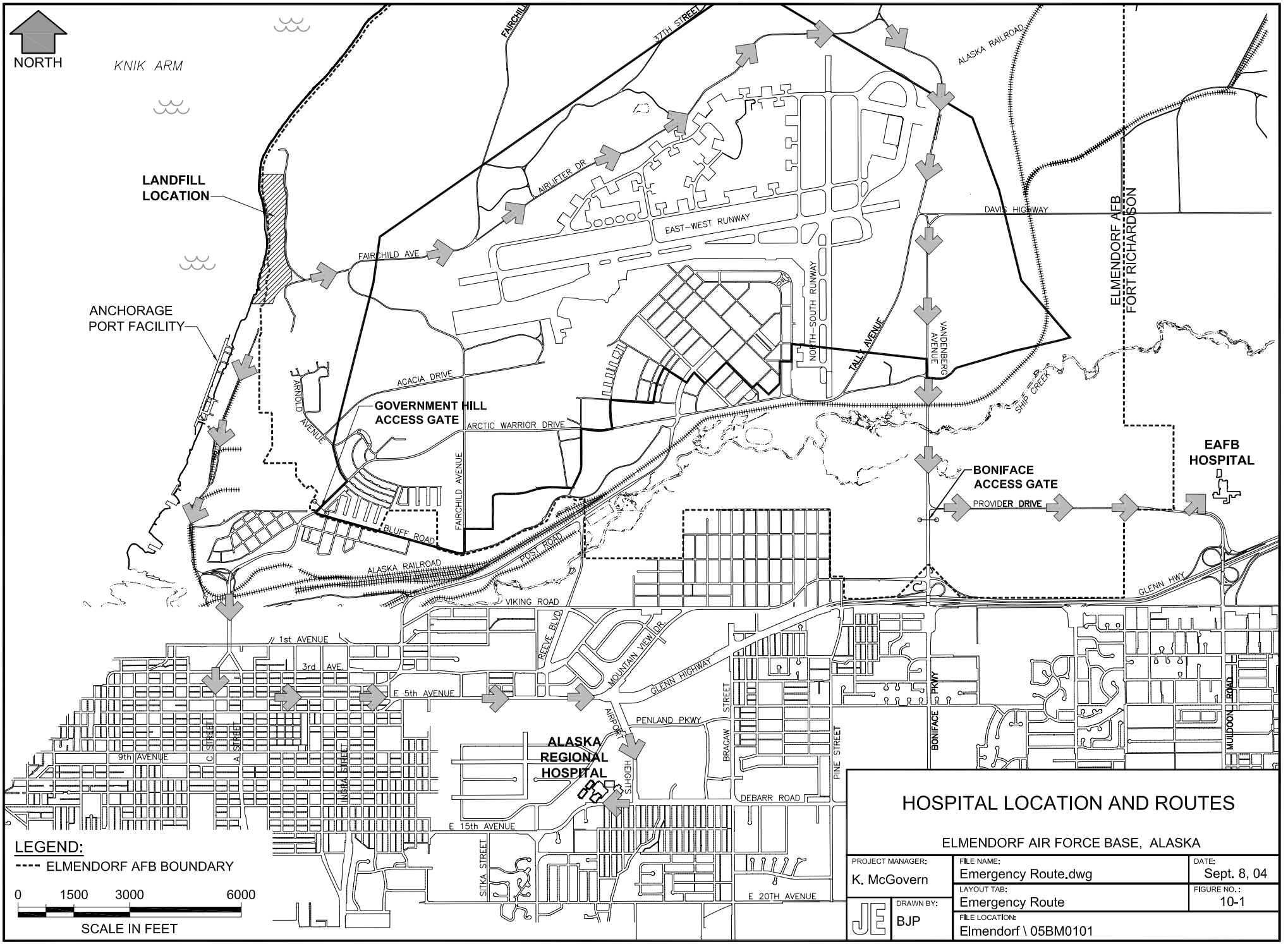
* When dialing 911 from a fixed phone on Elmendorf AFB, you will reach the Elmendorf AFB emergency operator. When dialing 911 from a cell phone on Elmendorf AFB, you will reach the municipal 911 operator and must ask to be connected to the Elmendorf AFB emergency operator.

DIRECTIONS TO HOSPITALS:

Call 911 and follow instructions. Refer to Figure 10-1.

Figure 10-1 Hospital Locations and Routes

8 ½ x 11 B&W



HOSPITAL LOCATION AND ROUTES

ELMENDORF AIR FORCE BASE, ALASKA

PROJECT MANAGER: K. McGovern	FILE NAME: Emergency Route.dwg	DATE: Sept. 8, 04
	LAYOUT TAB: Emergency Route	FIGURE NO.: 10-1
JE DRAWN BY: BJP	FILE LOCATION: Elmendorf \ 05BM0101	

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ATTACHMENT 1

HSP Acceptance Sheet

Project Safety and Health Agreement Sign-Off Sheet

Title	Signature	Date
Client:		
E. Godden, 3rd CES Project Manager		
K. Thomas, AFCEE COR		
JACOBS:		
B. Burns, Regional HSE Manager		
K. McGovern, Project Manager		
TBD SSHO		
Project Team:	**"I have read and agree to abide by this SSHP Addendum and Standard SSHP."**	

ATTACHMENT 2

HSP Record of Change Form

LF04 LANDFILL DEBRIS REMOVAL
HEALTH AND SAFETY PLAN
RECORD OF CHANGE FORM

For operational or other reasons, the following section(s) of this Health and Safety Plan is (are) hereby modified as follows:

Section _____ page _____

Modification:

_____

_____

_____

_____

_____

The reason for this modification is:

_____

_____

_____

_____

_____

_____

THIS CHANGE MUST BE APPROVED BY THE HEATH AND SAFETY MANAGER AND PROJECT MANAGER.

Signed _____ Date _____
Health and Safety Manager

Signed _____ Date _____
Project Manager

ATTACHMENT 3

Material Safety Data Sheets

Material Safety Data Sheet

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY (As Used on Label and List): ALCONOX

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name: ALCONOX, INC.

Address (Number, Street, City, State, and ZIP Code): 9 EAST 40th SREET, NEW YORK, NY 10016

Emergency Telephone Number: CHEMTEL: 800-255-3924

Telephone Number for Information: 212 532-4040

Date Prepared: FEBRUARY 18, 1993

Signature of Preparer (optional):

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)

THERE ARE NO INGREDIENTS IN ALCONOX WHICH APPEARED ON THE OSHA STANDARD 29 CFR 1910 SUBPART Z.

Section III — Physical/Chemical Characteristics

Boiling Point	N.A.	Specific Gravity (H_2O = 1)	N.A.
Vapor Pressure (mm Hg.)	N.A.	Melting Point	N.A.
Vapor Density (AIR = 1)	N.A.	Evaporation Rate (Butyl Acetate = 1)	N.A.

Solubility in Water: APPRECIABLE (GREATER THAN 10 PER CENT)

Appearance and Odor: WHITE POWDER INTERSPERED WITH CREAM COLORED FLAKES - ODORLESS

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
NONE		N.A.	N.A.

Extinguishing Media: WATER, CO_2, DRY CHEMICAL, FOAM, SAND/EARTH

Special Fire Fighting Procedures: FOR FIRES INVOLVING THIS MATERIAL DO NOT ENTER WITHOUT PROTECTIVE EQUIPMENT AND SELF CONTAINED BREATHING APPARATUS

Unusual Fire and Explosion Hazards: NONE

(Reproduce locally)

OSHA 174, Sept. 1985

Section V — Reactivity Data

Stability			Conditions to Avoid
	Unstable		NONE
	Stable	XX	

Incompatibility (*Materials to Avoid*): AVOID STRONG ACIDS

Hazardous Decomposition or Byproducts: MAY RELEASE CO_2 GAS ON BURNING

Hazardous Polymerization			Conditions to Avoid
	May Occur		NONE
	Will Not Occur	XX	

Section VI — Health Hazard Data

Route(s) of Entry: Inhalation? YES Skin? NO Ingestion? YES

Health Hazards (*Acute and Chronic*): INHALATION OF POWDER MAY PROVE LOCALLY IRRITATING TO MUCOUS MEMBRANES. INGESTION MAY CAUSE DISCOMFORT AND/OR DIARRHEA.

Carcinogenicity: NTP? NO IARC Monographs? NO OSHA Regulated? NO

Signs and Symptoms of Exposure: EXPOSURE MAY IRRITATE MUCOUS MEMBRANES. MAY CAUSE SNEEZING.

Medical Conditions Generally Aggravated by Exposure: RESPIRATORY CONDITIONS MAY BE AGGRAVATED BY POWDER.

Emergency and First Aid Procedures: YES-FLUSH WITH PLENTY OF WATER FOR 15 MINUTES SKIN-FLUSH WITH PLENTY OF WATER INGESTION-DRINK LARGE QUANTITIES OF WATER.GET MEDICAL ATTENTION FOR DISCOMFORT

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken In Case Material is Released or Spilled: MATERIAL FOAMS PROFUSELY. SHOVEL AND RECOVER AS MUCH AS POSSIBLE. RINSE REMAINDER TO SEWER. MATERIAL IS COMPLETELY BIODEGRADABLE.

Waste Disposal Method: SMALL QUANTITIES MAY BE DISPOSED OF IN SEWER. LARGE QUANTITIES SHOULD BE DISPOSED OF ACCORDING TO LOCAL REQUIREMENTS FOR NON-HAZARDOUS DETERGENT.

Precautions to Be Taken in Handling and Storing: STORE IN A DRY AREA TO PREVENT CAKING.

Other Precautions: NO SPECIAL REQUIREMENTS OTHER THAN THE GOOD INDUSTRIAL HYGIENE AND SAFETY PRACTICES ENPLOYED WITH ANY INDUSTRIAL CHEMICAL.

Section VIII — Control Measures

Respiratory Protection (*Specify Type*): DUST MASK

Ventilation			
	Local Exhaust: NORMAL	Special: N.A.	
	Mechanical (General): N.A.	Other: N.A.	

Protective Gloves: USEFUL-NOT REQUIRED

Eye Protection: USEFUL-NOT REQUIRED

Other Protective Clothing or Equipment: NOT REQUIRED

Work/Hygienic Practices: NO SPECIAL PRACTICES REQUIRED

ATTACHMENT 4

Safe Plan of Action

JACOBS

SAFE PLAN OF ACTION
(JVEP-30f1)

PROJECT NO. _____

Job/Task _____ Work Area _____ Date _____

Steps of Task	Hazard/Reaction to Failure	Safe Plan	Resources

TEAM MEMBERS' SIGNATURES

_____ _____ _____ _____

_____ _____ _____ _____

_____ _____ _____ _____

The signature of the supervisor confirms the completion of the hazard assessment and Safe Plan of Action by the crew.

Supervisors Signature: _____ Date _____

INSTRUCTIONS: 1. Write name of the job or task in the space provided. 2. Conduct a walk-through survey of work area. 3. Write the steps of the task in a safe sequence. 4. List all possible hazards involved in each step and reaction to failure. 5. In the Safe Plan column, state the actions that will be taken to prevent the hazards and injury from reaction to failure. 6. In the Resources column, list safety equipment and tools, etc. needed to do the job. 8. Ask each team member, who helped develop and will use this SPA, to sign in the spaces provided. 9. Review the SPA at the end of the task for improvements.

NOTE: Work shall stop when conditions change, the job changes, or a deficiency in the plan is discovered, and the current SPA will be modified or a new SPA created.

Safe Plan of Action Checklist (check all that apply)

(Review checklist while completing front page Safe Plan of Action)

A new SPA is required if the job scope or work conditions change.

Required Permits
☐ Confined Space
☐ Critical Lift
☐ Hot Work
☐ Lock Out/Tag Out
☐ Soil Disturbance (Over 12")
☐ Utility Clearance

Required PPE
☐ Hard Hat, Class C
☐ Hard Hat, Class E *(Elect. Protect)*
☐ Ear Plugs/Ear Muffs
Eye Protection:
☐ Safety Glasses
☐ Face Shield
☐ Chemical Goggles
☐ Welding Hood
Hand Protection:
☐ Cut Resistant Gloves
☐ Welders Gloves
☐ Nitrile Gloves
☐ Surgical Gloves
☐ Rubber Gloves
☐ Elect. Insulated Gloves
☐ Arm Sleeves
Foot Protection:
☐ Sturdy Work Boots
☐ Safety Toe Boots
☐ Rubber Boots
☐ Rubber Boot Covers
☐ Dielectric Footwear
Respiratory. Protection:
☐ Dust Mask
☐ Air Purifying Respirator
☐ Supplied Air Respirator
☐ SCBA
☐ Emergency Escape Respirator
Special Clothing:
☐ Tyvek ®
☐ Poly Coated Tyvek ®
☐ Fire Resistant Coveralls
☐ Rain Suit
☐ Safety Vest
Fall Protection:
☐ Harness
☐ Double Lanyard Required
☐ Anchorage Point Available
☐ Additional Anchorage Connector Needed e.g. Cross Arm Strap, etc.
☐ Retractable Device Needed
☐ Horizontal Life Line System Req'd.
☐ Fall Clearance Distance Adequate
☐ Fall Rescue/Retrieval Plan Set Up

Hazards	Safe Plan
☐ Overhead Utilities	☐ Power de-energization required ☐ Insulation blankets required ☐ Wire watcher required ☐ Required clearance distance = _____Ft. ☐ Safe work zone marked
☐ Crane or other Lifting Equipment	☐ Signalman assigned ☐ Tag lines in use ☐ Area around crane barricaded ☐ Lifting equipment inspected ☐ Personnel protected from overhead load
☐ Underground Utilities☐	☐ Reviewed as-builts ☐ Subsurface surveys ☐ Received dig permit Required clearance distance = _____ Ft. ☐ Safe work zone Marked
☐ Electrical	☐ Lock Out/Tag Out/Try Out ☐ Permit required? ☐ Confirm that equipment is de-energized ☐ Reviewed electrical safety procedures
☐ Excavations	☐ Permits ☐ Inspected prior to entering ☐ Proper sloping/shoring ☐ Barricades provided ☐ Access/egress provided ☐ Protection from accumulated water
☐ Fire Hazard	☐ Hot Work Permit ☐ Fire Extinguishers ☐ Fire watch ☐ Adjacent area protected ☐ Unnecessary flammable material removed
☐ Vehicular Traffic or Heavy Equipment	☐ Traffic Barricades ☐ Cones ☐ Signs ☐ Flagmen ☐ Lane closure ☐ Communication with equipment operator
☐ Noise >85 dB	Hearing protection is required: ☐ Ear plugs ☐ Ear Muffs ☐ Both
☐ Hand & Power Tools:	☐ Inspect general cond. ☐ GFCI in use ☐ Identified PPE required for each tool ☐ Reviewed safety requirements in operators manual(s) ☐ Guarding OK
☐ Hand Hazards	List sharp tools, material, equipment: _____ ☐ PPE gloves, etc. ☐ Protected sharp edges as necessary
☐ Manual Lifting	☐ Reviewed proper lifting tech. ☐ Identified material requiring lifting equipment ☐ Hand protection required ☐ Back support belts
☐ Ladders	☐ Inspect general cond. before use ☐ Ladder inspected with in last quarter ☐ Ladder tied off or held ☐ Proper angle and placement ☐ Reviewed ladder safety
☐ Scaffolds	☐ Inspect general condition before use ☐ Tags in place ☐ Properly secured ☐ Toe boards used ☐ Footings adequate ☐ Materials properly stored on scaffold
☐ Slips, Trips Falls	☐ Inspect for trip hazards ☐ Hazards marked ☐ Tools & material properly stored ☐ Extension cords properly secured ☐ Work zone free of debris
☐ Pinch Points	List potential pinch points: _____ ☐ Working near operating equipment ☐ Hand/Body positioning
☐ Working w/ Chemicals	☐ The task creates potential for direct contact with hazardous chemicals. ☐ Reviewed MSDS hazards and precautions ☐ Have proper containers and labels. ☐ Have identified proper PPE (respirators, clothing, gloves, etc.)
☐ Heat Stress Potential	☐ Heat stress monitoring (>85°) ☐ Liquids available ☐ Cool down periods ☐ Sun Screen ☐ Reviewed Heat Stress symptoms
☐ Cold Stress Potential	☐ Proper clothing (i.e.. gloves, coat, coveralls) ☐ Wind chill <32° ☐ Reviewed Cold Stress symptoms ☐ Warm up periods
☐ Environmental	☐ Air emissions ☐ Water discharge ☐ Hazardous wastes ☐ Other wastes ☐ Pollution prevention ☐ Waste minimization
☐ Natural or Site Hazards	☐ Weather ☐ Terrain ☐ Adjacent operations or processes ☐ Biological hazards ☐ Animals/reptiles/insects hazards
☐ Adjacent Work/Processes and/or co occupancy	☐ Notified them of our presents ☐ Other workers adjacent, above, or below. ☐ Coordinated with adjacent work supervisor/customer operator ☐ Can work safely
☐ Barricades/covers	☐ Caution barricade tape required ☐ Danger barricade tape required ☐ Rigid railing required ☐ Covers over opening ☐ Warning signs required
Additional Information:	

ATTACHMENT 5

Site Tailgate Meeting and Exclusion Zone Entry Log

JACOBS ENGINEERING GROUP INC.

SITE TAILGATE MEETING and EXCLUSION ZONE ENTRY LOG

Facility: _____ Conducted by: _____

Date: _____ Time: _____

Client: _____ Project Number: _____

Specific Location: _____

Type of Work: _____

Chemicals Brought to Site: _____

_____

MSDSs available: _____Yes _____No

HEALTH AND SAFETY TOPICS PRESENTED

Protective Clothing/Equipment: _____

_____

Chemical Hazards: _____

_____

Address: _____

_____

Emergency Procedures: Apply First Aid and notify Health and Safety immediately _____

_____

Hospital/Clinic: _____

Address: _____

Special Equipment: _____

_____

Evacuation Route: _____

_____

ATTENDEES

Entered Exclusion Zone	Printed Name	Company	SS#	Signature
__Yes __No				
__Yes __No				
__Yes __No				
__Yes __No				
__Yes __No				
__Yes __No				
__Yes __No				

ATTACHMENT 6

Accident/Incident Investigation Forms

JE MERIT CONSTRUCTORS, INC.
A MEMBER OF THE JACOBS ENGINEERING GROUP

ACCIDENT INVESTIGATION REPORT

AIR Number: _____

CLIENT:	PROJECT:
LOCATION:	DATE:

Name: _____ Contractor: _____ Date: _____

Age: _____ Location: _____ Time: _____

Craft: _____ Property Damage: Yes _____ No _____

What Happened? _____

Nature of Injury? _____

Injury Potential? Major: _____ Serious: _____ Minor: _____

Why did this happen? _____

Possibility of Reoccurrence? Often: _____ Seldom: _____ Rarely: _____

What Corrective Action Has Been/Will Be Taken? _____

Staff Supervisor: _____ Staff Supervisor: _____

Report Written By: _____ Report Written By: _____

Date of This Report: _____ Date of This Report: _____

(For Safety Staff only)	REPORT NO.	EROC CODE	**UNITED STATES ARMY CORPS OF ENGINEERS** **ACCIDENT INVESTIGATION REPORT** *(For Use of this Form See Help Menu and USACE Suppl to AR 385-40)*	**REQUIREMENT CONTROL SYMBOL: CEEC-S-8(R2)**

1. ACCIDENT CLASSIFICATION

PERSONNEL CLASSIFICATION	INJURY/ILLNESS/FATAL	PROPERTY DAMAGE	MOTOR VEHICLE INVOLVED	DIVING
GOVERNMENT ☐ CIVILIAN ☐ MILITARY	☒	☐ FIRE INVOLVED ☐ OTHER	☐	☐
☐ CONTRACTOR	☐	☐ FIRE INVOLVED ☐ OTHER	☐	☐
☐ PUBLIC ☐ FATAL ☐ OTHER			☐	

2. PERSONAL DATA

a. Name *(Last, First, MI)*	b. AGE	c. SEX ☐ MALE ☐ FEMALE	d. SOCIAL SECURITY NUMBER	e. GRADE

f. JOB SERIES/TITLE	g. DUTY STATUS AT TIME OF ACCIDENT	h. EMPLOYMENT STATUS AT TIME OF ACCIDENT
	☐ ON DUTY ☐ TDY ☐ OFF DUTY	☐ ARMY ACTIVE ☐ ARMY RESERVE ☐ VOLUNTEER ☐ PERMANENT ☐ FOREIGN NATIONAL ☐ SEASONAL ☐ TEMPORARY ☐ STUDENT ☐ OTHER *(Specify)*

3. GENERAL INFORMATION

a. DATE OF ACCIDENT *(month/day/year)*	b. TIME OF ACCIDENT *(Military time)*	c. EXACT LOCATION OF ACCIDENT	d. CONTRACTOR'S NAME
	hrs		(1) PRIME: (2) SUBCONTRACTOR:

e. CONTRACT NUMBER	f. TYPE OF CONTRACT	g. HAZARDOUS/TOXIC WASTE ACTIVITY
☐ CIVIL WORKS ☐ MILITARY ☐ OTHER *(Specify)*	☐ CONSTRUCTION ☐ SERVICE ☐ A/E ☐ DREDGE ☐ OTHER *(Specify)*	☐ SUPERFUND ☐ DERP ☐ IRP ☐ OTHER *(Specify)*

4. CONSTRUCTION ACTIVITIES ONLY *(Fill in line and corresponding code number in box from list - see help menu)*

a. CONSTRUCTION ACTIVITY	(CODE)	b. TYPE OF CONSTRUCTION EQUIPMENT	(CODE)
	#		#

5. INJURY/ILLNESS INFORMATION *(Include name on line and corresponding code number in box for items e, f & g - see help menu)*

a. SEVERITY OF ILLNESS/INJURY	(CODE)	B. ESTIMATED DAYS LOST	C. ESTIMATED DAYS HOSPITALIZED	D. ESTIMATED DAYS RESTRICTED DUTY
	#	0	0	0

e. BODY PART AFFECTED	(CODE)	g. TYPE AND SOURCE OF INJURY/ILLNESS	(CODE)
PRIMARY	#	TYPE	#
SECONDARY	#	SOURCE	#
f. NATURE OF ILLNESS / INJURY	#		

6. PUBLIC FATALITY *(Fill in line and correspondence code number in box - see help menu)*

a. ACTIVITY AT TIME OF ACCIDENT	(CODE)	b. PERSONAL FLOATATION DEVICE USED?
	#	☐ YES ☐ NO ☒ N/A

7. MOTOR VEHICLE ACCIDENT

a. TYPE OF VEHICLE	b. TYPE OF COLLISION	c. SEAT BELTS	USED	NOT USED	NOT AVAILABLE
☐☐ PICKUP/VAN ☐☐ AUTOMOBILE ☐☐ TRUCK ☐☐ OTHER *(Specify)*	☐ SIDE SWIPE ☐ HEAD ON ☐ REAR END ☐ BROADSIDE ☐ ROLL OVER ☐ BACKING ☐ OTHER *(Specify)*	(1) FRONT SEAT			
		(2) REAR SEAT			

8. PROPERTY/MATERIAL INVOLVED

a. NAME OF ITEM	B. OWNERSHIP	C. $ AMOUNT OF DAMAGE
(1)		
(2)		
(3)		

9. VESSEL/FLOATING PLANT ACCIDENT *(Fill in line and correspondence code number in box from list - see help menu)*

a. TYPE OF VESSEL/FLOATING PLANT	(CODE)	b. TYPE OF COLLISION/MISHAP	(CODE)
	#		#

10. ACCIDENT DESCRIPTION *(Use additional paper, if necessary)*

See attached page.

11. CAUSAL FACTOR(S) *(Read Instruction Before Completing)*

a. (Explain YES answers in item 13)	YES	NO
DESIGN: Was design of facility, workplace or equipment a factor?	☐	☐
INSPECTION/MAINTENANCE: Were inspection & maintenance procedures a factor?	☐	☐
PERSON'S PHYSICAL CONDITION: In your opinion, was the physical condition of the person a factor?	☐	☐
OPERATING PROCEDURES: Were operating procedures a factor?	☐	☐
JOB PRACTICES: Were any job safety/health practices not followed when the accident occurred?	☐	☐
HUMAN FACTORS: Did any human factors such as, size or strength of person, etc., contribute to accident?	☐	☐
ENVIRONMENTAL FACTORS: Did heat, cold, dust, sun, glare, etc., contribute to the accident?	☐	☐

a. *(CONTINUED)*	YES	NO
CHEMICAL AND PHYSICAL AGENT FACTORS: Did exposure to chemical agents, such as dust, fumes, mists, vapors or physical agents, such as, noise, radiation, etc., contribute to accident?	☐	☐
OFFICE FACTORS: Did office setting such as, lifting office furniture, carrying, stooping, etc., contribute to the accident?	☐	☐
SUPPORT FACTORS: Were inappropriate tools/resources provided to properly perform the activity/task?	☐	☐
PERSONAL PROTECTIVE EQUIPMENT: Did the improper selection, use or maintenance of personal protective equipment contribute to the accident?	☐	☐
DRUGS/ALCOHOL: In your opinion, was drugs or alcohol a factor to the accident	☐	☐

b. WAS A WRITTEN JOB/ACTIVITY HAZARD ANALYSIS COMPLETED FOR TASK BEING PERFORMED AT TIME OF ACCIDENT?

☐ YES *(If yes, attach a copy.)* ☐ NO

12. TRAINING

a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK?	b. TYPE OF TRAINING.	c. DATE OF MOST RECENT FORMAL TRAINING.
☐ YES ☐ NO	☐ CLASSROOM ☐ ON JOB	(Month) (Day) (Year)

13. FULLY EXPLAIN WHAT ALLOWED OR CAUSED THE ACCIDENT; INCLUDE DIRECT AND INDIRECT CAUSES *(See instruction for definition of direct and indirect causes.) (Use additional paper, if necessary)*

a. DIRECT CAUSE

See attached page.

b. INDIRECT CAUSE(S)

See attached page.

14. ACTION(S) TAKEN, ANTICIPATED OR RECOMMENDED TO ELIMINATE CAUSE(S).

DESCRIBE FULLY:

See attached page.

15. DATES FOR ACTIONS IDENTIFIED IN BLOCK 14.

a. BEGINNING (Month/Day/Year)	b. ANTICIPATED COMPLETION (Month/Day/Year)

c. SIGNATURE AND TITLE OF SUPERVISOR COMPLETING REPORT CORPS _____ CONTRACTOR _____	d. DATE *(Mo/Da/Yr)*	e. ORGANIZATION IDENTIFIER *(Div, Br, Sect)*	f. OFFICE SYMBOL

16. MANAGEMENT REVIEW *(1st)*

a. ☐ CONCUR b. ☐ NON CONCUR c. COMMENTS

SIGNATURE	TITLE	DATE

17. MANAGEMENT REVIEW *(2nd - Chief Operations, Construction, Engineering, etc.)*

a. ☐ CONCUR b. ☐ NON CONCUR c. COMMENTS

SIGNATURE	TITLE	DATE

18. SAFETY AND OCCUPATIONAL HEALTH OFFICE REVIEW

a. ☐ CONCUR b. ☐ NON CONCUR c. ADDITIONAL ACTIONS/COMMENTS

SIGNATURE	TITLE	DATE

19. COMMAND APPROVAL

COMMENTS

COMMANDER SIGNATURE	DATE

*U.S. GOVERNMENT PRINTING OFFICE: 1993-0-791-757

10. ACCIDENT DESCRIPTION *(Continuation)*

13a. DIRECT CAUSE *(Continuation)*

13b.	INDIRECT CAUSES *(Continuation)*

14.	ACTION(S) TAKEN, ANTICIPATED, OR RECOMMENDED TO ELIMINATE CAUSE(S) *(Continuation)*

GENERAL. Complete a separate report for each person who was *injured, caused* or *contributed* to the accident (excluding uninjured personnel and witnesses). Use of this form for reporting USACE employee first-aid type injuries *NOT* to be submitted to the Department of Labor (DOL), Office of Workers' Compensation Programs (OWCP) shall be at the discretion of the FOA Commander. Please type or print legibly. Appropriate items shall be marked with an "X" in the box(es). If additional space is needed, provide the information on a separate sheet and attach to the completed form. Ensure that these instructions are forwarded with the completed report to the designated management reviewers indicated in sections 16. and 17.

INSTRUCTIONS FOR SECTION 1— ACCIDENT CLASSIFICATION. *(Mark All Boxes That Are Applicable.)*

a. GOVERNMENT. Mark "CIVILIAN" box if accident involved government civilian employee; mark "MILITARY" box if accident involved U.S. military personnel.
   (1) INJURY/ILLNESS/FATALITY—Mark if accident resulted in any government civilian employee injury, illness, or fatality that requires the submission of Office of Workers Compensation Programs (OWCP) Forms CA-1 (injury), CA-2 (illness), or CA-6 (fatality), to the Department of Labor OWCP, or military personnel lost-time or fatal injury.
   (2) PROPERTY DAMAGE—Mark the appropriate box if accident resulted in any damage of $1000 or more to government property (including motor vehicles).
   (3) VEHICLE INVOLVED—Mark if accident involved a motor vehicle, *regardless* of whether "INJURY/ILLNESS" or "PROPERTY DAMAGE" are marked.
   (4) DIVING ACTIVITY—Mark if the accident involved an in-house USACE diving activity.

b. CONTRACTOR.
   (1) INJURY/ILLNESS/FATALITY—Mark if accident resulted in any contractor lost-time injury/illness or fatality.
   (2) PROPERTY DAMAGE—Mark the appropriate box if accident resulted in any damage of $1000 or more to contractor property (including motor vehicles).
   (3) VEHICLE INVOLVED—Mark if accident involved a motor vehicle, regardless of whether "INJURY/ILLNESS" or "PROPERTY DAMAGE" are marked.
   (4) DIVING ACTIVITY—Mark if the accident involved a USACE Contractor diving activity.

c. PUBLIC.
   (1) INJURY/ILLNESS/FATALITY—Mark if accident resulted in public fatality. (The "OTHER" box will be marked when requested by the FOA to report an unusual non-fatal public accident that could result in claims against the government or as otherwise directed by the FOA Commander).
   (2) VOID SPACE—Make no entry.
   (3) VEHICLE INVOLVED—Mark if accident resulted in a fatality to a member of the public and involved a motor vehicle, *regardless* of whether "INJURY/ILLNESS" is marked.
   (4) VOID SPACE—Make no entry.

INSTRUCTIONS FOR SECTION 2—PERSONAL DATA

a. NAME—(MANDATORY FOR GOVERNMENT ACCIDENTS. OPTIONAL AT THE DISCRETION OF THE FOA COMMANDER FOR CONTRACTOR AND PUBLIC ACCIDENTS). Enter last name, first name, middle initial of person involved.

b. AGE—Enter age.

c. SEX—Mark appropriate box.

d. SOCIAL SECURITY NUMBER—(FOR GOVERNMENT PERSONNEL ONLY) Enter the social security number (or other personal identification number if no social security number issued).

e. GRADE—(FOR GOVERNMENT PERSONNEL ONLY) Enter pay grade. Example: O-6; E-7; WG-8; WS-12; GS-11; etc.

f. JOB SERIES/TITLE—For *government civilian employees* enter the pay plan, full series number, and job title, e.g. GS-0810/Civil Engineer. For *military personnel* enter the primary military occupational specialty (PMOS), e.g., 15A30 or 11G50. For *contractor employees* enter the job title assigned to the injured person, e.g. carpenter, laborer, surveyor, etc.,

g. DUTY STATUS—Mark the appropriate box.
   (1) ON DUTY—Person was at duty station during duty hours or person was away from duty station during duty hours but on official business at time of the accident.
   (2) TDY—person was on official business, away from the duty station and with travel orders, at time of accident.
   (3) OFF DUTY—person was not on official business at time of accident.

h. EMPLOYMENT STATUS—(FOR GOVERNMENT PERSONNEL ONLY) Mark the most appropriate box. If "OTHER" is marked, specify the employment status of the person.

INSTRUCTION FOR SECTION 3—GENERAL INFORMATION

a. DATE OF ACCIDENT—Enter the month, day, and year of accident.

b. TIME OF ACCIDENT—Enter the local time of accident in military time. Example: 1430 hrs (not 2:30 p.m.).

c. EXACT LOCATION OF ACCIDENT—Enter facts needed to locate the accident scene. (installation/project name, building number, street, direction and distance from closest landmark, etc.,).

d. CONTRACTOR NAME
   (1) PRIME—Enter the exact name (title of firm) of the prime contractor.
   (2) SUBCONTRACTOR—Enter the name of any subcontractor involved in the accident.

e. CONTRACT NUMBER—Mark the appropriate box to identify if contract is civil works, military, or other: if "OTHER" is marked, specify contract appropriation on line provided. Enter complete contract number of prime contract, e.g., DACW 09-85-C-0100.

f. TYPE OF CONTRACT—Mark appropriate box. A/E means architect/engineer. If "OTHER" is marked, specify type of contract on line provided.

g. HAZARDOUS/TOXIC WASTE ACTIVITY (HTW)—Mark the box to identify the HTW activity being performed at the time of the accident. For Superfund, DERP, and Installation Restoration Program (IRP) HTW activities include accidents that occurred during inventory, predesign, design, and construction. For the purpose of accident reporting, DERP Formerly Used DoD Site (FUDS) activities and IRP activities will be treated separately. For Civil Works O&M HTW activities mark the "OTHER" box.

INSTRUCTIONS FOR SECTION 4—CONSTRUCTION ACTIVITIES

a. CONSTRUCTION ACTIVITY—Select the *most appropriate* construction activity being performed at time of accident from the list below. Enter the activity name and place the corresponding code number identified in the box.

CONSTRUCTION ACTIVITY LIST

1. MOBILIZATION
2. SITE PREPARATION
3. EXCAVATION/TRENCHING
4. GRADING (EARTHWORK)
5. PIPING/UTILITIES
6. FOUNDATION
7. FORMING
8. CONCRETE PLACEMENT
9. STEEL ERECTION
10. ROOFING
11. FRAMING
12. MASONRY
13. CARPENTRY
14. ELECTRICAL
15. SCAFFOLDING/ACCESS
16. MECHANICAL
17. PAINTING
18. EQUIPMENT/MAINTENANCE
19. TUNNELING
20. WAREHOUSING/STORAGE
21. PAVING
22. FENCING
23. SIGNING
24. LANDSCAPING/IRRIGATION
25. INSULATION
26. DEMOLITION

b. TYPE OF CONSTRUCTION EQUIPMENT—Select the equipment involved in the accident from the list below. Enter the name and place the corresponding code number identified in the box. If equipment is not included below, use code 24, "OTHER", and write in specific type of equipment.

CONSTRUCTION EQUIPMENT

1. GRADER
2. DRAGLINE
3. CRANE (ON VESSEL/BARGE)
4. CRANE (TRACKED)
5. CRANE (RUBBER TIRE)
6. CRANE (VEHICLE MOUNTED)
7. CRANE (TOWER)
8. SHOVEL
9. SCRAPER
10. PUMP TRUCK (CONCRETE)
11. TRUCK (CONCRETE/TRANSIT MIXER)
12. DUMP TRUCK (HIGHWAY)
13. DUMP TRUCK (OFF HIGHWAY)
14. TRUCK (OTHER)
15. FORKLIFT
16. BACKHOE
17. FRONT-END LOADER
18. PILE DRIVER
19. TRACTOR (UTILITY)
20. MANLIFT
21. DOZER
22. DRILL RIG
23. COMPACTOR/VIBRATORY ROLLER
24. OTHER

INSTRUCTIONS FOR SECTION 5—INJURY/ILLNESS INFORMATION

a. SEVERITY OF INJURY—Mark the appropriate box

(1) FATAL—injured person died or is missing and presumed dead.

(2) LOST TIME—a non-fatal injury that causes any loss of time from work beyond the day or shift in which it occurred or a non-fatal illness/disease that causes disability at any time.

(3) NO LOST TIME—a non-fatal, traumatic injury that does not cause loss of time from work beyond the day or shift in which it occurred.

(4) FIRST AID—One time treatment (and/or one follow visit for observation) for minor scratches, cuts and similar injuries that do not ordinarily require medical attention.

b. ESTIMATED DAYS LOST—Enter the estimated number of workdays the person will lose from work.

c. ESTIMATED DAYS HOSPITALIZED—Enter the estimated number of workdays the person will be hospitalized.

d. ESTIMATED DAYS RESTRICTED DUTY—Enter the estimated number of workdays the person, as a result of the accident, will not be able to perform all of their regular duties.

e. BODY PART AFFECTED—Select the most appropriate primary and when applicable, secondary body part affected from the list below. Enter body part name on line and place the corresponding code letters identifying that body part in the box.

GENERAL BODY AREA	CODE	BODY PART NAME
ARM/WRIST	AB	ARM AND WRIST
	AS	ARM OR WRIST
TRUNK, EXTERNAL MUSCULATURE	B1	SINGLE BREAST
	B2	BOTH BREASTS
	B3	SINGLE TESTICLE
	B4	BOTH TESTICLES
	BA	ABDOMEN
	BC	CHEST
	BL	LOWER BACK
	BP	PENIS
	BS	SIDE
	BU	UPPER BACK
	BW	WAIST
	BZ	TRUNK OTHER
HEAD, INTERNAL	C1	SINGLE EAR INTERNAL
	C2	BOTH EARS INTERNAL
	C3	SINGLE EYE INTERNAL
	C4	BOTH EYES INTERNAL
	CB	BRAIN
	CC	CRANIAL BONES
	CD	TEETH
	CJ	JAW
	CL	THROAT, LARYNX
	CM	MOUTH
	CN	NOSE
	CR	THROAT, OTHER
	CT	TONGUE
	CZ	HEAD OTHER INTERNAL
ELBOW	EB	BOTH ELBOWS
	ES	SINGLE ELBOW
FINGER	F1	FIRST FINGER
	F2	BOTH FIRST FINGERS
	F3	SECOND FINGER
	F4	BOTH SECOND FINGERS
	F5	THIRD FINGER
	F6	BOTH THIRD FINGERS
	F7	FOURTH FINGER
	F8	BOTH FOURTH FINGERS
TOE	G1	GREAT TOE
	G2	BOTH GREAT TOES
	G3	TOE OTHER
	G4	TOES OTHER
HEAD, EXTERNAL	H1	EYE EXTERNAL
	H2	BOTH EYES EXTERNAL
	H3	EAR EXTERNAL
	H4	BOTH EARS EXTERNAL
	HC	CHIN
	HF	FACE
	HK	NECK/THROAT
	HM	MOUTH/LIPS
	HN	NOSE
	HS	SCALP
KNEE	KB	BOTH KNEES
	KS	KNEE
LEG, HIP, ANKLE, BUTTOCK	LB	BOTH LEGS/HIPS/ ANKLES/BUTTOCKS
	LS	SINGLE LEG/HIP ANKLE/BUTTOCK
HAND	MB	BOTH HANDS
	MS	SINGLE HAND
FOOT	PB	BOTH FEET
	PS	SINGLE FOOT
TRUNK, BONES	R1	SINGLE COLLAR BONE
	R2	BOTH COLLAR BONES
	R3	SHOULDER BLADE
	R4	BOTH SHOULDER BLADES
	RB	RIB
	RS	STERNUM (BREAST BONE)
	RV	VERTEBRAE (SPINE; DISC)
	RZ	TRUNK BONES OTHER
SHOULDER	SB	BOTH SHOULDERS
	SS	SINGLE SHOULDER
THUMB	TB	BOTH THUMBS
	TS	SINGLE THUMB
TRUNK, INTERNAL ORGANS	V1	LUNG, SINGLE
	V2	LUNGS, BOTH
	V3	KIDNEY, SINGLE
	V4	KIDNEYS, BOTH
	VH	HEART
	VL	LIVER
	VR	REPRODUCTIVE ORGANS
	VS	STOMACH
	VV	INTESTINES
	VZ	TRUNK, INTERNAL; OTHER

f. NATURE OF INJURY—Select the most appropriate nature of injury from the list below. This nature of injury shall correspond to the *primary body part* selected in 5.e. above. Enter the nature of injury name on the line and place the corresponding CODE letters identifying the nature of injury in the box provided.

* The injury or condition selected below must be caused by a specific incident or event which occurred during a single work day or shift.

GENERAL NATURE CATEGORY	CODE	NATURE OF INJURY NAME
*TRAUMATIC INJURY OR DISABILITY	TA	AMPUTATION
	TB	BACK STRAIN
	TC	CONTUSION; BRUISE; ABRASION
	TD	DISLOCATION
	TF	FRACTURE
	TH	HERNIA
	TK	CONCUSSION
	TL	LACERATION, CUT
	TP	PUNCTURE
	TS	STRAIN, MULTIPLE
	TU	BURN, SCALD, SUNBURN
	TI	TRAUMATIC SKIN DISEASES/ CONDITIONS INCLUDING DERMATITIS
	TR	TRAUMATIC RESPIRATORY DISEASE
	TQ	TRAUMATIC FOOD POISONING
	TW	TRAUMATIC TUBERCULOSIS
	TX	TRAUMATIC VIROLOGICAL/ INFECTIVE/PARASITIC DISEASE
	T1	TRAUMATIC CEREBRAL VASCULAR CONDITION/STROKE
	T2	TRAUMATIC HEARING LOSS
	T3	TRAUMATIC HEART CONDITION
	T4	TRAUMATIC MENTAL DISORDER; STRESS; NERVOUS CONDITION
	T8	TRAUMATIC INJURY — OTHER (EXCEPT DISEASE, ILLNESS)

**A nontraumatic physiological harm or loss of capacity produced by systemic infection; continued or repeated stress or strain; exposure to toxins, poisons, fumes, etc.; or other continued and repeated exposures to conditions of the work environment over a long period of time. For practical purposes, an occupational illness/disease or disability is any reported condition which doses not meet the definition of traumatic injury or disability as described above.

GENERAL NATURE CATEGORY	CODE	NATURE OF INJURY NAME
**NON-TRAUMATIC ILLNESS/DISEASE OR DISABILITY		
RESPIRATORY DISEASE	RA	ASBESTOSIS
	RB	BRONCHITIS
	RE	EMPHYSEMA
	RP	PNEUMOCONIOSIS
	RS	SILICOSIS
	R9	RESPIRATORY DISEASE, OTHER
VIROLOGICAL, INFECTIVE & PARASITIC DISEASES	VB	BRUCELLOSIS
	VC	COCCIDIOMYCOSIS
	VF	FOOD POISONING
	VH	HEPATITIS
	VM	MALARIA
	VS	STAPHYLOCOCCUS
	VT	TUBERCULOSIS
	V9	VIROLOGICAL/INFECTIVE/ PARASITIC — OTHER
DISABILITY, OCCUPATIONAL	DA	ARTHRITIS, BURSITIS
	DB	BACK STRAIN, BACK SPRAIN
	DC	CEREBRAL VASCULAR CONDITION; STROKE
	DD	ENDEMIC DISEASE (OTHER THAN CODE TYPES R&S)
	DE	EFFECT OF ENVIRONMENTAL CONDITION
	DH	HEARING LOSS
	DK	HEART CONDITION
	DM	MENTAL DISORDER, EMOTIONAL STRESS NERVOUS CONDITION
	DR	RADIATION
	DS	STRAIN, MULTIPLE
	DU	ULCER
	DV	OTHER VASCULAR CONDITIONS
	D9	DISABILITY, OTHER
SKIN DISEASE OR CONDITION	SB	BIOLOGICAL
	SC	CHEMICAL
	S9	DERMATITIS, UNCLASSIFIED

g. TYPE AND SOURCE OF INJURY (CAUSE)—Type and Source Codes are used to describe what caused the incident. The Type Code stands for an ACTION and the Source Code for an OBJECT or SUBSTANCE. Together, they form a brief description of how the incident occurred. Where there are two different sources, code the *initiating* source of the incident (see example 1, below). Examples:

(1) An employee tripped on carpet and struck his head on a desk.
TYPE: 210 (Fell on Same Level) SOURCE: 0110 (walking/ working surface)

NOTE: This example would NOT be coded 120 (struck against) and 0140 (furniture).

(2) A Park Ranger contracted dermatitis from contact with poison ivy/ oak.
TYPE: 510 (contact) SOURCE: 0920 (plant)

(3) A lock and dam mechanic punctured his finger with a metal sliver while grinding a turbine blade.
TYPE: 410 (punctured by) SOURCE: 0830 (metal)

(4) An employee was driving a government vehicle when it was struck by another vehicle.
TYPE: 800 (traveling in) SOURCE: 0421 (government owned vehicle, as driver)

NOTE: The Type Code 800, "Traveling In" is different from the other type codes in that its function is not to identify factors contributing to the injury or fatality, but rather to collect data on the type of vehicle the employee was operating or traveling in at the time of the incident.

Select the most appropriate TYPE and SOURCE identifier from the list below and enter the name on the line and the corresponding code in the appropriate box.

CODE	TYPE OF INJURY NAME
	STRUCK
0110	STRUCK BY
0111	STRUCK BY FALLING OBJECT
0120	STRUCK AGAINST
	FELL, SLIPPED, TRIPPED
0210	FELL ON SAME LEVEL
0220	FELL ON DIFFERENT LEVEL
0230	SLIPPED, TRIPPED (NO FALL)
	CAUGHT
0310	CAUGHT ON
0320	CAUGHT IN
0330	CAUGHT BETWEEN
	PUNCTURED, LACERATED
0410	PUNCTURED BY
0420	CUT BY
0430	STUNG BY
0440	BITTEN BY
	CONTACTED
0510	CONTACTED WITH (INJURED PERSON MOVING)
0520	CONTACTED BY (OBJECT WAS MOVING)
	EXERTED
0610	LIFTED, STRAINED BY (SINGLE ACTION)
0620	STRESSED BY (REPEATED ACTION)
	EXPOSED
0710	INHALED
0720	INGESTED
0730	ABSORBED
0740	EXPOSED TO
0800	TRAVELING IN

CODE	SOURCE OF INJURY NAME
0100	BUILDING OR WORKING AREA
0110	WALKING/WORKING SURFACE (FLOOR, STREET, SIDEWALKS, ETC)
0120	STAIRS, STEPS
0130	LADDER
0140	FURNITURE, FURNISHINGS, OFFICE EQUIPMENT
0150	BOILER, PRESSURE VESSEL
0160	EQUIPMENT LAYOUT (ERGONOMIC)
0170	WINDOWS, DOORS
0180	ELECTRICITY

CODE	SOURCE OF INJURY NAME
0200	ENVIRONMENTAL CONDITION
0210	TEMPERATURE EXTREME (INDOOR)
0220	WEATHER (ICE, RAIN, HEAT, ETC.)
0230	FIRE, FLAME, SMOKE (NOT TOBACCO)
0240	NOISE
0250	RADIATION
0260	LIGHT
0270	VENTILATION
0271	TOBACCO SMOKE
0280	STRESS (EMOTIONAL)
0290	CONFINED SPACE
0300	MACHINE OR TOOL
0310	HAND TOOL (POWERED: SAW, GRINDER, ETC.)
0320	HAND TOOL (NONPOWERED)
0330	MECHANICAL POWER TRANSMISSION APPARATUS
0340	GUARD, SHIELD (FIXED, MOVEABLE, INTERLOCK)
0350	VIDEO DISPLAY TERMINAL
0360	PUMP, COMPRESSOR, AIR PRESSURE TOOL
0370	HEATING EQUIPMENT
0380	WELDING EQUIPMENT
0400	VEHICLE
0411	AS DRIVER OF PRIVATELY OWNED/RENTAL VEHICLE
0412	AS PASSENGER OF PRIVATELY OWNED/RENTAL VEHICLE
0421	DRIVER OF GOVERNMENT VEHICLE
0422	PASSENGER OF GOVERNMENT VEHICLE
0430	COMMON CARRIER (AIRLINE, BUS, ETC.)
0440	AIRCRAFT (NOT COMMERCIAL)
0450	BOAT, SHIP, BARGE
0500	MATERIAL HANDLING EQUIPMENT
0510	EARTHMOVER (TRACTOR, BACKHOE, ETC.)
0520	CONVEYOR (FOR MATERIAL AND EQUIPMENT)
0530	ELEVATOR, ESCALATOR, PERSONNEL HOIST
0540	HOIST, SLING CHAIN, JACK
0550	CRANE
0551	FORKLIFT
0560	HANDTRUCK, DOLLY
0600	DUST, VAPOR, ETC.
0610	DUST (SILICA, COAL, ETC.)
0620	FIBERS
0621	ASBESTOS
0630	GASES
0631	CARBON MONOXIDE
0640	MIST, STEAM, VAPOR, FUME
0641	WELDING FUMES
0650	PARTICLES (UNIDENTIFIED)
0700	CHEMICAL, PLASTIC, ETC.
0711	DRY CHEMICAL—CORROSIVE
0712	DRY CHEMICAL—TOXIC
0713	DRY CHEMICAL—EXPLOSIVE
0714	DRY CHEMICAL—FLAMMABLE
0721	LIQUID CHEMICAL—CORROSIVE
0722	LIQUID CHEMICAL—TOXIC
0723	LIQUID CHEMICAL—EXPLOSIVE
0724	LIQUID CHEMICAL—FLAMMABLE
0730	PLASTIC
0740	WATER
0750	MEDICINE
0800	INANIMATE OBJECT
0810	BOX, BARREL, ETC.
0820	PAPER
0830	METAL ITEM, MINERAL
0831	NEEDLE
0840	GLASS
0850	SCRAP, TRASH
0860	WOOD
0870	FOOD
0880	CLOTHING, APPAREL, SHOES
0900	ANIMATE OBJECT
0911	DOG
0912	OTHER ANIMAL
0920	PLANT
0930	INSECT
0940	HUMAN (VIOLENCE)
0950	HUMAN (COMMUNICABLE DISEASE)
0960	BACTERIA, VIRUS (NOT HUMAN CONTACT)

CODE	SOURCE OF INJURY NAME
1000	PERSONAL PROTECTIVE EQUIPMENT
1010	PROTECTIVE CLOTHING, SHOES, GLASSES, GOGGLES
1020	RESPIRATOR, MASK
1021	DIVING EQUIPMENT
1030	SAFETY BELT, HARNESS
1040	PARACHUTE

INSTRUCTIONS FOR SECTION 6 — PUBLIC FATALITY

a. ACTIVITY AT TIME OF ACCIDENT—Select the activity being performed at the time of the accident from the list below. Enter the activity name on the line and the corresponding number in the box. If the activity performed is not identified on the list, select from the *most* appropriate primary activity area (water related, non-water related or other activity), the code number for "Other", and write in the activity being performed at the time of the accident.

WATER RELATED RECREATION

1. Sailing
2. Boating—powered
3. Boating—unpowered
4. Water skiing
5. Fishing from boat
6. Fishing from bank dock or pier
7. Fishing while wading
8. Swimming/supervised area
9. Swimming/designated area
10. Swimming/other area
11. Underwater activities (skin diving, scuba, etc.)
12. Wading
13. Attempted rescue
14. Hunting from boat
15. Other

NON-WATER RELATED RECREATION

16. Hiking and walking
17. Climbing (general)
18. Camping/picnicking authorized area
19. Camping/picnicking unauthorized area
20. Guided tours
21. Hunting
22. Playground equipment
23. Sports/summer (baseball, football, etc.)
24. Sports/winter (skiing, sledding, snowmobiling etc.)
25. Cycling (bicycle, motorcycle, scooter)
26. Gliding
27. Parachuting
28. Other non-water related

OTHER ACTIVITIES

29. Unlawful acts (fights, riots, vandalism, etc.)
30. Food preparation/serving
31. Food consumption
32. Housekeeping
33. Sleeping
34. Pedestrian struck by vehicle
35. Pedestrian other acts
36. Suicide
37. "Other" activities

b. PERSONAL FLOTATION DEVICE USED—If fatality was water-related was the victim wearing a person flotation device? Mark the appropriate box.

INSTRUCTIONS FOR SECTION 7—MOTOR VEHICLE ACCIDENT

a. TYPE OF VEHICLE—Mark appropriate box for each vehicle involved. If more than one vehicle of the same type is involved, mark both halves of the appropriate box. USACE vehicle(s) involved shall be marked in left half of appropriate box.

b. TYPE OF COLLISION—Mark appropriate box.

c. SEAT BELT—Mark appropriate box.

INSTRUCTIONS FOR SECTION 8—PROPERTY/ MATERIAL INVOLVED

a. NAME OF ITEM—Describe all property involved in accident. Property/material involved means material which is damaged or whose use or misuse contributed to the accident. Include the name, type, model; also include the National Stock Number (NSN) whenever applicable.

b. OWNERSHIP—Enter ownership for each item listed. **(Enter one of** the following: *USACE; OTHER GOVERNMENT; CONTRACTOR: PRIVATE)*

c. $ AMOUNT OF DAMAGE—Enter the total estimated dollar amount

INSTRUCTIONS FOR SECTION 9 — VESSEL/ FLOATING PLANT ACCIDENT

a. TYPE OF VESSEL/FLOATING PLANT — Select the most appropriate vessel/floating plant from list below. Enter name and place corresponding number in box. If item is not listed below, enter item number for "OTHER" and write in specific type of vessel/ floating plant.

VESSEL/FLOATING PLANTS

1. ROW BOAT
2. SAIL BOAT
3. MOTOR BOAT
4. BARGE
5. DREDGE/HOPPER
6. DREDGE/SIDE CASTING
7. DREDGE/DIPPER
8. DREDGE/CLAMSHELL, BUCKET
9. DREDGE/PIPE LINE
10. DREDGE/DUST PAN
11. TUG BOAT
12. OTHER

b. COLLISION/MISHAP — Select from the list below the object(s) that contributed to the accident or were damaged in the accident.

COLLISION/MISHAP

1. COLLISION W/OTHER VESSEL
2. UPPER GUIDE WALL
3. UPPER LOCK GATES
4. LOCK WALL
5. LOWER LOCK GATES
6. LOWER GUIDE WALL
7. HAULAGE UNIT
8. BREAKING TOW
9. TOW BREAKING UP
10. SWEPT DOWN ON DAM
11. BUOY/DOLPHIN/CELL
12. WHARF OR DOCK
13. OTHER

INSTRUCTIONS FOR SECTION 10 — ACCIDENT DESCRIPTION

DESCRIBE ACCIDENT — Fully describe the accident. Give the sequence of events that describe what happened leading up to and including the accident. Fully identify personnel and equipment involved and their role(s) in the accident. Ensure that relationships between personnel and equipment are clearly specified. Continue on blank sheets if necessary and attach to this report.

INSTRUCTIONS FOR SECTION 11 — CAUSAL FACTORS

a. Review thoroughly. Answer each question by marking the appropriate block. If any answer is yes, explain in item 13 below. Consider, as a minimum, the following:

(1) DESIGN — Did inadequacies associated with the building or work site play a role? Would an improved design or layout of the equipment or facilities reduce the likelihood of similar accidents? Were the tools or other equipment designed and intended for the task at hand?

(2) INSPECTION/MAINTENANCE — Did inadequately or improperly maintained equipment, tools, workplace, etc. create or worsen any hazards that contributed to the accident? Would better equipment, facility, work site or work activity inspections have helped avoid the accident?

(3) PERSON'S PHYSICAL CONDITION — Do you feel that the accident would probably not have occurred if the employee was in "good" physical condition? If the person involved in the accident had been in better physical condition, would the accident have been less severe or avoided altogether? Was over exertion a factor?

(4) OPERATING PROCEDURES — Did a lack of or inadequacy within established operating procedures contribute to the accident? Did any aspect of the procedures introduce any hazard to, or increase the risk associated with the work process? Would establishment or improvement of operating procedures reduce the likelihood of similar accidents?

(5) JOB PRACTICES — Were any of the provisions of the Safety and Health Requirements Manual (EM 385-1-1) violated? Was the task being accomplished in a manner which was not in compliance with an established job hazard analysis or activity hazard analysis? Did any established job practice (including EM 385-1-1) fail to adequately address the task or work process? Would better job practices improve the safety of the task?

(6) HUMAN FACTORS — Was the person under undue stress (either internal or external to the job)? Did the task tend toward overloading the capabilities of the person; i.e., did the job require tracking and reacting to many external inputs such as displays, alarms, or signals? Did the arrangement of the workplace tend to interfere with efficient task performance? Did the task require reach, strength, endurance, agility, etc., at or beyond the capabilities of the employee? Was the work environment ill-adapted to the person? Did the person need more training, experience, or practice in doing the task? Was the person inadequately rested to perform safely?

(7) ENVIRONMENTAL FACTORS — Did any factors such as moisture, humidity, rain, snow, sleet, hail, ice, fog, cold, heat, sun, temperature changes, wind, tides, floods, currents, dust, mud, glare, pressure changes, lightning, etc., play a part in the accident?

(8) CHEMICAL AND PHYSICAL AGENT FACTORS — Did exposure to chemical agents (either single shift exposure or long-term exposure) such as dusts, fibers (asbestos, etc.), silica, gases (carbon monoxide, chlorine, etc.,), mists, steam, vapors, fumes, smoke, other particulates, liquid or dry chemicals that are corrosive, toxic, explosive or flammable, by-products of combustion or physical agents such as noise, ionizing radiation, non-ionizing radiation (UV radiation created during welding, etc.) contribute to the accident/incident?

(9) OFFICE FACTORS — Did the fact that the accident occurred in an office setting or to an office worker have a bearing on its cause? For example, office workers tend to have less experience and training in performing tasks such as lifting office furniture. Did physical hazards within the office environment contribute to the hazard?

(10) SUPPORT FACTORS — Was the person using an improper tool for the job? Was inadequate time available or utilized to safely accomplish the task? Were less than adequate personnel resources (in terms of employee skills, number of workers, and adequate supervision) available to get the job done properly? Was funding available, utilized, and adequate to provide proper tools, equipment, personnel, site preparation, etc?

(11) PERSONAL PROTECTIVE EQUIPMENT — Did the person fail to use appropriate personal protective equipment (gloves, eye protection, hard-toed shoes, respirator, etc.) for the task or environment? Did protective equipment provided or worn fail to provide adequate protection from the hazard(s)? Did lack of or inadequate maintenance of protective gear contribute to the accident?

(12) DRUGS/ALCOHOL — Is there any reason to believe the person's mental or physical capabilities, judgement, etc., were impaired or altered by the use of drugs or alcohol? Consider the effects of prescription medicine and over the counter medications as well as illicit drug use. Consider the effect of drug or alcohol induced "hangovers".

b. WRITTEN JOB/ACTIVITY HAZARD ANALYSIS — Was a written Job/Activity Hazard Analysis completed for the task being performed at the time of the accident? Mark the appropriate box. *If one was performed, attach a copy of the analysis to the report.*

INSTRUCTIONS FOR SECTION 12 — TRAINING

a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK? — For the purpose of this section "trained" means the person has been provided the necessary information (either formal and/or on-the-job (OJT) training) to competently perform the activity/task in a safe and healthful manner.

b. TYPE OF TRAINING — Mark the appropriate box that best indicates the type of training; (classroom or on-the-job) that the injured person received before the accident happened.

c. DATE OF MOST RECENT TRAINING — Enter the month, day, and year of the last *formal* training completed that covered the activity-task being performed at the time of the accident.

INSTRUCTIONS FOR SECTION 13—CAUSES

a. DIRECT CAUSES—The direct cause is that single factor which most directly lead to the accident. See examples below.

b. INDIRECT CAUSES—Indirect causes are those factors which contributed to but did not directly initiate the occurrence of the accident.

Examples for section 13:

a. Employee was dismantling scaffold and fell 12 feet from unguarded opening.
Direct cause: failure to provide fall protection at elevation.
Indirect causes: failure to enforce USACE safety requirements; improper training/motivation of employee (possibility that employee was not knowledgeable of USACE fall protection requirements or was lax in his attitude towards safety); failure to ensure provision of positive fall protection whenever elevated; failure to address fall protection during scaffold dismantling in phase hazard analysis.

b. Private citizen had stopped his vehicle at intersection for red light when vehicle was struck in rear by USACE vehicle. (note USACE vehicle was in proper/safe working condition).
Direct cause: failure of USACE driver to maintain control of and stop USACE vehicle within safe distance.
Indirect cause: Failure of employee to pay attention to driving (defensive driving).

INSTRUCTIONS FOR SECTION 14—ACTION TO ELIMINATE CAUSE(S)

DESCRIPTION—Fully describe all the actions taken, anticipated, and recommended to eliminate the cause(s) and prevent reoccurrence of similar accidents/illnesses. Continue on blank sheets of paper if necessary to fully explain and attach to the completed report form.

INSTRUCTIONS FOR SECTION 15—DATES FOR ACTION

a. BEGIN DATE—Enter the date when the corrective action(s) identified in Section 14 will begin.

b. COMPLETE DATE—Enter the date when the corrective action(s) identified in Section 14 will be completed.

c. TITLE AND SIGNATURE—Enter the title and signature of supervisor completing the accident report. For a GOVERNMENT employee accident/illness the immediate supervisor will complete and sign the report. For PUBLIC accidents the USACE Project Manager/Area Engineer responsible for the USACE property where the accident happened shall complete and sign the report. For CONTRACTOR accidents the Contractor's project manager shall complete and sign the report and provide to the USACE supervisor responsible for oversight of that contractor activity. This USACE Supervisor shall also sign the report. Upon entering the information required in 15.d, 15.e and 15.f below, the responsible USACE supervisor shall forward the report for management review as indicated in Section 16.

d. DATE SIGNED—Enter the month, day, and year that the report was signed by the responsible supervisor.

e. ORGANIZATION NAME—For GOVERNMENT employee accidents enter the USACE organization name (Division, Branch, Section, etc.) of the injured employee. For PUBLIC accidents enter the USACE organization name for the person identified in block 15.c. For CONTRACTOR accidents enter the USACE organization name for the USACE office responsible for providing contract administration oversight.

f. OFFICE SYMBOL—Enter the latest complete USACE Office Symbol for the USACE organization identified in block 15.e.

INSTRUCTIONS FOR SECTION 16—MANAGEMENT REVIEW (1st)

1ST REVIEW—Each USACE FOA shall determine who will provide 1st management review. The responsible USACE supervisor in section 15.c shall forward the completed report to the USACE office designated as the 1st Reviewer by the FOA. Upon receipt, the Chief of the Office shall review the completed report, mark the appropriate box, provide substantive comments, sign, date, and forward to the FOA Staff Chief (2nd review) for review and comment.

INSTRUCTIONS FOR SECTION 17—MANAGEMENT REVIEW (2nd)

2ND REVIEW—The FOA Staff Chief (i.e., FOA Chief of Construction, Operations, Engineering, Planning, etc.) shall mark the appropriate box, review the completed report, provide substantive comments, sign, date, and return to the FOA Safety and Occupational Health Office.

INSTRUCTIONS FOR SECTION 18—SAFETY AND OCCUPATIONAL HEALTH REVIEW

3RD REVIEW—The FOA Safety and Occupational Health Office shall review the completed report, mark the appropriate box, ensure that any inadequacies, discrepancies, etc, are rectified by the responsible supervisor and management reviewers, provide substantive comments, sign, date and forward to the FOA Commander for review, comment, and signature.

INSTRUCTION FOR SECTION 19—COMMAND APPROVAL

4TH REVIEW—The FOA Commander shall (to include the person designated Acting Commander in his absence) review the completed report, comment if required, sign, date, and forward the report to the FOA Safety and Occupational Health Office. Signature authority shall not be delegated.

CEPOD-SO

POD AND HED IMMEDIATE REPORT OF ACCIDENT

SOHO USE ONLY
Date Recd': _____
Time Recd': _____

TO: _____ FROM: _____ DATE: _____
(COE OFFICE)

1. Name of Person Reporting: _____ Phone No.: _____
(Print)
2. Location of Accident: _____
3. Date and Time of Accident: _____
If this accident is being reported late, (24 hrs) Why? _____
4. Name of Injured (If any): _____
5. Nature of Injury: _____
6. Occupation (Injured Person): _____
7. Age (Injured Person): _____
8. Estimated Lost Time (Days): _____
Was, return to light duty emphasized to the doctor? _____
9. Estimated Property Damage: _____
10. Contrator & Contract No.: _____
11. Board of Investigation Required? Yes _____ 1. Fatal?
No _____ 2. Three or more admitted to a hospital?
3. Property damage of $200,000 or more?
If yes, was immediate phone notifications to the Commander, Directorate and safety made? ___
12. Description of Accident: (continue on back if needed) Provide a narrative (Where, what, why, How it Happened) so the Commander can get a understanding of the situtation.

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Who Investigated This Accident (Name): _____
Signature of Person Making Report: _____ Print Name: _____
Title of Person Making Report: _____ Phone No. to Reach: _____
Location of Person Making Report: _____

ATTACHMENT 7

Working Safely Around Wild Animals

JACOBS

HSE Procedure		Document No: HSEP 7.4	Page: 1 of 18
Working Safely Around Wild Animals		Supersedes: CHSP 7.4	Rev. Rev. 2
Issuing Department: Corporate HSE	Approval: Mike.Coyle@Jacobs.com	Previous Rev. Date: 1 Feb 01	Current Revision Date: 28 Aug 01

Table of Contents

1.0 PURPOSE AND SCOPE 1
2.0 RESPONSIBILITIES 1
3.0 WILD ANIMAL DEFENSE MEASURES 1
3.1. Basic Protection Requirements 1
3.2. Supplemental Protection 3
3.3. Firearms Used by Jacobs Employees or Contractor Employees 3
4.0 PROCEDURE 4
5.0 REFERENCES 4
6.0 FIGURES 4
Hazard and Precautions – Bear Safety 4
Hazards and Precautions – Moose, Elk, and Deer Safety 4
Hazards and Precautions – American Bison and Feral Wild Cattle Safety 4

1.0 PURPOSE AND SCOPE

This work instruction addresses encounters with bears and other wild animals and the controls necessary to minimize human injury, loss of property, and unnecessary loss of wildlife, while maintaining a safe work environment.

This work instruction applies to all employees who prepare Health, Safety, and Environmental Plans or perform fieldwork in environments in which wild animals may be encountered.

2.0 RESPONSIBILITIES

Specific HSE Program implementation responsibilities are stated in HSEP 1.5. Additional management, staff, employee, and subcontractor responsibilities are stated in individual procedures that address responsibilities specific to the HSE topic.

3.0 WILD ANIMAL DEFENSE MEASURES

Procedures in this work instruction have been developed through interactions with Alaska Fish and Game Department and through bear and wild animal guide services providers.

These procedures are believed to provide the best actions to provide protection to our workers and limit company liability.

3.1. Basic Protection Requirements

Work teams in the field should work together in groups of four or more, whenever possible. Large numbers of humans present deterrence to wild animals.

When feasible, fieldwork activities should be scheduled around seasonal activity cycles of animals in the area. For example, to the extent possible, work activities should not be scheduled in seasonal breeding areas or in seasonal feeding areas, such as hillsides during berry season or near salmon streams during salmon runs.

When wild animal avoidance measures cannot be achieved through scheduling, all Jacobs and contractor personnel who may be involved with field activities, at which encounters with wild animals may result, will take the following steps and will be equipped and trained, as set forth below.

3.1.1. Clear the Area

Evaluate and control the area before entry by

- Determining areas of recent sightings through local Fish and Game, state troopers, etc.;
- Conducting a site observation from an off-site elevated point, if possible;
- Conducting a controlled walkthrough in the area by a trained observer;
- Arranging briefing by a local specialist, e. g., Fish and Game, etc.; and
- Utilizing appropriate noisemakers.

3.1.2. Basic Equipment

Each employee in a field environment in which encounters with wild animals are possible—as determined by the Project Manager and the HSEM—will be provided, as a minimum:

- Noisemakers, such as air horns, bells, etc.; and
- Bear spray of not less than 16-ounce capacity (with holster), equivalent to capsicum pepper (red pepper extract), which is capable of spraying at least 15 feet.
  - Field crews may carry bear sprays without the need for client authorization. Law prohibits transport of such sprays in aircraft passenger compartments. Employees shall notify small plane pilots of placement of sprays in baggage. All packaging and shipment shall comply with applicable DoT regulations.
  - In order to avoid complications related to transport of hazardous materials, sprays must be locally purchased, if possible, and disposed properly after fieldwork completion. Sprays shall not be brought to a Jacobs fixed office but may be taken to a Jacobs field office.

At all times, employees shall know the whereabouts of noisemakers and sprays until they are returned.

3.1.3. Training

Each employee covered by this work instruction will be provided bear and wild animal awareness training before field assignment

- which will include hazards, precautions, and protection measures set forth in Attachments 1 – 3, as appropriate,
- with content which will have been approved by the HSEM, and
- which will be documented.

As a minimum, the training must include information related to:

- animal habitat,
- behavior patterns, including when wild animals are most active, etc.
- warning signs, such as tracks, bedding areas, scat, claw marks, offspring, paths, etc.,
- situations to avoid, such as work after dark, going into brush, etc.
- food storage procedures, and
- (at the jobsite) spray demonstration and safety instruction.

A record of the training will be maintained at the job site and a copy will be filed by the HSEM in the employee's training records maintained in the program office.

3.2. Supplemental Protection

Professional site security services may be necessary in areas where significant possibility of injury from wildlife may exist. An evaluation of need for such supplemental protection will be made jointly by the Project Manager and the Health and Safety Manager.

Prospective bear and wild animal protection contractors shall provide to the HSEM, five days before providing such services, evidence of

- firearm safety course training and firearm proficiency and
- a minimum of three years experience as a bear guide or an assistant guide.

3.3. Firearms Used by Jacobs Employees or Contractor Employees

3.3.1. In some situations of significant potential hazard, the Project Manager and HSEM, after collaboration with the client, may authorize selected Jacobs employees or contractor employees to carry firearms.

3.3.2. Persons carrying firearms shall have attended a firearm safety training class administered by the Fish and Game Department, a local firearm range instructor, or other trainer approved by the HSEM.

- Training will be documented and records of training will be maintained on site.
- Training must include, as a minimum
  - shooting safety,
  - firearms handling safety, and
  - safe storage.

3.3.3. Firearms authorized for site use

- **will not** be carried with a round in the chamber unless extreme danger is present, such as when a bear has been sited in the immediate area, and
- **must** be unloaded and have a trigger lock installed and in use when not actively being used for protection to prevent unauthorized persons from using the firearm.

3.3.4. Some military installations and some clients require the approval of the base security force before allowing a firearm to be brought onto a military installation. In addition to base requirements, some clients require that their own approvals be obtained, as well.

The Project Manager must determine with sufficient lead-time whether firearm protection of employees from wild animals will be required. If such is determined to be necessary, the PjM must submit a request for authorization to the HSEM with sufficient lead-time to permit personnel training and other steps required prior to departure for the field.

3.3.5. All firearms and firearm-carrying personnel shall be registered and approved by the HSEM. Approvals will be maintained in the regional HSE office.

The project manager shall provide to the HSEM a description of the type of firearm, the caliber and serial number of the firearm, the ammunition to be used, and the qualification of the person(s) to be approved by the HSEM.

3.3.6. Approved Firearms

Firearms that are appropriate for protection against large animals include:

- A 0.3-mangum ("300 magnum") or larger rifle, or
- A 12-guage shotgun with rifled slugs.
- Other firearms that may be authorized by the Jacobs HSE Manager. This authorization will be in writing and will be obtained before going to the field.

3.3.7. Ammunition

- The number of rounds and type of ammunition brought to job sites shall be registered with the on-site SSHO.
- When not in use, ammunition and firearms will be effectively secured/locked up in a vehicle, cabinet, etc.

4.0 PROCEDURE

Non-lethal methods of deterrence will be used before other options are exercised. In the case where immediate danger to an individual exists, the wild animal may have to be killed. Refer to local provisions of the Defense of Life or Property Regulation in your state. In Alaska, refer to 5 AAC 92.410.

An immediate report of such action will be made to the Jacobs HSEM. The individual who shot the animal will make the report. In the case of bears shot in the state of Alaska, a report will also be submitted to the Alaska Department of Fish and Game. The head and the hide must be salvaged and delivered the Alaska Department of Fish and Game.

5.0 REFERENCES

Alaska Administrative Code 5 AAC 92.230 and 5 AAC 92.410.

Alaska Department of Fish and Game, Division of Wildlife Conservation, Policy for Managing Bear and Human Conflicts in Alaska.

Safety in Bear Country, Alaska Department of Game and Fish, Division of Wildlife Conservation, Anchorage Alaska, Larry Van Daele.

Research by Dominic Domenici, U.S. Fish and Wildlife Services (Red vs. Lead Article, Field & Stream Magazine, January 2001) Vehicle safety.

Use extreme caution, particularly in darkness, when operating vehicles in areas where wild animals may be present. Collisions with large animals have been known to cause significant property damage and personal injuries to vehicle passengers, including fatalities.

6.0 FIGURES

Hazard and Precautions – Bear Safety
Hazards and Precautions – Moose, Elk, and Deer Safety
Hazards and Precautions – American Bison and Feral Wild Cattle Safety

Figure 1

Hazards and Precautions – Bear Safety

From time to time, field projects may be conducted in locations where bears may be encountered. This directive draws on experiences and conditions for field work in the state of Alaska for the bulk of its technical information, precautions, and guidelines for all operations in which bears could be encountered. When bears may be present, we all have a responsibility to the bears and ourselves to behave in a rational and proper manner. The more bears are understood the less they will be feared. Bears are intelligent, wild animals that are potentially dangerous, and would rather be left alone. With this background, rational decisions about how to avoid bear encounters and how to properly address face-to-face encounters can be made.

Bear Life History

Although bears are creatures of habit, they are also intelligent, and each has its own personality. The way a bear reacts is often dictated by what it has learned from its mother, the experience it has had on its own, and the instincts nature has provided. So, like other intelligent animals, such as dogs, we can make general statements about bears, but few people can accurately predict their behavior.

The most important sense organ for a bear is his nose. They have an incredible sense of smell, and they seem to trust it more than any other sense. Hearing and sight are also important, but to a lesser degree. A bear's hearing is probably better than ours, but not as keen as a dog's hearing. Their sight is probably comparable to that of a human.

Both black and brown bears have similar life styles, although they do not usually get along with each other. Where both species occur in the same area, black bears tend to favor forested habitats while brown bears favor open areas. Since the likelihood of encountering a polar bear is remote, we will deal with only black and brown bears throughout the rest of this HSEP.

Bears are opportunists, relying on their intelligence and their senses to find food. They use different habitats throughout the year, depending on the availability of food and other necessities of life. The amount of area a bear covers in a given year is partially dependent on how far it has to go to satisfy these basic needs. In some areas, individual bears have home ranges of less than a square mile. In other areas, home ranges can encompass hundreds of square miles. Males usually range over larger areas than females.

In the spring, black and brown bears begin coming out of their dens. Males are usually the first bears to emerge, usually in April, and females with new cubs are usually the last, sometimes as late as late June. When bears emerge from their dens, they are lethargic for the first few days, frequently sleeping near their dens and not eating. When they do start eating, they seek carrion (dead moose, caribou, sea mammals, deer, etc.), roots, and emerging vegetation. In coastal areas, beaches become travel corridors as bears seek these foods.

In early summer, bears continue to eat new grasses and forage as they develop in higher elevations. Moose and caribou calves are also important foods where they are available.

In areas where they are available, salmon are the most important food to bears from June through September. This period is one of the few times that bears are found in large groups, and it is the time that most people see bears. Bears often travel, eat, and sleep along streams for weeks at a time.

Other summer foods for bears include salmonberries, grasses, forbs, ground squirrels, and occasionally, adult moose and caribou. When bears kill or scavenge large prey, they commonly cover the portions they cannot eat with sticks and duff. A bear may remain near a food cache for days and it will defend it from all intruders.

During the late summer and early fall, bears move inland and consume large amounts of blueberries, elderberries, soapberries, and other types of succulent fruits. As the seasons progress towards winter, a bear's diet becomes more varied. The last berries and salmon are sought, as are live and hunter-killed moose, deer, and caribou. This is the time that bears are adding final deposits of fat before their long winter naps.

In October and November, bears move into their denning areas and begin preparing a suitable den. Black bears usually den in holes under large trees or rock outcrops, or in small natural cavities. Brown bears usually dig their dens in steep alpine areas. Dens are just large enough for the bears to squeeze into. Bears rarely eat, drink, urinate, or defecate while they are denning. They sleep deeply, but do not truly hibernate, and they can be awakened by loud noises or disturbances.

Cubs are born in the den, usually in January. Black bear cubs usually stay with their mothers for a year and a half, and brown bear cubs usually stay with their mothers for 2.5 to 3.5 years. Black bears are sexually mature at age 2 and brown bears are sexually mature at age 4 – 8. Mating season is in the spring (May or June) and both species are polygamous (multiple mates). Both black and brown bears can live for 25 – 30 years, although most live less than 20 years.

Bear and Human Interactions

Given the choice, most bears would prefer to be left alone, but they share their homes with other creatures, including humans, who intrude on virtually every aspect of the bear's life. Bears are normally tolerant of these activities, and if they can find a secure way to avoid them, they will.

Humans can help the bears make a graceful retreat and avoid many close encounters by letting them know we are coming. Walking in groups, talking, and wearing noise making devices, such as bear bells, all serve to warn a bear of your approach. Whenever possible, avoid hiking and camping in areas where bears are common, such as bear trails through heavy brush or along salmon streams. Keep an eye out for bears and bear signs. If you happen upon a dead animal, especially one that is covered with sticks and duff (a bear cache), immediately retreat the way you came, but do not run, and make a detour around the area. If you see a cub up a tree or a small bear walking by itself, immediately retreat and detour around the area. Like all young animals, cubs wander away from their mothers, but female bears are furiously protective when they believe their cubs are threatened.

Even if we do everything possible to avoid meeting a bear, sometimes bears come to us. Bears are both intelligent and opportunistic, and they express these qualities through their curiosity. This curiosity frequently brings them into "human habitat." When this happens, we often feel vulnerable, and the bear is sometimes viewed as a threat or nuisance.

In most cases, a curious bear will investigate a "human sign," perhaps test it out (chew on a raft, bite into some cans, etc.), and leave, never to return. If the bear was rewarded during his investigation by finding something to eat, it is hard to stop them from returning once they have been food-rewarded.

That is why we emphasize the importance of keeping human food and garbage away from bears. When in bear country, always think about the way you store, cook, and dispose of your food. **Never feed bears!** This is both illegal and foolish. Food should be stored in airtight containers, preferably away from living and sleeping areas. Garbage should be thoroughly incinerated as soon as possible. Fish and game should be cleaned well away from camp, and clothing that smells of fish and game should be stored away from sleeping areas. Menstruating women should take extra precautions to keep themselves as clean as possible, and soiled tampons and pads should be treated as another form of organic garbage.

Once a bear has obtained food from people, it may continue to frequent areas occupied by people. If a bear does not find food or garbage after the next few tries, it may give up and

move back into a more natural feeding pattern. Occasionally, though, the bear will continue to seek human foods and can become a "problem bear." Some bears become bold enough to raid campsites and break into cabins to search for human food.

Shooting bears in the rump with cracker shells, flares, rubber bullets, and birdshot are common methods of "aversive conditioning." These are also very dangerous techniques, because they may seriously injure a bear if not done properly and/or they may cause a bear to attack the shooter.

Avoiding Bear Encounters When

- *The Bears see you but you do not know the bear is around.* Most bears avoid detection by people and will simply move away when they sense a human.
- *You see a bear and it does not know you are there.* Move away slowly. Avoid intercepting the bear if it is walking. If possible, detour around the bear. If the bear is close to you, stand where you are or back away slowly. Do not act threateningly toward the bear, it may know you are there but it has chosen to ignore you as long as you are not a threat.
- *You see the bear and the bear sees you.* Do not act threateningly, but let the bear know you are human. Wave your arms slowly, talk in a calm voice, and walk away slowly in a lateral direction, keeping an eye on the bear. Unless you are very close to a car or a building, never run from bears. In a bear's world, when something runs it is an open invitation to chase it. Like dogs, bears will chase a running object even if they have no previous intention of catching it. Bears can run as fast as a racehorse, so humans have little or no chance of outrunning a bear.
- *You see the bear, the bear sees you and stands on its hind legs.* This means that the bear is seeking more information. Bears stand on their hind legs to get a better look, or smell, at something they are uncertain of. It is your cue to help it figure out what you are. Help the bear by waving your arms slowly and talking to it. Standing is not a precursor to an attack. Bears do not attack on their hind legs. It is also important to remember that when a bear goes back down on all fours from a standing position, it may come towards you a few steps. This is normal, and probably not an aggressive act.
- *The bear sees you, recognizes you as a human, but continues to come towards you slowly.* This may mean several things, depending on the bear and the situation. It may mean that the bear does not see you as a threat, and just wants to get by you (especially if the bear is used to humans, as in a National Park); the bear wants to get food from you (if it has gotten food from people before); the bear wants to test your dominance (it views you as another bear); or if it is a black bear it may be stalking you as food (a rare occurrence). In all cases, your reaction should be to back off the trail very slowly, stand abreast if you are in a group, talk loudly, and/or use some sort of noise making device. If the bear continues to advance, you should stop. At this point, it is important to give the bear the message that if he continues to advance it will cost him. Continue to make loud noises and present a large visual image to the bear (standing abreast, open your coat). In bear language, bears assert themselves by showing their size. If an adult brown bear continues to come at you, climbing 20 feet or higher up a tree may also be an option if one is next to you (remember, never run from bears). Keep in mind, though, brown bear cubs and black bears can climb trees, and adult brown bears can reach 10 – 15 feet.
- *The bear recognizes you as a human and acts nervous or aggressive.* When bears are nervous or stressed they can be extremely dangerous. This is when it is important to try to understand what is going on in the bears mind. Nervous dogs bark and snarl. Nervous bears growl, woof, make popping sounds with their teeth, rock back and forth on their front legs, and often stand sideways to their opponent. A universal sign of a nervous bear is excessive salivation (sometimes it looks like they have white lips). When a bear shows any

of these signs, stand where you are and talk in a calm voice. Do not try to imitate bear sounds, this may only serve to confuse and further agitate the bear. If you are in a group, stand abreast. If you have a firearm available, be prepared to use it.

- *The bear charges.* If all other signals fail, a bear will charge. Surprisingly, however, most bear charges are just another form of their language and they do not end up making contact. The vast majority of these are "bluff charges," that is, the bear stops before making contact with their opponent. There are many different types of bluff charges ranging from a loping uncertain gait to a full-blown charge. If a bear charges, stand still. If you have a firearm, take appropriate action, but remember, if a bear is wounded, a bluff charge may immediately turn into a real charge as the bear's mind shifts from an offensive mode to a defensive mode.
- *The bear attacks.* When all else fails, a bear may attack. Attacks may be preceded by all of the behaviors previously described or they may be sudden. Seemingly unprovoked attacks are often the result of a bear being surprised (and feeling threatened), a bear defending its food cache, or a female defending her cubs. When a bear attacks, it typically runs with its body low to the ground, legs are stiff, ears are flattened, hair on the nape of the neck is up, and the bear moves in a fast, determined way. Front paws are often used to knock the opponent down and jaws are used to subdue it.

After A Bear Encounter

If a bear attacks you, your reaction depends on the type of bear that is attacking.

If it is a black bear, fight vigorously, for your life may depend on it. Black bears have been known to view humans as prey, and if you struggle with the attacking black bear, it will probably go elsewhere for its meal.

Brown bears are a completely different story. Brown bears attack because they feel threatened, and they will continue to press the attack until the threat has been neutralized. If you fight and struggle, the bear will continue to fight, and a human has little or no chance to defeat a brown bear in battle. Lie on your face and stomach, place your hands behind your neck, and lie still when you are attacked. A brown bear will no longer see you as a threat and may stop the attack.

Although it sounds foolish to play dead while being attacked by a bear, this has been proven to be the best way to survive a brown bear attack. It should be noted, however, that if you fall down and play dead before a bear actually makes contact, the bear may come over to determine what is going on.

Actual maulings by bears are very rare. Alaska has more bears than anywhere else in the world, and there are hundreds of thousands of people living, working, and playing in these bears' back yard. Yet, since 1900, there have only been an average of about two people per year mauled by bears in the state, and very few of those instances have resulted in death.

Types of Bears

The three most prevalent species of are bears are the black bear, the brown (grizzly) bear, and the polar bear. Each has a different life-style and somewhat different behavior pattern.

Black Bear

Identification

Black bears are the smallest and most abundant of the bear species in Alaska. They are five to six feet long and stand about two to three feet high at the shoulders. They weigh from 200 to 500 pounds. While they are most commonly black, other color phases include brown (cinnamon), and, rarely, gray (blue), and white. Muzzles are usually brown. Black bears can be distinguished from brown bears by:

- their head shape (a black bear's nose is straight in profile, a brown bear's is dished);
- their claws (black bear's claws are curved and smaller, brown bears are relatively straight and longer);
- their body shape (when standing, a black bear's rump seems to be higher than its shoulders; a brown bear's shoulders are usually higher than its rump); and
- by their ears (a black bear's ears are more prominent than a brown bear's ears).

Range in Alaska

Black bears live throughout Alaska, except on Kodiak Islands, the Alaska Peninsula, some islands, and the extreme northern and western portion of the state.

Typical Habitat

Black bears can occupy a wide range of habitats, but they seem to be most common in forested areas. Black bears are not uncommon in and around human settlements in Alaska.

Brown Bear

Identification

Brown and grizzly bears are the same species. They can be over eight feet long and stand five feet high at the shoulder. Weights are typically 600 to 800 pounds, but can reach 1500 pounds. Colors range from blonde to dark brown. Coastal bears (referred to as brown bears) are the largest land carnivores and are usually medium-to-dark brown in color. Interior bears (referred to as grizzly bears) are smaller and usually have light tips on their hair, giving them a grizzled appearance. A brown bear's muzzle is the same color as its body. Cubs frequently have a white collar around their neck and shoulders. The dished-face and large shoulder hump are distinguishing features of the brown bear.

Range in Alaska

Brown bears live throughout Alaska, except for the southern portion of the panhandle in southeastern Alaska, and on the Aleutians, and some other islands. Biologists estimate that there are from 30,000 and 45,000 brown bears in the state, and in most areas the numbers are stable. Highest densities occur on Admiralty Island, the Kodiak Islands, and the Alaska Peninsula.

Typical Habitat

Brown bears can, and do, use virtually every type of habitat. Although they are less common around human settlements than black bears, brown bears can live in close proximity to people.

Polar Bear

Identification

Polar bears are about the same size as coastal brown bears. Colors range from white to yellow. Black nose is prominent. Head shape is similar to that of a black bear, but their long tapering necks make polar bears' heads appear to be small in relation to their body size.

Range in Alaska

Polar bears are found in coastal Alaska and offshore waters from Bristol Bay to the Arctic. Ice conditions dictate local polar bear abundance.

Typical Habitat

Islands, coastlines, and waters near pack-ice and ice-floes, rarely occurring far inland, except for denning females, are typical habitat.

Firearms for Bear Protection

As a last resort, a bear may have to be shot. When this is the only option, it will likely be in a situation that has a sudden onset. Therefore, it is important that you are familiar and comfortable with whatever firearm you decide to carry. Remember that if you wound a bear, you make the situation worse.

There is an on-going debate as to what is the best firearm to use for protection from bears. The following are a few of the pros and cons for some of the more popular firearms:

Pistols

PROS - convenient to carry, always with the person, can be used in close quarters during an attack, rapid-fire is possible.

CONS - dangerous to humans (accidents), much practice is needed to be proficient; may not be powerful enough to stop a large bear.

Shotguns

PROS - can be loaded with a variety of projectiles, effective at close range in brushy situations, rapid-fire is possible, easy to use.

CONS - inaccurate and ineffective at medium to long range, heavy to carry, potentially dangerous to humans, may not be powerful enough to stop a large bear.

Rifles

PROS - very powerful calibers are available, accurate at both close and long range.

CONS - much practice required for accuracy in an emergency, range of bullet makes it dangerous to humans, heavy and awkward to carry, rapid fire is difficult with bolt action rifles.

There are different thoughts as to the best place to shoot a charging bear. In reality, a person usually has little time to contemplate shot placement in a true bear attack. If you have a choice, it is best to aim at the shoulder and chest area. Bear's skulls are thick and covered with large muscles, so head shots may not be effective. Once you have made the decision to shoot a bear, you have a responsibility to finish the job you have started. Keep firing until you are out of bullets or you are positive the bear is dead. A wounded bear can be dangerous to you and anyone else who comes into the area.

Bear Sprays

PROS - easy to carry and use, little risk of permanent damage to bears and humans, effective in many situations.

CONS - may change a false charge into a real charge, ineffective at ranges greater than 20 feet, ineffective in windy conditions, dangerous if accidentally discharged in a closed area such as an aircraft cockpit.

Regardless of the firearm you choose, it is imperative that you realize that the most effective tool you have against an attacking bear is your brain. Although bears are intelligent animals, we are smarter and can often think our way out of a bad situation if we try. We must never let the firearm we carry become a replacement for common sense.

Laws Concerning Bear/Human Interactions In Alaska

There are two regulations governing bear and human interactions in Alaska.

The first, ACC 92.230, prohibits feeding bears or leaving garbage that attracts them. The other, 5 ACC 92.410, sets guidelines for taking a bear in defense of your life or property (DLP).

These DLP provisions specifically state that a bear cannot be killed legally if the problem is caused by the improper disposal of garbage or some other attractive nuisance, or if it is brought about by harassment or provocation of the animal or an unreasonable invasion of its habitat.

The regulation also defines what is considered “property.” If a bear is killed under the DLP provisions, the hide and skull are the property of the state and must be turned over to Fish and Game as soon as possible.

The person who shot the bear is also required to submit a written incident report with 15 days. (Obtain a paper copy of this attachment through Corporate Health, Safety, and Environment.)

Figure 2

Hazards and Precautions – Moose, Elk, and Deer

From time to time, field projects may be conducted in locations where dangerous wildlife may be encountered. This attachment addresses Moose, Elk, and Deer and draws on experiences and conditions for fieldwork in the state of Alaska for the bulk of its technical information, precautions, and guidelines for all operations in which the big game species could be encountered.

We all have a responsibility to the wild life and ourselves to behave in a rational and proper manner at all times. The more these species are understood, the easier it will be for us to avoid contact with them thus preventing injury to ourselves and to the animals themselves. All of Alaska big game species are unpredictable and can be dangerous under certain conditions. It is up to all of us to understand this and learn as much as possible so we can work safely while in their domain.

Moose

Moose (Alces alces) are the world's largest members of the deer family. The Alaska race is the largest of all the moose. Moose are generally associated with northern forest in North America, Europe, and Russia. In Alaska, they occur in suitable habitat from the Stikine River in the Panhandle to the Colville River on the Arctic Slope, and as far south on the Alaska Peninsula as Herendeen bay. They are most abundant in recently burned areas that contain willow and birch shrubs, on timberline plateaus, and along the major rivers of South-central and interior Alaska.

General Description

Moose are long-legged and heavy-bodied with a drooping nose, with a "bell" or dewlap under the chin, and a small tail. Their color ranges from golden brown to almost black, depending on the season and the age of the animal. The hair of newborn calves is generally red-brown, fading to a lighter rust color within a few weeks. Newborn calves weigh 28 to 35 pounds and within five months grow to over 300 pounds. Males in prime condition weigh from 1,200 to 1,600 pounds. Adult females weigh 800 to 1,300 pounds. Only the bull has antlers.

Life History

Cow moose generally breed at 28 months, though some may breed as young as 16 months. Calves are born anytime from mid-May to early June. Cows give birth to twins 15 to 75 percent of the time, and triplets may occur once in every 1,000 births. The incidence of twinning is directly related to range conditions. A cow moose defends her newborn calf vigorously. Calves begin taking solid food a few days after birth. They are weaned in the fall at the time the mother is breeding again. The maternal bond is generally maintained until calves are 12 months old at which time the mother aggressively chases her offspring from the immediate area just before she gives birth. By late October, adult males have exhausted their summer accumulation of fat and their desire for female company. Once again, they begin feeding. Antlers are shed as early as November, but mostly in December and January.

Food Habits

During fall and winter, moose consume large quantities of willow, birch, and aspen twigs. In some areas, moose actually establish a "hedge" or browse line six to eight feet above the ground by clipping most of the terminal shoots of favored food species. Spring is the time of grazing as well as browsing. Horsetail, pond weeds, and grasses. During summer, moose feed on vegetation in shallow ponds, forbs, and leaves of birch, willow, and aspen.

Movement

Most moose make seasonal movements to calving, rutting, and wintering areas. They travel from only a few miles to as many as 60 miles during these transitions.

Working Safely Around Moose

Every year someone is injured by a moose and in some cases fatalities are caused by attacks from moose. Most cases of moose attack are from cows defending their calves and they are well equipped to do so. Cow moose attack with their front feet and sharp hooves; they can kill wolves and in some cases drive grizzly bears away from their offspring. Bull moose attack with their massive antlers and can do great damage in a short amount of time.

One should always be alert when working in moose country. If you encounter a moose, never approach too closely. Moose will generally declare their displeasure of your presence by lowering their ears and raising their hackles (the long hair on their neck and back). Immediately retreat if you see a moose displaying this behavior. If you are about to be attacked by a moose and there are trees present, stay behind the tree. A human can move around a tree faster than a moose can.

Use common sense. Avoid contact with any wild animal. Most have the ability injure a human. Never play dead if attacked by a moose. Put something substantial between you and the moose.

Roosevelt Elk

Roosevelt Elk are larger, slightly darker in color, and have shorter, less symmetrical yet more massive antlers than the Rocky Mountain Elk found east of the Cascade Mountains in Canada and the United States.

General Description

Elk are members of the deer family and share many physical traits with deer, moose, and caribou. They are much larger than deer, but not as large as moose, which occur in Alaska. Distinguishing features include a large yellowish rump patch, a grayish to brownish body, and dark brown legs and neck. Unlike some members of the deer family, both sexes have upper canine teeth. The males have antlers, which in prime bull are very large, sweeping gracefully back over the shoulders with spikes pointing forward. Alaska elk antlers have a tendency toward crowning, the formation of the three points at the end of each antler. Elk shed their antlers during the winter each year and grow new ones the following summer. The soft growing antler is covered with velvet, which is scraped off by rubbing and jousting after the antlers harden in the fall.

Bull elk on Afognak Island are estimated to weigh up to 1,300 pounds. Cow elk are similar in appearance to the bulls, but are smaller and have no antlers.

Life History

Elk calves are born in late May or early June when abundant food is available for the mother and the mild weather increases the calves' chances for survival. Birth usually occurs under the cover of dense spruce forest, hidden from predators and protected from the elements. Calves are born with protective coloration (light spotted areas on the back, which act as camouflage). A few days after giving birth, the mother joins other cow elk with calves. A single cow will often "baby-sit" with the calves while the remaining cows seek food. As summer progresses, elk bands move above timberline and feed on the alpine slopes where breezes keep biting insects at bay and young plants are highly nutritious. By July, the calves, although still nursing, begin feeding on succulent forbs.

Beginning in August, bands of elk congregate and form herds consisting of cows, calves, yearlings, and an occasional mature bull. Nearby, but separate from the heard mature bulls can

be found. During September, the bulls join the main herds and mating activities (the rut) begin. Large herds are scenes of vigorous activity as mature bull challenge each other vocally, emitting a high-pitched whistle or bugle, an eerie but thrilling sound. Occasionally, pushing and shoving matches are initiated as the mature bull attempt to take advantage of the larger bull's preoccupation and run past them to win the favors of a female. By mid-October most breeding activities have ceased. Herds may begin to disperse into smaller bands as they move into wintering areas. Winter months are spent in lower valleys and in the dense spruce forest and small openings near the coastline searching for food.

Food

Elk are hardy animals whose large body size and herding tendencies require tremendous amounts of food. From late spring to early fall, with a wide variety of food available, elk are mainly grazers, using grasses, forbs, and other leafy vegetation. By late fall they become browsers, feeding on sprouts and branches of shrubs and trees.

Population

From the original eight transplanted animals, Afognak elk have expanded to about 1,200.

Working Safely Around Elk

Although elk are not as widely distributed as moose in Alaska, they are large and potentially dangerous when the bulls are in the rut and when you may be near cows with young calves. Follow the same precautions as set forth above for moose. Elk bulls have a tendency to be more aggressive during the rut (September & October) than either moose or deer, and caution should be used when working near bulls during this time of year. Aggressive cows with calves should be avoided as well, since they attack in the same manner as cow moose.

Sitka Black-Tailed Deer, Mule Deer, and White-Tailed Deer

The Sitka black-tailed deer is native to the wet coastal rain forest of Southeast Alaska and north coastal British Columbia. Transplants have expanded its range and established population now also exist near Yakutat, in Prince William Sound, as well as Kodiak, and Afognak, and Raspberry Islands.

General Description

The Sitka black tailed deer is smaller, stockier, and has a shorter face than other members of the black-tailed group. Fawns are born in early June and weigh six to eight pounds at birth. The average October live weight of adults is about 80 pounds for does and 120 pounds for bucks, although dressed weight bucks of over 200 pounds have been reported. The summer coat of reddish brown is replaced by dark brownish gray in winter. Antlers are dark brown with typical black tailed branching. Normal adult antler development is three points on each side. Average life span is about 10 years, but a few are known to have attained an age of at least 15.

Life History

Fawns are born in late spring. After the winter snow pack recedes, deer disperse; migratory deer move to high elevation alpine/sub-alpine habitats while resident deer remain at lower elevations throughout the forest. Summer and early fall are periods of active foraging as deer accumulate fat reserves, which will help them through the winter and early spring. With the first heavy frost, deer in the higher alpine and sub-alpine areas descend to the upper forest.

The breeding season (or rut) peaks during late November. Breeding bucks spend little time foraging and by late November have used up much of their fat reserve. Does, however, generally enter December in prime condition. Does breed during their second year of life and continue producing fawns annually until they are 10 or 12 years of age. Reproductive success decreases rapidly beyond 10 to 12 years and by age 15, which is probably the maximum life

expectancy, reproduction has essentially ceased. Prime age does (5 to 10 years) typically produce two fawns annually.

Throughout the rest of the winter and early spring, deer are generally restricted to uneven-aged old growth forest below 1,500 feet in elevation. The old growth forest provides optimal winter habitat because the high broken canopy intercept much snow but still provides enough light for the growth of forage plants used by deer. During winter, the distribution of deer at various elevations is influenced by changing snow depth. During extreme snow accumulations, many deer congregate in heavily timbered stands at lower elevations, and some may even move into the beach. Spring is a critical period for deer, and if winters are deep and persistent, many deer die of starvation. As snow melts in mid to late spring, deer begin to disperse, and by late spring and early summer they start rebuilding some of the fat reserves lost during winter.

Home Range

Summer and winter home range areas vary from 30 to 1,200 acres and average about 200 acres for radio-collared deer on Admiralty Island. Migratory deer have larger annual home ranges than resident deer. The average distance between summer and winter home ranges is five miles for migratory deer and half a mile for resident deer. Movement of deer between watersheds appears to be minimal during winter.

Food Habits

During summer, deer generally feed on herbaceous vegetation and the green leaves of shrubs. During winter, they are restricted to evergreen forbs and woody browse. When snow is not a problem, evergreen forbs such as bunchberry and trailing bramble are preferred. During periods of deep snow, woody browse such as blueberry, yellow cedar and hemlock, and arboreal lichens are used. Woody browse alone, however, is not an adequate diet and deer rapidly deplete their energy reserves when restricted to such forage.

Populations

Deer populations in Alaska are dynamic and fluctuate considerably with the severity of the winters. When winters are mild, deer numbers generally increase. Periodically, however, a severe winter will cause a major decline in the population. Deer have a high reproductive potential, and depressed populations normally recover rapidly. In some cases, however, predation may speed deer decline, as well as slow recovery to higher levels. The wolf, which occurs on the mainland and islands south of Frederick Sound, is considered the major predator of deer in Southeast Alaska. Both black and brown bears also prey on deer to some degree.

Working Safely Around Deer

The White-tailed deer found thought the eastern and western part of the United States have been known to attack people on many occasions. It is unknown whether Black-tailed deer have made any such attacks, but it is possible for someone to be injured by an irate buck in the breeding season (late fall). Deer are well equipped to injure humans. They are very fast. Bucks have sharp antlers and can clear amazingly high obstacles with graceful, arching leaps. They can run with remarkable speed, even in dense cover, and have excellent camouflage. When working in areas populated with deer, whether it be White-tailed, Black-tailed, or Mule deer, it is just common sense not to approach any large wild animal too closely. It is unlikely that an attack from a deer would be fatal but it is possible and serious injury is likely.

Figure 3

Hazards and Precautions – American Bison and Feral Wild Cattle Safety

American Bison

American Bison (Bison), which shaped the lifestyle of the plains Indians and figured prominently in American history before they were brought to near extinction, were transplanted to Alaska from Montana in 1928. While bison were the most common large land mammal in Alaska thousands of years ago, all of Alaska's wild bison came from 20 animals released near Delta Junction. Natural emigration and transplants have now created additional herds at Copper River, Chitina River, and Farewell. Small domestic herds are located at Healy, Kodiak Island, and on Provo Island. There were approximately 700 wild bison in the state in mid-1985.

General Description

The bison is the largest native land mammal in North America. A full-grown bull stands six feet at the shoulder, is up to 10 feet long, and can weigh more than a ton. Full-grown cows are smaller, but have been known to weigh over 1,200 pounds. A bison's head and forequarters are massive and seem out of proportion to the smaller hind parts. Bison have vertebrae, which begins just ahead of the hips and reaches its maximum height above the front shoulder. From above the shoulder, the hump drops almost straight down to the neck.

The bison's horns curve upward. The horns of the bull are larger and heavier than the horns of the cow. As winter progresses, their coats change color and are much paler by spring. When the weather warms, the hair loosens and hangs in patches until it is completely shed and replaced with new hair by late spring. Hair on the chin resembles a goatee. Older animals tend to have more hair on their heads.

Life History

Most bison young are born in May, but calves are born from April to August or even later. Newly born calves have a reddish coat. They are able to stand when only 30 minutes old; within three hours of birth, they can run and kick their hind legs in the air. At about 6 days of age, calves start grazing. Their reddish-orange coat begins to darken at about 10 weeks, with the molt to dark brown complete about five weeks later.

Cows are sexually mature at two years of age and give birth to single calves twice in three years. The gestation period is approximately 270 days. On rare occasions, a mostly white or even albino calf has been born in the Delta herd, but none has reached maturity.

Bison in Alaska have been known to live to a relatively great age compared to other hoofed animals (ungulates). One tagged bull killed in the Copper River area was over 20 years old.

Bison are migratory animals by nature. Alaska's wild bison do not remain in single herds, but scatter alone or in-groups ranging up to 50 animals or more. In the Delta Junction area, they move far up the Delta River in early spring to secluded meadows where they calve. Around August they travel back downstream, eventually moving on the Delta Junction Bison Range, and finally in late fall, onto farms where they remain throughout the winter. Here they sometimes cause damage to unharvested crops. Alaska's other wild bison herds also have seasonal movement patterns. Bison move slowly while feeding and appear to be quite clumsy. This is pure deception, for when pursued, the bison is fleet of foot and has great endurance. A mature bull eventually captured at Delta Junction jumped a seven-foot log fence from a standing position.

Food Habits

Bison are grazing animals and in Alaska find only limited amounts of food along rivers, in recent burns, and sedge potholes. Their diet is made up mainly of various grasses and forbs like vetch,

a favored summer food found on gravel bars. Sedges, silverberry, willow, and ground birch are also eaten.

Working Safely Around Bison

When working in areas where bison are present, follow the same precautions as stated above for other large potentially dangerous wild animal. Generally, where bison are present there also will be moose and Brown (Grizzly) bears sharing the same area. Partially due to the relatively sparse population, bison injure fewer people than Brown Bears or moose.

Never approach bison and use caution when working near bison as they are unpredictable and can cover a lot of ground in a short amount of time. Bison can be found in timbered areas. If approached by a bison and you cannot make it to a vehicle, keep a large tree between you and the bison. You can move around the tree faster than the bison.

If a single bison or heard of bison approach you or your crew, retreat to your vehicle and leave the area. Do not attempt to "drive" the bison from your area while in your vehicle. Bison have no respect for cars and could charge and damage your vehicle and the occupants. The best way to avoid contact is to use your head and give the bison the right of way.

Feral or Wild Cattle

Feral or wild cattle are only found in a few remote locations in Alaska. A population exists on Sitkinak Island on the south end of Kodiak Island, Long Island, Harvester Island, and Chirikof Island. The same caution should be used when working in areas with a population of wild cattle that would be used when working around any of Alaska's dangerous wildlife. Never approach too closely and if they begin to approach you, clear the area as fast as possible. If you arrive at your work site and there are wild cattle close by, stay in you vehicle and remain there until they leave the area.

If it is necessary to destroy a wild cow, you must notify the Department of Fish & Game. The same Defense of Life and Property (DLP) law that applies to big game species does not apply to wild domestic cattle, but you will be required to salvage the meat and make the report. Cattle reside on leased ground, and the owner of the leases must also be notified. It may also be necessary to compensate the landowner.

Wild Feral Cattle can be dangerous, and there are reports of injuries to people. Although they may look domestic cattle, they are wild and have no fear or respect for humans. Give them the right a way, use common sense, and maintain a safe distance when working where wild Feral Cattle inhabit the area.

ATTACHMENT 8

Heat Stress

JACOBS

HSE Procedure		Document No: HSEP 11.5	Page: 1 of 6
Heat Stress Control		Supersedes: CHSP 11.5	Rev. 2
Issuing Department: Corporate HSE	Approval: Mike.Coyle@Jacobs.com	Previous Rev. Date: 11 Apr 01	Current Revision Date: 18 Sept 01

Table of Contents

1.0 PURPOSE AND SCOPE 1
2.0 RESPONSIBILITIES 1
3.0 DEFINITIONS 1
4.0 PROCEDURE 1
4.1. Hazards of Hot Environments 1
4.2. Prevention 3
5.0 REFERENCES 4
6.0 FIGURES 4
Work – Rest Regimen[1] 5
Suggested Frequency Of Physiological Monitoring For Fit And Acclimatized Workers[5] 6

1.0 PURPOSE AND SCOPE

This Corporate Health, Safety, and Environmental Procedure (HSEP) describes the procedures for heat stress monitoring of personnel engaged in field work activities.

This procedure applies to all employees who perform field work in hot weather and who are at risk of developing heat stress.

2.0 RESPONSIBILITIES

Specific HSE Program implementation responsibilities are stated in HSEP 1.5. Additional management, staff, employee, and subcontractor responsibilities are stated in individual procedures that address responsibilities specific to the HSE topic.

3.0 DEFINITIONS

Heat stress	Refers to heat-induced physiological stress
Wet Bulb Globe Temperature Index (WBGT)	Refers to a measure of environmental factors which most nearly correlate with deep body temperature and other physiological responses to heat.

4.0 PROCEDURE

4.1. Hazards of Hot Environments

Heat-induced physiological stress (heat stress) occurs when the body fails to maintain a normal body temperature. A number of physical reactions can occur ranging from mild (such as fatigue, irritability, anxiety, and decreased concentration, dexterity, or movement) to fatal. Because the incidence of heat stress depends on a variety of factors, all workers, even those not wearing protective equipment, should be monitored.

For workers wearing permeable clothing (e.g., standard cotton or synthetic work clothes), follow the ACGIH Threshold Limit Value recommendations for suggested work and rest schedules listed in the table entitled Work-Rest Regimen (Figure 1). This work–rest schedule is determined by the Wet Bulb Globe Temperature Index (WBGT), a measure of environmental factors which most nearly correlate with deep body temperature and other physiological responses to heat. WBGT values are calculated by the following equations:

- Outdoors with solar load

WBGT = 0.7 NWB + 0.2 GT + 0.1 DB

– Indoors or Outdoors with no solar load

WBGT = 0.7 NWB + 0.3 GT

where:

WBGT = Wet Bulb Globe Temperature

NWB = Natural Wet Bulb Temperature

DB = Dry-Bulb Temperature

GT = Globe Temperature

The determination of WBGT requires the use of a black globe thermometer, a natural (static) wet-bulb thermometer, and a dry-bulb thermometer. Commercially available instruments can be used for convenient measurement of WBGT.

For workers wearing semipermeable or impermeable encapsulating ensembles and/or levels of protection A, B, or C, the recommendations listed in the table entitled Work – Rest Regimen cannot be used. For these situations, workers should be monitored when the temperature in the work area is above 70°F (21°C).

To monitor these workers, measure:

- Heart rate.

  Count the radial pulse during a 30-second period as early as possible in the rest period.

  – If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.

  – If the heart rate still exceeds 110 beats per minute at the next rest period, shorten the following work cycle by one-third.

- Oral temperature.

  Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking).

  – If oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by one-third without changing the rest period.

  – If oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following work cycle by one-third.

  – Do not permit a worker to wear a semipermeable or impermeable garment when his/her oral temperature exceeds 100.6°F (38.1°C).

- Body water loss.

  Measure weight on a scale accurate to ±0.25 lb. at the beginning and end of each work day to see if enough fluids are being taken to prevent dehydration. Weights should be taken while the employee wears similar clothing or, ideally, is nude. The body water loss should not exceed 1.5 percent total body weight loss in a work day.

Initially, the frequency of physiological monitoring depends on the air temperature adjusted for solar radiation and the level of physical work. See the table entitled Suggested Frequency of

Physiological Monitoring For Fit And Acclimatized Worker (Figure 2). The length of the work cycle will be governed by the frequency of the required physiological monitoring.

4.2. Prevention

Proper training and preventative measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because once someone suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat injuries. One or more of the following recommendations will help reduce heat stress.

- Adjust work schedules
  - Modify work/rest schedules according to monitoring requirements.
  - Mandate work slowdowns as needed.
  - Rotate personnel: alternate job functions to minimize overstress or overexertion at one task.
  - Add additional personnel to work teams.
  - Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain workers' body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat, i.e., 8 fluid ounces (0.23 liters) of water must be ingested for approximately every 18 ounces (0.23 kg) of weight lost. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful.
  - Maintain water temperature at 50° to 60°F (10° to 15.6°C).
  - Provide small disposable cups that hold about 4 ounces (0.1 liter).
  - Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or dilute drinks) before beginning work.
  - Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.
  - Weigh workers before and after work to determine if fluid replacement is adequate.
- Encourage workers to maintain an optimal level of physical fitness.
  - Acclimatize workers to site work conditions: temperature, protective clothing, and workload.
  - Urge workers to maintain normal weight levels.
- Wear long cotton underwear under chemical protective clothing. Cotton will aid in absorbing perspiration and will hold it close to the skin, which will provide the maximum amount of cooling from the limited evaporation that takes place underneath the chemical resistant clothing.
- Provide cooling devices to aid natural body heat exchange during prolonged work or severe heat exposure. Cooling devices include:

  - Field showers or hose-down areas to reduce body temperature and/or to cool off protective clothing.
  - Cooling jackets, vests, or suits.

- Train workers to recognize and treat heat stress. As part of training, identify the signs and symptoms of heat stress, which appear below.
  - Heat Rash is caused by continuous exposure to heat and humid air and aggravated by chafing clothes. Symptoms include a decreased ability to tolerate heat as well as being a nuisance.
  - Heat Cramps is caused by profuse perspiration with inadequate fluid intake and chemical replacement (especially salts). Signs are muscle spasm and pain in the extremities and abdomen.
  - Heat Exhaustion is caused by increased stress on various organs to meet increased demands to cool the body. Signs are shallow breathing; pale, cool moist skin; profuse sweating; dizziness and lassitude; nausea; fainting.
  - Heat Stroke is the most severe form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Body must be cooled immediately to prevent severe injury and/or death. Competent medical help must be obtained immediately. Signs and symptoms are red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma.

5.0 REFERENCES

NIOSH/OSHA/USCG/EPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, October 1985

American Conference of Governmental Industrial Hygienists, Threshold Limit Values and Biological Exposure Indices

U. S. Army Corps of Engineers Safety and Health Requirements Manual, EMR 385-1-1, October 1992

6.0 FIGURES

Work – Rest Regimen

Suggested Frequency of Physiological Monitoring For Fit And Acclimatized Worker

Figure 1

Work – Rest Regimen[1]

WBGT Temperature In Which Various Work Loads Are Performed, F°(C°)			
Work-Rest Regimen	Light[2]	Moderate[3]	Heavy[4]
Continuous Work Permitted	86.0 (30.0)	80.1 (26.7)	77.0 (25.0)
75% work 25% rest, each hour	87.1 (30.6)	82.4 (28.0)	78.6 (25.9)
50% work 50% rest, each hour	88.5 (31.4)	84.9 (29.4)	82.2 (27.9)
25% work 75% rest, each hour	90.0 (32.2)	88.0 (31.1)	86.0 (30.0)

Adapted from "Permissible Heat Exposure Threshold Limit Values" in Threshold Limit Values and Biological Exposure Indices for 1990-1991, American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio, 1990, p. 69.

2 Light work (up to 200 Kcal/hr or 800 Btu/hr): e.g., sitting or standing to control machines, performing light hand or arm work, etc.

3 Moderate work (200-300 Kcal/hr or 800-1400 Btu/hr): e.g., walking about with moderate lifting and pushing, etc.

4 Heavy work (350-500 Kcal/hr or 1400-2000 Btu/hr): e.g., sampling work, pick and shovel work, etc.

Figure 2

Suggested Frequency Of Physiological Monitoring For Fit And Acclimatized Workers[5]

NORMAL ADJUSTED TEMPERATURE[6]	IMPERMEABLE WORK ENSEMBLE[7]	ENSEMBLE
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5°.90°F (30.8°-322°C)	After each 60 minutes of work	After each 30 minutes of work
82.5°-87.5°F (28.1°-30.8°C)	After each 90 minutes of work	After each 50 minutes of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5°.77.5°F (22.5°-25.3°C)	After each 150 minutes of work	After each 120 minutes of work

Source: *NIOSH/OSHA/USCG/EPA,* Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, October 1985, p. 8-22.

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5 For work levels of 250 kilocalories/hour.

6 Calculate the adjusted air temperature (ta adj) by using this equation: ta adj °F = ta °F+ (13 x % sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)

7 A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

ATTACHMENT 9

Cold Stress

JACOBS

HSE Procedure		Document No: HSEP 11.4	Page: 1 of 5
Cold Stress Control		Supersedes: CHSP 11.4	Rev. 2
Issuing Department: Corporate HSE	Approval: Mike.Coyle@Jacobs.com	Previous Rev. Date: 11 Apr 01	Current Revision Date: 18 Sept 01

Table of Contents

1.0 PURPOSE AND SCOPE 1
2.0 RESPONSIBILITIES 1
3.0 DEFINITIONS 1
4.0 PROCEDURE 1
4.1. Hazards of Cold Environments 1
4.2. Evaluation and Control 2
5.0 REFERENCES 3
6.0 FIGURES 3

1.0 PURPOSE AND SCOPE

This Corporate Health, Safety and Environment Procedure (HSEP) describes the procedures for cold stress monitoring of personnel engaged in field work activities.

This HSEP applies to all Company employees who perform field work in cold weather and who are at risk of developing cold stress.

2.0 RESPONSIBILITIES

Specific HSE Program implementation responsibilities are stated in HSEP 1.5. Additional management, staff, employee, and subcontractor responsibilities are stated in individual procedures that address responsibilities specific to the HSE topic.

3.0 DEFINITIONS

ECT Refers to equivalent chill temperature.

4.0 PROCEDURE

4.1. Hazards of Cold Environments

Frostbite and hypothermia are two types of cold injury, against which personnel must be protected during the performance of field activities. Two factors influence the development of a cold injury: ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. For instance, 100°F with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at -18°F (see Table entitled Cooling Power Of Wind On Exposed Flesh Expressed As Equivalent Temperature). As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph.

Pain in the extremities may be the first early warning of danger to cold stress. During exposure to cold, maximum severe shivering develops when the body temperature has fallen to 35°C (95°F). This must be taken as a sign of danger to the workers and exposure to cold should be immediately terminated for any workers when severe shivering becomes evident.

Since prolonged exposure to cold air, or to immersion in cold water at temperatures well above freezing, can lead to dangerous hypothermia, whole body protection must be provided.

Adequate insulating clothing to maintain core temperatures above 36°C (96.8°F) will be provided to workers. The equivalent chill temperature (see Table entitled Cooling Power Of Wind On Exposed Flesh Expressed As Equivalent Temperature) should be used when estimating the

combined cooling effect of wind and low air temperatures on exposed skin or when determining clothing insulation requirements to maintain the deep body core temperature.

Core body temperatures of less than 96.8°F will very likely result in reduced mental alertness, reduction in rational decision-making, or loss of consciousness with the threat of fatal consequences. Unless there are unusual or extenuating circumstances, cold injury to other than hands, feet, and head is not likely to occur without the development of the initial signs of hypothermia.

4.2. Evaluation and Control

Environmental monitoring will be conducted when air temperatures are below 45ºF.

Workers with diseases or taking medication that interferes with normal body temperature regulation will be excluded from work when temperatures are 30ºF or below.

For exposed skin, continuous exposure should not be permitted when the air speed and temperature results in an equivalent chill temperature of -32°C (-25°F). Superficial or deep local tissue freezing will occur only at temperatures below -1°C (30°F) regardless of wind speed.

At air temperatures of 2°C (35.6°F) or less, it is imperative that workers who become immersed in water or whose clothing becomes wet be immediately provided a change of clothing and be treated for hypothermia.

Limits for properly clothed workers for periods of work at temperatures below freezing are shown in the table entitled Threshold Limit Values Work — Warm-up Schedule for Four-Hour Shift.

If available clothing does not give adequate protection to prevent hypothermia or frostbite, work shall be modified or suspended until adequate clothing is made available or until weather conditions improve.

If work is performed continuously in the cold at an equivalent chill temperature (ECT) or below -7°C (20°F), heated warming shelters (tents, trailers, etc.) shall be made available nearby and the workers should be encouraged to use these shelters at regular intervals, the frequency depending on the severity of the environmental exposure.

The onset of heavy shivering, frostnip, the feeling of excessive fatigue, drowsiness, irritability, or euphoria, are indications for immediate return to the shelter. When entering the heated shelter the outer layer of clothing shall be removed and the remainder of the clothing loosened to permit sweat evaporation or a change of dry work clothing provided.

A change of dry work clothing shall be provided as necessary to prevent workers from returning to their work with wet clothing. Dehydration, or the loss of body fluids, occurs insidiously in the cold environment and may increase the susceptibility of the worker to cold injury due to a significant change in blood flow to the extremities. Warm sweet drinks and soups should be provided at the work site to provide caloric intake and fluid volume. The intake of coffee should be limited because of a diuretic and circulatory effect.

If workers are handling fluids which cool when they evaporate (gasoline, alcohol or cleaning fluids) precautions will be taken to avoid soaking clothing and skin contact.

For work practices at or below -12°C (100°F) ECT the following shall apply:

- The worker shall be under constant protective observation (buddy system or supervision).
- The work rate should not be so high as to cause heavy sweating that will result in wet clothing; if heavy work must be done, test periods must be taken in heated shelters and opportunity for changing into dry clothing shall be provided.
- New employees shall not be required to work full-time in cold in the first days until they become accustomed to the working conditions and required protective clothing.
- The work shall be arranged in such a way that sitting still or standing still for long periods is minimized. Unprotected metal chair seats shall not be used.

- The workers shall be instructed in safety and health procedures. The training program shall include as a minimum instruction in:
  - Proper re-warming procedures and appropriate first aid treatment.
  - Proper clothing practices.
  - Proper eating and drinking habits.
  - Recognition of impending frostbite.
  - Recognition signs and symptoms of impending hypothermia or excessive cooling of the body even when shivering does not occur.
  - Safe work practices.

5.0 REFERENCES

American Conference of Governmental Industrial Hygienists, Threshold Limit Values and Biological Exposure Indices

U.S. Army Corps of Engineering, Safety and Health Requirements Manual, October 1992

6.0 FIGURES

Cooling Power Of Wind On Exposed Flesh Expressed As Equivalent Temperature

Threshold Limit Values Work/Warm-up Schedule for Four-Hour Shift

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Figure 1

Cooling Power Of Wind On Exposed Flesh Expressed As Equivalent Temperature

(UNDER CALM CONDITIONS)

Estimated Wind Speed (in mph)	Actual Temperature Reading (F°)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (F°)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148

(Wind speeds greater than 40 mph have little additional effect	LITTLE DANGER In < hr with dry skin. Maximum danger of false sense of security	INCREASING DANGER Danger from freezing of exposed flesh within one minute.	GREAT DANGER Flesh may freeze within 30 seconds.

Trenchfoot and immersion foot may occur at any point on this chart.

Source: American Conference of Governmental Industrial Hygienists, Threshold Limit Values and Biological Exposure Indices for 1987-1988, Cincinnati, Ohio, 1987

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Figure 2

Threshold Limit Values Work/Warm-up Schedule for Four-Hour Shift

Air Temperature - Sunny Sky		No Noticeable Wind		5 mph Wind		10 mph Wind		15 mph Wind		20 mph Wind	
°C (approx.)	°F	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work period	No. of Breaks	Max. Work Period	No. of Breaks
1. -26° to -28°	-15° to -19°	(Norm. Breaks)	1	(Norm. Breaks)	1	75 min.	2	55 min.	3	40 min.	4
2. -29° to -31°	-20° to -24°	(Norm. Breaks)	1	75 min	2	55 min	3	40 min	4	30 min	5
3. -32° to -34°	-25° to -29°	75 min	2	55 min	3	40 min	4	30 min	5	Non-emergency work should cease	
4. -35° to -37°	-30° to -34°	55 min	3	40 min	4	30 min	5	Non-emergency work should cease			
5. -38° to -39°	-35° to -39°	40 min	4	30 min	5	Non-emergency work should cease					
6. -40° to -42°	-40° to -44°	30 min	5	Non-emergency work should cease							
7. -43° & below	-45° & below	Non-emergency work should cease									

Notes:

1. Schedule applies to moderate to heavy work activity with warm-up breaks of ten (10) minutes in a warm location. For light-to-moderate work (limited physical movement): apply the schedule one step lower. For example, at -30°F with no noticeable wind (Step 4), a worker at a job with little physical movement should have a maximum work period of 40 minutes with 4 breaks in a 4-hour period (Step 5).

2. The following is suggested as a guide for estimating wind velocity if accurate information is not available:
   5mph: light flag moves; 10 mph: light flag fully extended; 15 mph: raises newspaper sheet; 20 mph: blowing and drifting snow.

Source: American Conference of Governmental Industrial Hygienists, Threshold Limit Values and Biological Exposure Indices for 1990-1991, Cincinnati, Ohio, 1990.

Material Safety Data Sheet

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY (As Used on Label and List): ALCONOX

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name: ALCONOX, INC.

Address (Number, Street, City, State, and ZIP Code): 9 EAST 40th SREET, NEW YORK, NY 10016

Emergency Telephone Number: CHEMTEL: 800-255-3924

Telephone Number for Information: 212 532-4040

Date Prepared: FEBRUARY 18, 1993

Signature of Preparer (optional):

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)

THERE ARE NO INGREDIENTS IN ALCONOX WHICH APPEARED ON THE OSHA STANDARD 29 CFR 1910 SUBPART Z.

Section III — Physical/Chemical Characteristics

Boiling Point	N.A.	Specific Gravity (H_2O = 1)	N.A.
Vapor Pressure (mm Hg.)	N.A.	Melting Point	N.A.
Vapor Density (AIR = 1)	N.A.	Evaporation Rate (Butyl Acetate = 1)	N.A.

Solubility in Water: APPRECIABLE (GREATER THAN 10 PER CENT)

Appearance and Odor: WHITE POWDER INTERSPERED WITH CREAM COLORED FLAKES - ODORLESS

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
NONE		N.A.	N.A.

Extinguishing Media: WATER, CO_2, DRY CHEMICAL, FOAM, SAND/EARTH

Special Fire Fighting Procedures: FOR FIRES INVOLVING THIS MATERIAL DO NOT ENTER WITHOUT PROTECTIVE EQUIPMENT AND SELF CONTAINED BREATHING APPARATUS

Unusual Fire and Explosion Hazards: NONE

(Reproduce locally)

OSHA 174, Sept. 1985

Section V — Reactivity Data

Stability			Conditions to Avoid
	Unstable		NONE
	Stable	XX	

Incompatibility (*Materials to Avoid*): AVOID STRONG ACIDS

Hazardous Decomposition or Byproducts: MAY RELEASE CO_2 GAS ON BURNING

Hazardous Polymerization			Conditions to Avoid
	May Occur		NONE
	Will Not Occur	XX	

Section VI — Health Hazard Data

Route(s) of Entry: Inhalation? YES Skin? NO Ingestion? YES

Health Hazards (*Acute and Chronic*): INHALATION OF POWDER MAY PROVE LOCALLY IRRITATING TO MUCOUS MEMBRANES. INGESTION MAY CAUSE DISCOMFORT AND/OR DIARRHEA.

Carcinogenicity: NTP? NO IARC Monographs? NO OSHA Regulated? NO

Signs and Symptoms of Exposure: EXPOSURE MAY IRRITATE MUCOUS MEMBRANES. MAY CAUSE SNEEZING.

Medical Conditions Generally Aggravated by Exposure: RESPIRATORY CONDITIONS MAY BE AGGRAVATED BY POWDER.

Emergency and First Aid Procedures: YES-FLUSH WITH PLENTY OF WATER FOR 15 MINUTES SKIN-FLUSH WITH PLENTY OF WATER INGESTION-DRINK LARGE QUANTITIES OF WATER.GET MEDICAL ATTENTION FOR DISCOMFORT

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken In Case Material is Released or Spilled: MATERIAL FOAMS PROFUSELY. SHOVEL AND RECOVER AS MUCH AS POSSIBLE. RINSE REMAINDER TO SEWER. MATERIAL IS COMPLETELY BIODEGRADABLE.

Waste Disposal Method: SMALL QUANTITIES MAY BE DISPOSED OF IN SEWER. LARGE QUANTITIES SHOULD BE DISPOSED OF ACCORDING TO LOCAL REQUIREMENTS FOR NON-HAZARDOUS DETERGENT.

Precautions to Be Taken in Handling and Storing: STORE IN A DRY AREA TO PREVENT CAKING.

Other Precautions: NO SPECIAL REQUIREMENTS OTHER THAN THE GOOD INDUSTRIAL HYGIENE AND SAFETY PRACTICES ENPLOYED WITH ANY INDUSTRIAL CHEMICAL.

Section VIII — Control Measures

Respiratory Protection (*Specify Type*): DUST MASK

Ventilation			
	Local Exhaust: NORMAL	Special: N.A.	
	Mechanical (General): N.A.	Other: N.A.	

Protective Gloves: USEFUL-NOT REQUIRED

Eye Protection: USEFUL-NOT REQUIRED

Other Protective Clothing or Equipment: NOT REQUIRED

Work/Hygienic Practices: NO SPECIAL PRACTICES REQUIRED

JE MERIT CONSTRUCTORS, INC.
A MEMBER OF THE JACOBS ENGINEERING GROUP

ACCIDENT INVESTIGATION REPORT

AIR Number: _____

CLIENT:	PROJECT:
LOCATION:	DATE:

Name: _____ Contractor: _____ Date: _____

Age: _____ Location: _____ Time: _____

Craft: _____ Property Damage: Yes _____ No _____

What Happened? _____

Nature of Injury? _____

Injury Potential? Major: _____ Serious: _____ Minor: _____

Why did this happen? _____

Possibility of Reoccurrence? Often: _____ Seldom: _____ Rarely: _____

What Corrective Action Has Been/Will Be Taken? _____

Staff Supervisor: _____ Staff Supervisor: _____

Report Written By: _____ Report Written By: _____

Date of This Report: _____ Date of This Report: _____

(For Safety Staff only)	REPORT NO.	EROC CODE	**UNITED STATES ARMY CORPS OF ENGINEERS** **ACCIDENT INVESTIGATION REPORT** *(For Use of this Form See Help Menu and USACE Suppl to AR 385-40)*	**REQUIREMENT CONTROL SYMBOL: CEEC-S-8(R2)**

1. ACCIDENT CLASSIFICATION

PERSONNEL CLASSIFICATION	INJURY/ILLNESS/FATAL	PROPERTY DAMAGE	MOTOR VEHICLE INVOLVED	DIVING
GOVERNMENT ☐ CIVILIAN ☐ MILITARY	☒	☐ FIRE INVOLVED ☐ OTHER	☐	☐
☐ CONTRACTOR	☐	☐ FIRE INVOLVED ☐ OTHER	☐	☐
☐ PUBLIC ☐ FATAL ☐ OTHER			☐	

2. PERSONAL DATA

a. Name *(Last, First, MI)*	b. AGE	c. SEX ☐ MALE ☐ FEMALE	d. SOCIAL SECURITY NUMBER	e. GRADE

f. JOB SERIES/TITLE	g. DUTY STATUS AT TIME OF ACCIDENT	h. EMPLOYMENT STATUS AT TIME OF ACCIDENT
	☐ ON DUTY ☐ TDY ☐ OFF DUTY	☐ ARMY ACTIVE ☐ ARMY RESERVE ☐ VOLUNTEER ☐ PERMANENT ☐ FOREIGN NATIONAL ☐ SEASONAL ☐ TEMPORARY ☐ STUDENT ☐ OTHER *(Specify)*

3. GENERAL INFORMATION

a. DATE OF ACCIDENT *(month/day/year)*	b. TIME OF ACCIDENT *(Military time)*	c. EXACT LOCATION OF ACCIDENT	d. CONTRACTOR'S NAME
	hrs		(1) PRIME: (2) SUBCONTRACTOR:

e. CONTRACT NUMBER	f. TYPE OF CONTRACT	g. HAZARDOUS/TOXIC WASTE ACTIVITY
☐ CIVIL WORKS ☐ MILITARY ☐ OTHER *(Specify)*	☐ CONSTRUCTION ☐ SERVICE ☐ A/E ☐ DREDGE ☐ OTHER *(Specify)*	☐ SUPERFUND ☐ DERP ☐ IRP ☐ OTHER *(Specify)*

4. CONSTRUCTION ACTIVITIES ONLY *(Fill in line and corresponding code number in box from list - see help menu)*

a. CONSTRUCTION ACTIVITY	(CODE)	b. TYPE OF CONSTRUCTION EQUIPMENT	(CODE)
	#		#

5. INJURY/ILLNESS INFORMATION *(Include name on line and corresponding code number in box for items e, f & g - see help menu)*

a. SEVERITY OF ILLNESS/INJURY	(CODE)	B. ESTIMATED DAYS LOST	C. ESTIMATED DAYS HOSPITALIZED	D. ESTIMATED DAYS RESTRICTED DUTY
	#	0	0	0

e. BODY PART AFFECTED	(CODE)	g. TYPE AND SOURCE OF INJURY/ILLNESS	(CODE)
PRIMARY	#	TYPE	#
SECONDARY	#	SOURCE	#
f. NATURE OF ILLNESS / INJURY	#		

6. PUBLIC FATALITY *(Fill in line and correspondence code number in box - see help menu)*

a. ACTIVITY AT TIME OF ACCIDENT	(CODE)	b. PERSONAL FLOATATION DEVICE USED?
	#	☐ YES ☐ NO ☒ N/A

7. MOTOR VEHICLE ACCIDENT

a. TYPE OF VEHICLE	b. TYPE OF COLLISION	c. SEAT BELTS	USED	NOT USED	NOT AVAILABLE
☐☐ PICKUP/VAN ☐☐ AUTOMOBILE ☐☐ TRUCK ☐☐ OTHER *(Specify)*	☐ SIDE SWIPE ☐ HEAD ON ☐ REAR END ☐ BROADSIDE ☐ ROLL OVER ☐ BACKING ☐ OTHER *(Specify)*	(1) FRONT SEAT			
		(2) REAR SEAT			

8. PROPERTY/MATERIAL INVOLVED

a. NAME OF ITEM	B. OWNERSHIP	C. $ AMOUNT OF DAMAGE
(1)		
(2)		
(3)		

9. VESSEL/FLOATING PLANT ACCIDENT *(Fill in line and correspondence code number in box from list - see help menu)*

a. TYPE OF VESSEL/FLOATING PLANT	(CODE)	b. TYPE OF COLLISION/MISHAP	(CODE)
	#		#

10. ACCIDENT DESCRIPTION *(Use additional paper, if necessary)*

See attached page.

11. CAUSAL FACTOR(S) *(Read Instruction Before Completing)*

a. (Explain YES answers in item 13)	YES	NO
DESIGN: Was design of facility, workplace or equipment a factor?	☐	☐
INSPECTION/MAINTENANCE: Were inspection & maintenance procedures a factor?	☐	☐
PERSON'S PHYSICAL CONDITION: In your opinion, was the physical condition of the person a factor?	☐	☐
OPERATING PROCEDURES: Were operating procedures a factor?	☐	☐
JOB PRACTICES: Were any job safety/health practices not followed when the accident occurred?	☐	☐
HUMAN FACTORS: Did any human factors such as, size or strength of person, etc., contribute to accident?	☐	☐
ENVIRONMENTAL FACTORS: Did heat, cold, dust, sun, glare, etc., contribute to the accident?	☐	☐

a. *(CONTINUED)*	YES	NO
CHEMICAL AND PHYSICAL AGENT FACTORS: Did exposure to chemical agents, such as dust, fumes, mists, vapors or physical agents, such as, noise, radiation, etc., contribute to accident?	☐	☐
OFFICE FACTORS: Did office setting such as, lifting office furniture, carrying, stooping, etc., contribute to the accident?	☐	☐
SUPPORT FACTORS: Were inappropriate tools/resources provided to properly perform the activity/task?	☐	☐
PERSONAL PROTECTIVE EQUIPMENT: Did the improper selection, use or maintenance of personal protective equipment contribute to the accident?	☐	☐
DRUGS/ALCOHOL: In your opinion, was drugs or alcohol a factor to the accident	☐	☐

b. WAS A WRITTEN JOB/ACTIVITY HAZARD ANALYSIS COMPLETED FOR TASK BEING PERFORMED AT TIME OF ACCIDENT?

☐ YES *(If yes, attach a copy.)* ☐ NO

12. TRAINING

a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK?	b. TYPE OF TRAINING.	c. DATE OF MOST RECENT FORMAL TRAINING.
☐ YES ☐ NO	☐ CLASSROOM ☐ ON JOB	(Month) (Day) (Year)

13. FULLY EXPLAIN WHAT ALLOWED OR CAUSED THE ACCIDENT; INCLUDE DIRECT AND INDIRECT CAUSES *(See instruction for definition of direct and indirect causes.) (Use additional paper, if necessary)*

a. DIRECT CAUSE

See attached page.

b. INDIRECT CAUSE(S)

See attached page.

14. ACTION(S) TAKEN, ANTICIPATED OR RECOMMENDED TO ELIMINATE CAUSE(S).

DESCRIBE FULLY:

See attached page.

15. DATES FOR ACTIONS IDENTIFIED IN BLOCK 14.

a. BEGINNING (Month/Day/Year)	b. ANTICIPATED COMPLETION (Month/Day/Year)

c. SIGNATURE AND TITLE OF SUPERVISOR COMPLETING REPORT CORPS _____ CONTRACTOR _____	d. DATE *(Mo/Da/Yr)*	e. ORGANIZATION IDENTIFIER *(Div, Br, Sect)*	f. OFFICE SYMBOL

16. MANAGEMENT REVIEW *(1st)*

a. ☐ CONCUR b. ☐ NON CONCUR c. COMMENTS

SIGNATURE	TITLE	DATE

17. MANAGEMENT REVIEW *(2nd - Chief Operations, Construction, Engineering, etc.)*

a. ☐ CONCUR b. ☐ NON CONCUR c. COMMENTS

SIGNATURE	TITLE	DATE

18. SAFETY AND OCCUPATIONAL HEALTH OFFICE REVIEW

a. ☐ CONCUR b. ☐ NON CONCUR c. ADDITIONAL ACTIONS/COMMENTS

SIGNATURE	TITLE	DATE

19. COMMAND APPROVAL

COMMENTS

COMMANDER SIGNATURE	DATE

*U.S. GOVERNMENT PRINTING OFFICE: 1993-0-791-757

10. ACCIDENT DESCRIPTION *(Continuation)*

13a. DIRECT CAUSE *(Continuation)*

13b.	INDIRECT CAUSES *(Continuation)*

14.	ACTION(S) TAKEN, ANTICIPATED, OR RECOMMENDED TO ELIMINATE CAUSE(S) *(Continuation)*

GENERAL. Complete a separate report for each person who was *injured, caused* or *contributed* to the accident (excluding uninjured personnel and witnesses). Use of this form for reporting USACE employee first-aid type injuries *NOT* to be submitted to the Department of Labor (DOL), Office of Workers' Compensation Programs (OWCP) shall be at the discretion of the FOA Commander. Please type or print legibly. Appropriate items shall be marked with an "X" in the box(es). If additional space is needed, provide the information on a separate sheet and attach to the completed form. Ensure that these instructions are forwarded with the completed report to the designated management reviewers indicated in sections 16. and 17.

INSTRUCTIONS FOR SECTION 1— ACCIDENT CLASSIFICATION. *(Mark All Boxes That Are Applicable.)*

a. GOVERNMENT. Mark "CIVILIAN" box if accident involved government civilian employee; mark "MILITARY" box if accident involved U.S. military personnel.
   (1) INJURY/ILLNESS/FATALITY—Mark if accident resulted in any government civilian employee injury, illness, or fatality that requires the submission of Office of Workers Compensation Programs (OWCP) Forms CA-1 (injury), CA-2 (illness), or CA-6 (fatality), to the Department of Labor OWCP, or military personnel lost-time or fatal injury.
   (2) PROPERTY DAMAGE—Mark the appropriate box if accident resulted in any damage of $1000 or more to government property (including motor vehicles).
   (3) VEHICLE INVOLVED—Mark if accident involved a motor vehicle, *regardless* of whether "INJURY/ILLNESS" or "PROPERTY DAMAGE" are marked.
   (4) DIVING ACTIVITY—Mark if the accident involved an in-house USACE diving activity.

b. CONTRACTOR.
   (1) INJURY/ILLNESS/FATALITY—Mark if accident resulted in any contractor lost-time injury/illness or fatality.
   (2) PROPERTY DAMAGE—Mark the appropriate box if accident resulted in any damage of $1000 or more to contractor property (including motor vehicles).
   (3) VEHICLE INVOLVED—Mark if accident involved a motor vehicle, regardless of whether "INJURY/ILLNESS" or "PROPERTY DAMAGE" are marked.
   (4) DIVING ACTIVITY—Mark if the accident involved a USACE Contractor diving activity.

c. PUBLIC.
   (1) INJURY/ILLNESS/FATALITY—Mark if accident resulted in public fatality. (The "OTHER" box will be marked when requested by the FOA to report an unusual non-fatal public accident that could result in claims against the government or as otherwise directed by the FOA Commander).
   (2) VOID SPACE—Make no entry.
   (3) VEHICLE INVOLVED—Mark if accident resulted in a fatality to a member of the public and involved a motor vehicle, *regardless* of whether "INJURY/ILLNESS" is marked.
   (4) VOID SPACE—Make no entry.

INSTRUCTIONS FOR SECTION 2—PERSONAL DATA

a. NAME—(MANDATORY FOR GOVERNMENT ACCIDENTS. OPTIONAL AT THE DISCRETION OF THE FOA COMMANDER FOR CONTRACTOR AND PUBLIC ACCIDENTS). Enter last name, first name, middle initial of person involved.

b. AGE—Enter age.

c. SEX—Mark appropriate box.

d. SOCIAL SECURITY NUMBER—(FOR GOVERNMENT PERSONNEL ONLY) Enter the social security number (or other personal identification number if no social security number issued).

e. GRADE—(FOR GOVERNMENT PERSONNEL ONLY) Enter pay grade. Example: O-6; E-7; WG-8; WS-12; GS-11; etc.

f. JOB SERIES/TITLE—For *government civilian employees* enter the pay plan, full series number, and job title, e.g. GS-0810/Civil Engineer. For *military personnel* enter the primary military occupational specialty (PMOS), e.g., 15A30 or 11G50. For *contractor employees* enter the job title assigned to the injured person, e.g. carpenter, laborer, surveyor, etc.,

g. DUTY STATUS—Mark the appropriate box.
   (1) ON DUTY—Person was at duty station during duty hours or person was away from duty station during duty hours but on official business at time of the accident.
   (2) TDY—person was on official business, away from the duty station and with travel orders, at time of accident.
   (3) OFF DUTY—person was not on official business at time of accident.

h. EMPLOYMENT STATUS—(FOR GOVERNMENT PERSONNEL ONLY) Mark the most appropriate box. If "OTHER" is marked, specify the employment status of the person.

INSTRUCTION FOR SECTION 3—GENERAL INFORMATION

a. DATE OF ACCIDENT—Enter the month, day, and year of accident.

b. TIME OF ACCIDENT—Enter the local time of accident in military time. Example: 1430 hrs (not 2:30 p.m.).

c. EXACT LOCATION OF ACCIDENT—Enter facts needed to locate the accident scene. (installation/project name, building number, street, direction and distance from closest landmark, etc.,).

d. CONTRACTOR NAME
   (1) PRIME—Enter the exact name (title of firm) of the prime contractor.
   (2) SUBCONTRACTOR—Enter the name of any subcontractor involved in the accident.

e. CONTRACT NUMBER—Mark the appropriate box to identify if contract is civil works, military, or other: if "OTHER" is marked, specify contract appropriation on line provided. Enter complete contract number of prime contract, e.g., DACW 09-85-C-0100.

f. TYPE OF CONTRACT—Mark appropriate box. A/E means architect/engineer. If "OTHER" is marked, specify type of contract on line provided.

g. HAZARDOUS/TOXIC WASTE ACTIVITY (HTW)—Mark the box to identify the HTW activity being performed at the time of the accident. For Superfund, DERP, and Installation Restoration Program (IRP) HTW activities include accidents that occurred during inventory, predesign, design, and construction. For the purpose of accident reporting, DERP Formerly Used DoD Site (FUDS) activities and IRP activities will be treated separately. For Civil Works O&M HTW activities mark the "OTHER" box.

INSTRUCTIONS FOR SECTION 4—CONSTRUCTION ACTIVITIES

a. CONSTRUCTION ACTIVITY—Select the *most appropriate* construction activity being performed at time of accident from the list below. Enter the activity name and place the corresponding code number identified in the box.

CONSTRUCTION ACTIVITY LIST

1. MOBILIZATION
2. SITE PREPARATION
3. EXCAVATION/TRENCHING
4. GRADING (EARTHWORK)
5. PIPING/UTILITIES
6. FOUNDATION
7. FORMING
8. CONCRETE PLACEMENT
9. STEEL ERECTION
10. ROOFING
11. FRAMING
12. MASONRY
13. CARPENTRY
14. ELECTRICAL
15. SCAFFOLDING/ACCESS
16. MECHANICAL
17. PAINTING
18. EQUIPMENT/MAINTENANCE
19. TUNNELING
20. WAREHOUSING/STORAGE
21. PAVING
22. FENCING
23. SIGNING
24. LANDSCAPING/IRRIGATION
25. INSULATION
26. DEMOLITION

b. TYPE OF CONSTRUCTION EQUIPMENT—Select the equipment involved in the accident from the list below. Enter the name and place the corresponding code number identified in the box. If equipment is not included below, use code 24, "OTHER", and write in specific type of equipment.

CONSTRUCTION EQUIPMENT

1. GRADER
2. DRAGLINE
3. CRANE (ON VESSEL/BARGE)
4. CRANE (TRACKED)
5. CRANE (RUBBER TIRE)
6. CRANE (VEHICLE MOUNTED)
7. CRANE (TOWER)
8. SHOVEL
9. SCRAPER
10. PUMP TRUCK (CONCRETE)
11. TRUCK (CONCRETE/TRANSIT MIXER)
12. DUMP TRUCK (HIGHWAY)
13. DUMP TRUCK (OFF HIGHWAY)
14. TRUCK (OTHER)
15. FORKLIFT
16. BACKHOE
17. FRONT-END LOADER
18. PILE DRIVER
19. TRACTOR (UTILITY)
20. MANLIFT
21. DOZER
22. DRILL RIG
23. COMPACTOR/VIBRATORY ROLLER
24. OTHER

INSTRUCTIONS FOR SECTION 5—INJURY/ILLNESS INFORMATION

a. SEVERITY OF INJURY—Mark the appropriate box

(1) FATAL—injured person died or is missing and presumed dead.

(2) LOST TIME—a non-fatal injury that causes any loss of time from work beyond the day or shift in which it occurred or a non-fatal illness/disease that causes disability at any time.

(3) NO LOST TIME—a non-fatal, traumatic injury that does not cause loss of time from work beyond the day or shift in which it occurred.

(4) FIRST AID—One time treatment (and/or one follow visit for observation) for minor scratches, cuts and similar injuries that do not ordinarily require medical attention.

b. ESTIMATED DAYS LOST—Enter the estimated number of workdays the person will lose from work.

c. ESTIMATED DAYS HOSPITALIZED—Enter the estimated number of workdays the person will be hospitalized.

d. ESTIMATED DAYS RESTRICTED DUTY—Enter the estimated number of workdays the person, as a result of the accident, will not be able to perform all of their regular duties.

e. BODY PART AFFECTED—Select the most appropriate primary and when applicable, secondary body part affected from the list below. Enter body part name on line and place the corresponding code letters identifying that body part in the box.

GENERAL BODY AREA	CODE	BODY PART NAME
ARM/WRIST	AB	ARM AND WRIST
	AS	ARM OR WRIST
TRUNK, EXTERNAL MUSCULATURE	B1	SINGLE BREAST
	B2	BOTH BREASTS
	B3	SINGLE TESTICLE
	B4	BOTH TESTICLES
	BA	ABDOMEN
	BC	CHEST
	BL	LOWER BACK
	BP	PENIS
	BS	SIDE
	BU	UPPER BACK
	BW	WAIST
	BZ	TRUNK OTHER
HEAD, INTERNAL	C1	SINGLE EAR INTERNAL
	C2	BOTH EARS INTERNAL
	C3	SINGLE EYE INTERNAL
	C4	BOTH EYES INTERNAL
	CB	BRAIN
	CC	CRANIAL BONES
	CD	TEETH
	CJ	JAW
	CL	THROAT, LARYNX
	CM	MOUTH
	CN	NOSE
	CR	THROAT, OTHER
	CT	TONGUE
	CZ	HEAD OTHER INTERNAL
ELBOW	EB	BOTH ELBOWS
	ES	SINGLE ELBOW
FINGER	F1	FIRST FINGER
	F2	BOTH FIRST FINGERS
	F3	SECOND FINGER
	F4	BOTH SECOND FINGERS
	F5	THIRD FINGER
	F6	BOTH THIRD FINGERS
	F7	FOURTH FINGER
	F8	BOTH FOURTH FINGERS
TOE	G1	GREAT TOE
	G2	BOTH GREAT TOES
	G3	TOE OTHER
	G4	TOES OTHER
HEAD, EXTERNAL	H1	EYE EXTERNAL
	H2	BOTH EYES EXTERNAL
	H3	EAR EXTERNAL
	H4	BOTH EARS EXTERNAL
	HC	CHIN
	HF	FACE
	HK	NECK/THROAT
	HM	MOUTH/LIPS
	HN	NOSE
	HS	SCALP
KNEE	KB	BOTH KNEES
	KS	KNEE
LEG, HIP, ANKLE, BUTTOCK	LB	BOTH LEGS/HIPS/ ANKLES/BUTTOCKS
	LS	SINGLE LEG/HIP ANKLE/BUTTOCK
HAND	MB	BOTH HANDS
	MS	SINGLE HAND
FOOT	PB	BOTH FEET
	PS	SINGLE FOOT
TRUNK, BONES	R1	SINGLE COLLAR BONE
	R2	BOTH COLLAR BONES
	R3	SHOULDER BLADE
	R4	BOTH SHOULDER BLADES
	RB	RIB
	RS	STERNUM (BREAST BONE)
	RV	VERTEBRAE (SPINE; DISC)
	RZ	TRUNK BONES OTHER
SHOULDER	SB	BOTH SHOULDERS
	SS	SINGLE SHOULDER
THUMB	TB	BOTH THUMBS
	TS	SINGLE THUMB
TRUNK, INTERNAL ORGANS	V1	LUNG, SINGLE
	V2	LUNGS, BOTH
	V3	KIDNEY, SINGLE
	V4	KIDNEYS, BOTH
	VH	HEART
	VL	LIVER
	VR	REPRODUCTIVE ORGANS
	VS	STOMACH
	VV	INTESTINES
	VZ	TRUNK, INTERNAL; OTHER

f. NATURE OF INJURY—Select the most appropriate nature of injury from the list below. This nature of injury shall correspond to the *primary body part* selected in 5.e. above. Enter the nature of injury name on the line and place the corresponding CODE letters identifying the nature of injury in the box provided.

* The injury or condition selected below must be caused by a specific incident or event which occurred during a single work day or shift.

GENERAL NATURE CATEGORY	CODE	NATURE OF INJURY NAME
*TRAUMATIC INJURY OR DISABILITY	TA	AMPUTATION
	TB	BACK STRAIN
	TC	CONTUSION; BRUISE; ABRASION
	TD	DISLOCATION
	TF	FRACTURE
	TH	HERNIA
	TK	CONCUSSION
	TL	LACERATION, CUT
	TP	PUNCTURE
	TS	STRAIN, MULTIPLE
	TU	BURN, SCALD, SUNBURN
	TI	TRAUMATIC SKIN DISEASES/ CONDITIONS INCLUDING DERMATITIS
	TR	TRAUMATIC RESPIRATORY DISEASE
	TQ	TRAUMATIC FOOD POISONING
	TW	TRAUMATIC TUBERCULOSIS
	TX	TRAUMATIC VIROLOGICAL/ INFECTIVE/PARASITIC DISEASE
	T1	TRAUMATIC CEREBRAL VASCULAR CONDITION/STROKE
	T2	TRAUMATIC HEARING LOSS
	T3	TRAUMATIC HEART CONDITION
	T4	TRAUMATIC MENTAL DISORDER; STRESS; NERVOUS CONDITION
	T8	TRAUMATIC INJURY — OTHER (EXCEPT DISEASE, ILLNESS)

**A nontraumatic physiological harm or loss of capacity produced by systemic infection; continued or repeated stress or strain; exposure to toxins, poisons, fumes, etc.; or other continued and repeated exposures to conditions of the work environment over a long period of time. For practical purposes, an occupational illness/disease or disability is any reported condition which doses not meet the definition of traumatic injury or disability as described above.

GENERAL NATURE CATEGORY	CODE	NATURE OF INJURY NAME
**NON-TRAUMATIC ILLNESS/DISEASE OR DISABILITY		
RESPIRATORY DISEASE	RA	ASBESTOSIS
	RB	BRONCHITIS
	RE	EMPHYSEMA
	RP	PNEUMOCONIOSIS
	RS	SILICOSIS
	R9	RESPIRATORY DISEASE, OTHER
VIROLOGICAL, INFECTIVE & PARASITIC DISEASES	VB	BRUCELLOSIS
	VC	COCCIDIOMYCOSIS
	VF	FOOD POISONING
	VH	HEPATITIS
	VM	MALARIA
	VS	STAPHYLOCOCCUS
	VT	TUBERCULOSIS
	V9	VIROLOGICAL/INFECTIVE/ PARASITIC — OTHER
DISABILITY, OCCUPATIONAL	DA	ARTHRITIS, BURSITIS
	DB	BACK STRAIN, BACK SPRAIN
	DC	CEREBRAL VASCULAR CONDITION; STROKE
	DD	ENDEMIC DISEASE (OTHER THAN CODE TYPES R&S)
	DE	EFFECT OF ENVIRONMENTAL CONDITION
	DH	HEARING LOSS
	DK	HEART CONDITION
	DM	MENTAL DISORDER, EMOTIONAL STRESS NERVOUS CONDITION
	DR	RADIATION
	DS	STRAIN, MULTIPLE
	DU	ULCER
	DV	OTHER VASCULAR CONDITIONS
	D9	DISABILITY, OTHER
SKIN DISEASE OR CONDITION	SB	BIOLOGICAL
	SC	CHEMICAL
	S9	DERMATITIS, UNCLASSIFIED

g. TYPE AND SOURCE OF INJURY (CAUSE)—Type and Source Codes are used to describe what caused the incident. The Type Code stands for an ACTION and the Source Code for an OBJECT or SUBSTANCE. Together, they form a brief description of how the incident occurred. Where there are two different sources, code the *initiating* source of the incident (see example 1, below). Examples:

(1) An employee tripped on carpet and struck his head on a desk.
TYPE: 210 (Fell on Same Level) SOURCE: 0110 (walking/ working surface)

NOTE: This example would NOT be coded 120 (struck against) and 0140 (furniture).

(2) A Park Ranger contracted dermatitis from contact with poison ivy/ oak.
TYPE: 510 (contact) SOURCE: 0920 (plant)

(3) A lock and dam mechanic punctured his finger with a metal sliver while grinding a turbine blade.
TYPE: 410 (punctured by) SOURCE: 0830 (metal)

(4) An employee was driving a government vehicle when it was struck by another vehicle.
TYPE: 800 (traveling in) SOURCE: 0421 (government owned vehicle, as driver)

NOTE: The Type Code 800, "Traveling In" is different from the other type codes in that its function is not to identify factors contributing to the injury or fatality, but rather to collect data on the type of vehicle the employee was operating or traveling in at the time of the incident.

Select the most appropriate TYPE and SOURCE identifier from the list below and enter the name on the line and the corresponding code in the appropriate box.

CODE	TYPE OF INJURY NAME
	STRUCK
0110	STRUCK BY
0111	STRUCK BY FALLING OBJECT
0120	STRUCK AGAINST
	FELL, SLIPPED, TRIPPED
0210	FELL ON SAME LEVEL
0220	FELL ON DIFFERENT LEVEL
0230	SLIPPED, TRIPPED (NO FALL)
	CAUGHT
0310	CAUGHT ON
0320	CAUGHT IN
0330	CAUGHT BETWEEN
	PUNCTURED, LACERATED
0410	PUNCTURED BY
0420	CUT BY
0430	STUNG BY
0440	BITTEN BY
	CONTACTED
0510	CONTACTED WITH (INJURED PERSON MOVING)
0520	CONTACTED BY (OBJECT WAS MOVING)
	EXERTED
0610	LIFTED, STRAINED BY (SINGLE ACTION)
0620	STRESSED BY (REPEATED ACTION)
	EXPOSED
0710	INHALED
0720	INGESTED
0730	ABSORBED
0740	EXPOSED TO
0800	TRAVELING IN

CODE	SOURCE OF INJURY NAME
0100	BUILDING OR WORKING AREA
0110	WALKING/WORKING SURFACE (FLOOR, STREET, SIDEWALKS, ETC)
0120	STAIRS, STEPS
0130	LADDER
0140	FURNITURE, FURNISHINGS, OFFICE EQUIPMENT
0150	BOILER, PRESSURE VESSEL
0160	EQUIPMENT LAYOUT (ERGONOMIC)
0170	WINDOWS, DOORS
0180	ELECTRICITY

CODE	SOURCE OF INJURY NAME
0200	ENVIRONMENTAL CONDITION
0210	TEMPERATURE EXTREME (INDOOR)
0220	WEATHER (ICE, RAIN, HEAT, ETC.)
0230	FIRE, FLAME, SMOKE (NOT TOBACCO)
0240	NOISE
0250	RADIATION
0260	LIGHT
0270	VENTILATION
0271	TOBACCO SMOKE
0280	STRESS (EMOTIONAL)
0290	CONFINED SPACE
0300	MACHINE OR TOOL
0310	HAND TOOL (POWERED: SAW, GRINDER, ETC.)
0320	HAND TOOL (NONPOWERED)
0330	MECHANICAL POWER TRANSMISSION APPARATUS
0340	GUARD, SHIELD (FIXED, MOVEABLE, INTERLOCK)
0350	VIDEO DISPLAY TERMINAL
0360	PUMP, COMPRESSOR, AIR PRESSURE TOOL
0370	HEATING EQUIPMENT
0380	WELDING EQUIPMENT
0400	VEHICLE
0411	AS DRIVER OF PRIVATELY OWNED/RENTAL VEHICLE
0412	AS PASSENGER OF PRIVATELY OWNED/RENTAL VEHICLE
0421	DRIVER OF GOVERNMENT VEHICLE
0422	PASSENGER OF GOVERNMENT VEHICLE
0430	COMMON CARRIER (AIRLINE, BUS, ETC.)
0440	AIRCRAFT (NOT COMMERCIAL)
0450	BOAT, SHIP, BARGE
0500	MATERIAL HANDLING EQUIPMENT
0510	EARTHMOVER (TRACTOR, BACKHOE, ETC.)
0520	CONVEYOR (FOR MATERIAL AND EQUIPMENT)
0530	ELEVATOR, ESCALATOR, PERSONNEL HOIST
0540	HOIST, SLING CHAIN, JACK
0550	CRANE
0551	FORKLIFT
0560	HANDTRUCK, DOLLY
0600	DUST, VAPOR, ETC.
0610	DUST (SILICA, COAL, ETC.)
0620	FIBERS
0621	ASBESTOS
0630	GASES
0631	CARBON MONOXIDE
0640	MIST, STEAM, VAPOR, FUME
0641	WELDING FUMES
0650	PARTICLES (UNIDENTIFIED)
0700	CHEMICAL, PLASTIC, ETC.
0711	DRY CHEMICAL—CORROSIVE
0712	DRY CHEMICAL—TOXIC
0713	DRY CHEMICAL—EXPLOSIVE
0714	DRY CHEMICAL—FLAMMABLE
0721	LIQUID CHEMICAL—CORROSIVE
0722	LIQUID CHEMICAL—TOXIC
0723	LIQUID CHEMICAL—EXPLOSIVE
0724	LIQUID CHEMICAL—FLAMMABLE
0730	PLASTIC
0740	WATER
0750	MEDICINE
0800	INANIMATE OBJECT
0810	BOX, BARREL, ETC.
0820	PAPER
0830	METAL ITEM, MINERAL
0831	NEEDLE
0840	GLASS
0850	SCRAP, TRASH
0860	WOOD
0870	FOOD
0880	CLOTHING, APPAREL, SHOES
0900	ANIMATE OBJECT
0911	DOG
0912	OTHER ANIMAL
0920	PLANT
0930	INSECT
0940	HUMAN (VIOLENCE)
0950	HUMAN (COMMUNICABLE DISEASE)
0960	BACTERIA, VIRUS (NOT HUMAN CONTACT)

CODE	SOURCE OF INJURY NAME
1000	PERSONAL PROTECTIVE EQUIPMENT
1010	PROTECTIVE CLOTHING, SHOES, GLASSES, GOGGLES
1020	RESPIRATOR, MASK
1021	DIVING EQUIPMENT
1030	SAFETY BELT, HARNESS
1040	PARACHUTE

INSTRUCTIONS FOR SECTION 6 — PUBLIC FATALITY

a. ACTIVITY AT TIME OF ACCIDENT—Select the activity being performed at the time of the accident from the list below. Enter the activity name on the line and the corresponding number in the box. If the activity performed is not identified on the list, select from the *most* appropriate primary activity area (water related, non-water related or other activity), the code number for "Other", and write in the activity being performed at the time of the accident.

WATER RELATED RECREATION

1. Sailing
2. Boating—powered
3. Boating—unpowered
4. Water skiing
5. Fishing from boat
6. Fishing from bank dock or pier
7. Fishing while wading
8. Swimming/supervised area
9. Swimming/designated area
10. Swimming/other area
11. Underwater activities (skin diving, scuba, etc.)
12. Wading
13. Attempted rescue
14. Hunting from boat
15. Other

NON-WATER RELATED RECREATION

16. Hiking and walking
17. Climbing (general)
18. Camping/picnicking authorized area
19. Camping/picnicking unauthorized area
20. Guided tours
21. Hunting
22. Playground equipment
23. Sports/summer (baseball, football, etc.)
24. Sports/winter (skiing, sledding, snowmobiling etc.)
25. Cycling (bicycle, motorcycle, scooter)
26. Gliding
27. Parachuting
28. Other non-water related

OTHER ACTIVITIES

29. Unlawful acts (fights, riots, vandalism, etc.)
30. Food preparation/serving
31. Food consumption
32. Housekeeping
33. Sleeping
34. Pedestrian struck by vehicle
35. Pedestrian other acts
36. Suicide
37. "Other" activities

b. PERSONAL FLOTATION DEVICE USED—If fatality was water-related was the victim wearing a person flotation device? Mark the appropriate box.

INSTRUCTIONS FOR SECTION 7—MOTOR VEHICLE ACCIDENT

a. TYPE OF VEHICLE—Mark appropriate box for each vehicle involved. If more than one vehicle of the same type is involved, mark both halves of the appropriate box. USACE vehicle(s) involved shall be marked in left half of appropriate box.

b. TYPE OF COLLISION—Mark appropriate box.

c. SEAT BELT—Mark appropriate box.

INSTRUCTIONS FOR SECTION 8—PROPERTY/ MATERIAL INVOLVED

a. NAME OF ITEM—Describe all property involved in accident. Property/material involved means material which is damaged or whose use or misuse contributed to the accident. Include the name, type, model; also include the National Stock Number (NSN) whenever applicable.

b. OWNERSHIP—Enter ownership for each item listed. **(Enter one of** the following: *USACE; OTHER GOVERNMENT; CONTRACTOR: PRIVATE)*

c. $ AMOUNT OF DAMAGE—Enter the total estimated dollar amount

INSTRUCTIONS FOR SECTION 9 — VESSEL/ FLOATING PLANT ACCIDENT

a. TYPE OF VESSEL/FLOATING PLANT — Select the most appropriate vessel/floating plant from list below. Enter name and place corresponding number in box. If item is not listed below, enter item number for "OTHER" and write in specific type of vessel/ floating plant.

VESSEL/FLOATING PLANTS

1. ROW BOAT
2. SAIL BOAT
3. MOTOR BOAT
4. BARGE
5. DREDGE/HOPPER
6. DREDGE/SIDE CASTING
7. DREDGE/DIPPER
8. DREDGE/CLAMSHELL, BUCKET
9. DREDGE/PIPE LINE
10. DREDGE/DUST PAN
11. TUG BOAT
12. OTHER

b. COLLISION/MISHAP — Select from the list below the object(s) that contributed to the accident or were damaged in the accident.

COLLISION/MISHAP

1. COLLISION W/OTHER VESSEL
2. UPPER GUIDE WALL
3. UPPER LOCK GATES
4. LOCK WALL
5. LOWER LOCK GATES
6. LOWER GUIDE WALL
7. HAULAGE UNIT
8. BREAKING TOW
9. TOW BREAKING UP
10. SWEPT DOWN ON DAM
11. BUOY/DOLPHIN/CELL
12. WHARF OR DOCK
13. OTHER

INSTRUCTIONS FOR SECTION 10 — ACCIDENT DESCRIPTION

DESCRIBE ACCIDENT — Fully describe the accident. Give the sequence of events that describe what happened leading up to and including the accident. Fully identify personnel and equipment involved and their role(s) in the accident. Ensure that relationships between personnel and equipment are clearly specified. Continue on blank sheets if necessary and attach to this report.

INSTRUCTIONS FOR SECTION 11 — CAUSAL FACTORS

a. Review thoroughly. Answer each question by marking the appropriate block. If any answer is yes, explain in item 13 below. Consider, as a minimum, the following:

(1) DESIGN — Did inadequacies associated with the building or work site play a role? Would an improved design or layout of the equipment or facilities reduce the likelihood of similar accidents? Were the tools or other equipment designed and intended for the task at hand?

(2) INSPECTION/MAINTENANCE — Did inadequately or improperly maintained equipment, tools, workplace, etc. create or worsen any hazards that contributed to the accident? Would better equipment, facility, work site or work activity inspections have helped avoid the accident?

(3) PERSON'S PHYSICAL CONDITION — Do you feel that the accident would probably not have occurred if the employee was in "good" physical condition? If the person involved in the accident had been in better physical condition, would the accident have been less severe or avoided altogether? Was over exertion a factor?

(4) OPERATING PROCEDURES — Did a lack of or inadequacy within established operating procedures contribute to the accident? Did any aspect of the procedures introduce any hazard to, or increase the risk associated with the work process? Would establishment or improvement of operating procedures reduce the likelihood of similar accidents?

(5) JOB PRACTICES — Were any of the provisions of the Safety and Health Requirements Manual (EM 385-1-1) violated? Was the task being accomplished in a manner which was not in compliance with an established job hazard analysis or activity hazard analysis? Did any established job practice (including EM 385-1-1) fail to adequately address the task or work process? Would better job practices improve the safety of the task?

(6) HUMAN FACTORS — Was the person under undue stress (either internal or external to the job)? Did the task tend toward overloading the capabilities of the person; i.e., did the job require tracking and reacting to many external inputs such as displays, alarms, or signals? Did the arrangement of the workplace tend to interfere with efficient task performance? Did the task require reach, strength, endurance, agility, etc., at or beyond the capabilities of the employee? Was the work environment ill-adapted to the person? Did the person need more training, experience, or practice in doing the task? Was the person inadequately rested to perform safely?

(7) ENVIRONMENTAL FACTORS — Did any factors such as moisture, humidity, rain, snow, sleet, hail, ice, fog, cold, heat, sun, temperature changes, wind, tides, floods, currents, dust, mud, glare, pressure changes, lightning, etc., play a part in the accident?

(8) CHEMICAL AND PHYSICAL AGENT FACTORS — Did exposure to chemical agents (either single shift exposure or long-term exposure) such as dusts, fibers (asbestos, etc.), silica, gases (carbon monoxide, chlorine, etc.,), mists, steam, vapors, fumes, smoke, other particulates, liquid or dry chemicals that are corrosive, toxic, explosive or flammable, by-products of combustion or physical agents such as noise, ionizing radiation, non-ionizing radiation (UV radiation created during welding, etc.) contribute to the accident/incident?

(9) OFFICE FACTORS — Did the fact that the accident occurred in an office setting or to an office worker have a bearing on its cause? For example, office workers tend to have less experience and training in performing tasks such as lifting office furniture. Did physical hazards within the office environment contribute to the hazard?

(10) SUPPORT FACTORS — Was the person using an improper tool for the job? Was inadequate time available or utilized to safely accomplish the task? Were less than adequate personnel resources (in terms of employee skills, number of workers, and adequate supervision) available to get the job done properly? Was funding available, utilized, and adequate to provide proper tools, equipment, personnel, site preparation, etc?

(11) PERSONAL PROTECTIVE EQUIPMENT — Did the person fail to use appropriate personal protective equipment (gloves, eye protection, hard-toed shoes, respirator, etc.) for the task or environment? Did protective equipment provided or worn fail to provide adequate protection from the hazard(s)? Did lack of or inadequate maintenance of protective gear contribute to the accident?

(12) DRUGS/ALCOHOL — Is there any reason to believe the person's mental or physical capabilities, judgement, etc., were impaired or altered by the use of drugs or alcohol? Consider the effects of prescription medicine and over the counter medications as well as illicit drug use. Consider the effect of drug or alcohol induced "hangovers".

b. WRITTEN JOB/ACTIVITY HAZARD ANALYSIS — Was a written Job/Activity Hazard Analysis completed for the task being performed at the time of the accident? Mark the appropriate box. *If one was performed, attach a copy of the analysis to the report.*

INSTRUCTIONS FOR SECTION 12 — TRAINING

a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK? — For the purpose of this section "trained" means the person has been provided the necessary information (either formal and/or on-the-job (OJT) training) to competently perform the activity/task in a safe and healthful manner.

b. TYPE OF TRAINING — Mark the appropriate box that best indicates the type of training; (classroom or on-the-job) that the injured person received before the accident happened.

c. DATE OF MOST RECENT TRAINING — Enter the month, day, and year of the last *formal* training completed that covered the activity-task being performed at the time of the accident.

INSTRUCTIONS FOR SECTION 13—CAUSES

a. DIRECT CAUSES—The direct cause is that single factor which most directly lead to the accident. See examples below.

b. INDIRECT CAUSES—Indirect causes are those factors which contributed to but did not directly initiate the occurrence of the accident.

Examples for section 13:

a. Employee was dismantling scaffold and fell 12 feet from unguarded opening.
Direct cause: failure to provide fall protection at elevation.
Indirect causes: failure to enforce USACE safety requirements; improper training/motivation of employee (possibility that employee was not knowledgeable of USACE fall protection requirements or was lax in his attitude towards safety); failure to ensure provision of positive fall protection whenever elevated; failure to address fall protection during scaffold dismantling in phase hazard analysis.

b. Private citizen had stopped his vehicle at intersection for red light when vehicle was struck in rear by USACE vehicle. (note USACE vehicle was in proper/safe working condition).
Direct cause: failure of USACE driver to maintain control of and stop USACE vehicle within safe distance.
Indirect cause: Failure of employee to pay attention to driving (defensive driving).

INSTRUCTIONS FOR SECTION 14—ACTION TO ELIMINATE CAUSE(S)

DESCRIPTION—Fully describe all the actions taken, anticipated, and recommended to eliminate the cause(s) and prevent reoccurrence of similar accidents/illnesses. Continue on blank sheets of paper if necessary to fully explain and attach to the completed report form.

INSTRUCTIONS FOR SECTION 15—DATES FOR ACTION

a. BEGIN DATE—Enter the date when the corrective action(s) identified in Section 14 will begin.

b. COMPLETE DATE—Enter the date when the corrective action(s) identified in Section 14 will be completed.

c. TITLE AND SIGNATURE—Enter the title and signature of supervisor completing the accident report. For a GOVERNMENT employee accident/illness the immediate supervisor will complete and sign the report. For PUBLIC accidents the USACE Project Manager/Area Engineer responsible for the USACE property where the accident happened shall complete and sign the report. For CONTRACTOR accidents the Contractor's project manager shall complete and sign the report and provide to the USACE supervisor responsible for oversight of that contractor activity. This USACE Supervisor shall also sign the report. Upon entering the information required in 15.d, 15.e and 15.f below, the responsible USACE supervisor shall forward the report for management review as indicated in Section 16.

d. DATE SIGNED—Enter the month, day, and year that the report was signed by the responsible supervisor.

e. ORGANIZATION NAME—For GOVERNMENT employee accidents enter the USACE organization name (Division, Branch, Section, etc.) of the injured employee. For PUBLIC accidents enter the USACE organization name for the person identified in block 15.c. For CONTRACTOR accidents enter the USACE organization name for the USACE office responsible for providing contract administration oversight.

f. OFFICE SYMBOL—Enter the latest complete USACE Office Symbol for the USACE organization identified in block 15.e.

INSTRUCTIONS FOR SECTION 16—MANAGEMENT REVIEW (1st)

1ST REVIEW—Each USACE FOA shall determine who will provide 1st management review. The responsible USACE supervisor in section 15.c shall forward the completed report to the USACE office designated as the 1st Reviewer by the FOA. Upon receipt, the Chief of the Office shall review the completed report, mark the appropriate box, provide substantive comments, sign, date, and forward to the FOA Staff Chief (2nd review) for review and comment.

INSTRUCTIONS FOR SECTION 17—MANAGEMENT REVIEW (2nd)

2ND REVIEW—The FOA Staff Chief (i.e., FOA Chief of Construction, Operations, Engineering, Planning, etc.) shall mark the appropriate box, review the completed report, provide substantive comments, sign, date, and return to the FOA Safety and Occupational Health Office.

INSTRUCTIONS FOR SECTION 18—SAFETY AND OCCUPATIONAL HEALTH REVIEW

3RD REVIEW—The FOA Safety and Occupational Health Office shall review the completed report, mark the appropriate box, ensure that any inadequacies, discrepancies, etc, are rectified by the responsible supervisor and management reviewers, provide substantive comments, sign, date and forward to the FOA Commander for review, comment, and signature.

INSTRUCTION FOR SECTION 19—COMMAND APPROVAL

4TH REVIEW—The FOA Commander shall (to include the person designated Acting Commander in his absence) review the completed report, comment if required, sign, date, and forward the report to the FOA Safety and Occupational Health Office. Signature authority shall not be delegated.

CEPOD-SO

POD AND HED IMMEDIATE REPORT OF ACCIDENT

SOHO USE ONLY
Date Recd': _____
Time Recd': _____

TO: _____ FROM: _____ DATE: _____
(COE OFFICE)

1. Name of Person Reporting: _____ Phone No.: _____
(Print)
2. Location of Accident: _____
3. Date and Time of Accident: _____
If this accident is being reported late, (24 hrs) Why? _____
4. Name of Injured (If any): _____
5. Nature of Injury: _____
6. Occupation (Injured Person): _____
7. Age (Injured Person): _____
8. Estimated Lost Time (Days): _____
Was, return to light duty emphasized to the doctor? _____
9. Estimated Property Damage: _____
10. Contrator & Contract No.: _____
11. Board of Investigation Required? Yes _____ 1. Fatal?
No _____ 2. Three or more admitted to a hospital?
3. Property damage of $200,000 or more?
If yes, was immediate phone notifications to the Commander, Directorate and safety made? ___
12. Description of Accident: (continue on back if needed) Provide a narrative (Where, what, why, How it Happened) so the Commander can get a understanding of the situtation.

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Who Investigated This Accident (Name): _____
Signature of Person Making Report: _____ Print Name: _____
Title of Person Making Report: _____ Phone No. to Reach: _____
Location of Person Making Report: _____

APPENDIX C

Response to Comments

REVIEW COMMENTS **PROJECT: Elmendorf AFB, LF04**

DOCUMENT: LF04 Debris Removal Work Plan LOCATION: Alaska

AFCEE	**DATE:** 30 August 2004 **REVIEWER:** Ellen Godden **PHONE:** 552-7111	**Action taken on comment by:** Jessica Randel

Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	JACOBS RESPONSE	RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
1	3.1	Mobilization and Site Access: The 3 CES/CEVR Project Manager will notify the Port of Anchorage representative 24 hours prior to accessing LF04. I called Roger Graves about this since we had the issue with the port access letter. He suggested a 48-hour notice because of the new port security personnel. In addition, we may need to reference or update the access letter to ensure all personnel, including subcontractors, are covered. (You and I talked since this comment and coordinating with Mr. Devito is fine, also. I'll still call Roger as a courtesy.)		Text will be changed to read, "The 3 CES/CEVR Project Manager will notify the Port of Anchorage representative 48 hours prior to accessing LF04. All personnel must then check in at the Port of Anchorage security checkpoint when entering the area. An access letter will be generated listing all Jacobs and subcontractor personnel requiring access to the site. A copy of this letter will be furnished to the guards at the security checkpoint. All equipment will then be mobilized to the staging area at LF04".	
2	3.4.1	Potential unexploded ordnance. Personnel working onsite at LF04 will view an unexploded ordnance (UXO) recognition and safety presentation prior to initiating any site work. EOD is satisfied with the CD training as a refresher for personnel who have attended "live" training. Those who have not been trained by EOD personnel at least once must attend the on-base training. (Also, I talked to Amn Brown at EOD. If you can positively identify something as a .22 cal or 30-06, he doesn't see a reason for EOD to be called. If there is an unknown or if you come across a cache of unfired whole rounds, they are interested. Otherwise, just mark with surveyor tape or		Text will be changed to, "Personnel working onsite at LF04 will attend unexploded ordnance (UXO) Recognition training to be provided by Elmendorf Explosive Ordinance Disposal (EOD). Those personnel who have previously attended this class will view a refresher UXO recognition and safety presentation prior to initiating any site work." Text in Section 3.4.2 will be changed to, "The locations of any small arms casings (i.e., smaller than .50 caliber) will be flagged with surveyor's marking tape and surveyed. If any casings larger than .50	

AFCEE	**DATE:** 30 August 2004 **REVIEWER:** Ellen Godden **PHONE:** 552-7111	**Action taken on comment by:** Jessica Randel

Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	JACOBS RESPONSE	RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
		something, and we'll call them at the end to come pick up all EOW/UXO type materials.)		caliber or caches of unfired whole rounds are found, Elmendorf AFB EOD will immediately be notified, and are responsible for removing and disposing of these materials from the beach area".	
3	3.4.8	Suspected Medical Waste. These materials will be containerized separately, and disposed of at the Anchorage Municipal Landfill. Change to "disposed" of.		Text will be changed to, "disposed".	
4	Fig. 4-1	LF04 Post Record of Decision Site Evaluation Project Schedule. Change title to LF04 Debris Removal and Monitoring to match contract title.		Title will be changed to, "LF04 Debris Removal and Monitoring".	
5	Table 3-1	Waste Characterization Analyses Summary. In the paragraph preceding this table, sampling was reduced to 2 samples each, solid and liquid matrix, but footnotes to table still shows 5 samples each.		Text in footnote 2 of Table 3-1 of the FSP will be changed to, "It is estimated that two samples of liquid phase matrixes and two samples of solids will be required to characterize the materials in drums and allow for manifesting and proper disposal."	

REVIEW COMMENTS **PROJECT: Elmendorf AFB, LF04**

DOCUMENT: LF04 Debris Removal Work Plan LOCATION: Alaska

AFCEE	**DATE:** 7 September 2004 **REVIEWER:** Lewis Howard **PHONE:**	**Action taken on comment by:** Jessica Randel

Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	JACOBS RESPONSE	RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
1		The Alaska Department of Environmental Conservation (the Department) received the above document on August 4, 2004. The department has reviewed the plan and will approve the document as submitted. Please note that our review and concurrence on this plan is to ensure that the work is done in accordance with State of Alaska environmental conservation laws and regulations. While the Department may comment on other state and federal laws and regulations, our concurrence on the plan does not relieve the Air Force, its contractors, subcontractors, or civilian personnel from the need to comply with other applicable laws and regulations. If you have any questions regarding this letter, please call me at (907) 269-7552. [Letter dated 12 August 2004]			

REVIEW COMMENTS

PROJECT: Elmendorf AFB, LF04

DOCUMENT: LF04 Debris Removal Work Plan

LOCATION: Alaska

AFCEE	**DATE:** 7 September 2004 **REVIEWER:** Jim Klasen **PHONE:**	**Action taken on comment by:** Jessica Randel

Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	JACOBS RESPONSE	RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
1		No comments.			