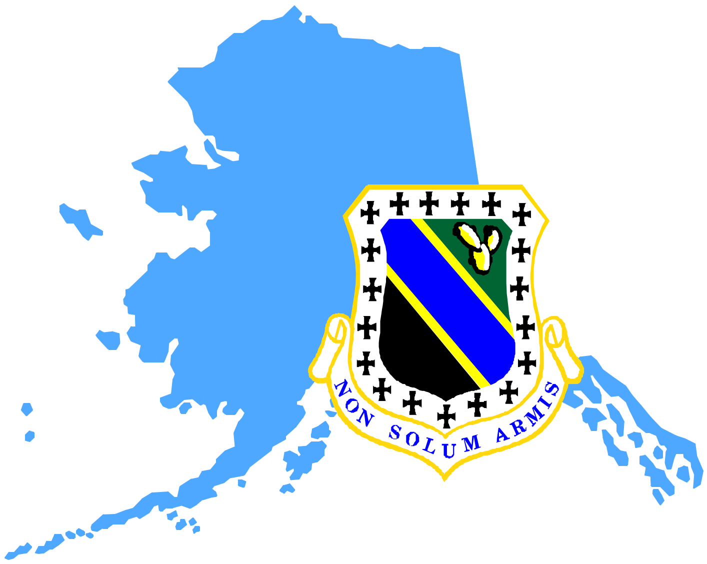


# UNITED STATES AIR FORCE
# ELMENDORF AIR FORCE BASE, ALASKA

*ENVIRONMENTAL RESTORATION PROGRAM*

## ST32 REMOVAL ACTION WORK PLAN

**FINAL**

**SEPTEMBER 2004**

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(continued)

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## TABLES



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## APPENDICES

## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ADEC | Alaska Department of Environmental Conservation |
| AFB | Air Force Base |
| BTEX | benzene, toluene, ethylbenzene, and xylenes |
| DRO | diesel-range organics |
| EOD | explosive ordnance disposal |
| FSP | Field Sampling Plan |
| GPS | Global Positioning System |
| GRO | gasoline-range organics |
| HSP | Health and Safety Plan |
| Jacobs | Jacobs Engineering Group Inc. |
| PID | photoionization detector |
| POL | petroleum, oil, and lubricants |
| QPP | Quality Program Plan |
| SAP | Sampling and Analysis Plan |
| USAF | United States Air Force |
| UST | underground storage tank |
| UXO | unexploded ordnance |
| °F | degrees Fahrenheit |

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# 1.0 INTRODUCTION

This work plan describes the cleanup activities that will be performed at Site ST32 on Elmendorf Air Force Base (AFB), Alaska during 2004. These activities include:

- Removal of existing bioventing systems at Tanks 4, 5 and 6;
- Excavation, transportation, and treatment of petroleum, oil, and lubricants (POL)-contaminated soil associated with Tanks 4, 5 and 6; and
- Excavation, transportation, and treatment of petroleum, oil, and lubricants (POL)-contaminated soil associated with the former fuel pipeline, locations 123+80 and 301+40.

The aforementioned remedies are described in a Decision Document (ADEC 2003) signed by the U.S. Air Force (USAF) and the Alaska Department of Environmental Conservation (ADEC) in August 2003.

## 1.1 WORK PLAN ORGANIZATION

This work plan is organized into the following sections:

- Section 1.0 summarizes the physical characteristics, and available historical information that relates to the environmental condition of Site ST32.
- Section 2.0 presents the anticipated project schedule.
- Section 3.0 presents site target cleanup levels.
- Section 4.0 describes the technical approach to meet project objectives.
- Section 5.0 describes the reporting requirements.
- Section 6.0 presents a list of references.

The two-part Quality Program Plan (QPP), provided in this document as appendices, includes specific procedures that will be followed during this project. Part 1 of the QPP is the Sampling and Analysis Plan (SAP), which consists of a Field Sampling Plan (FSP) and Quality Assurance Project Plan. Part 2 is the Health and Safety Plan (HSP). This document refers to the QPP extensively to avoid repetition and to enhance consistency.

## 1.2 ST32 SITE SETTING AND HISTORY

Site ST32 is located on Elmendorf AFB in Southcentral Alaska. Elmendorf AFB consists of 13,103 acres located along the head of the Knik Arm of Cook Inlet, and adjacent to the City of

Anchorage (Figure 1-1). The AFB is bordered to the north and west by Cook Inlet, to the east by Fort Richardson, and to the south by the City of Anchorage. Site ST32 consists of 80 acres located to the north of Airlifter Drive, and the east-west runway.

Access to the site is typically restricted to site workers, security forces, and other authorized personnel.

Twenty-nine 50,000-gallon underground storage tanks (USTs) were once located within Site ST32 along the face and crest of a ridge formed by the Elmendorf moraine. The USTs were originally used to store aviation gasoline, and were converted for use to store jet fuel (JP-4) during the period between the mid-1950's and 1975. The USTs were connected by a pipeline which delivered fuel to the aircraft flight line by gravity flow.

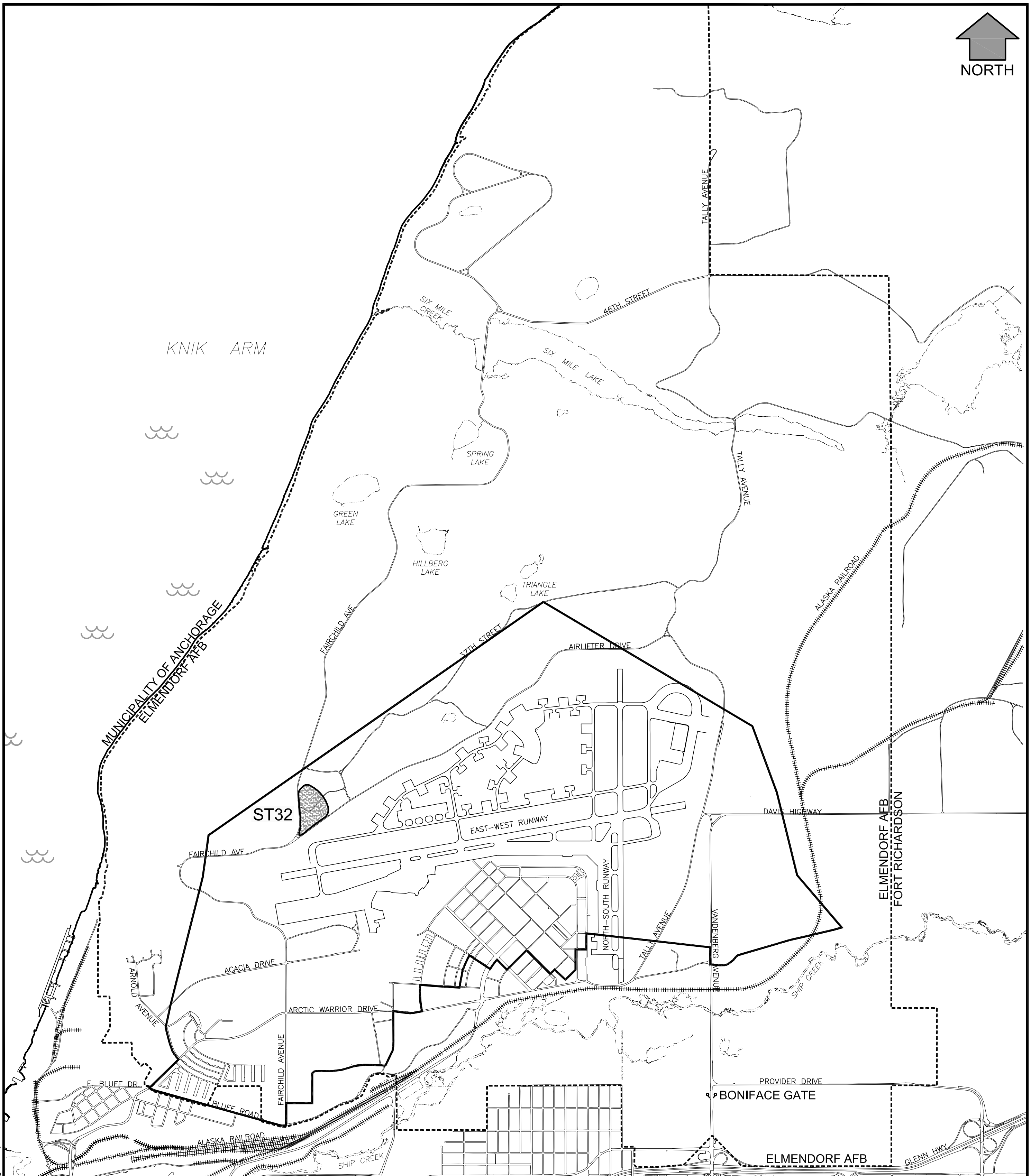
In November 1982, 11 of the 29 USTs failed testing, and as a result all 29 USTs were emptied and taken out of service.

### 1.2.1 Previous Investigations

In 1988, twelve monitoring wells were installed in the areas surrounding the 11 tanks that failed the 1982 inspection and testing. Nine groundwater samples and 16 soil samples were collected and analyzed for the presence of gasoline, diesel and kerosene. No soil contamination was detected during this investigation. Groundwater was found to be contaminated in monitoring wells associated with Tanks 12, 17 and 28.

In 1993, 28 of the 29 USTs were removed. Tank 7 was left in place for confined space entry and other training purposes. During the tank removal six soil samples were collected from pre-selected locations at each tank excavation. The samples were analyzed for gasoline and diesel range organics (DRO), and benzene, toluene, ethylbenzene, and total xylenes (BTEX). Work was conducted under project FXSB 19937008 Preliminary Assessment/Site Investigation State-Elmendorf Environmental Restoration Agreement UST Sites. The results of this work is presented in a Phase II Site Assessment Report dated July 1995 (USAF, July 1995).

In 1995, 10 sentry monitoring wells were installed and sampled from 1995 through 2001 under the Basewide Groundwater Monitoring Program. In 2002 seven of the 10 wells were removed




LEGEND:

---- ELMENDORF AIR FORCE BASE BOUNDARY

0 2000 4000 8000

SCALE IN FEET

# ST32 SITE LOCATION MAP

ELMENDORF AFB, ALASKA

| PROJECT MANAGER: K. McGovern | FILE NAME: Location Map.dwg | DATE: July 28, 04 |
|---|---|---|
| JE — DRAWN BY: AV | LAYOUT TAB: Location Map | FIGURE NO.: 1-1 |
| | FILE LOCATION: Elmendorf \ 05BM1001 | |

G:\Autocad\Elmendorf\05BM1001\Location Map.dwg Sep 15,2004 -BPeratro from the program as they met the Decision Guide criteria listed in the Basewide Monitoring Program. Monitoring wells 59-WL-30, 59-WL-31 and 59-WL-36 will continue to be monitored.

In 1996, a total of six bioventing systems were installed, one each at Tanks 2,4,5,6,7, and 8. These systems are configured to inject air into the subsurface vadose zone through the use of blowers located on the surface. In 1997, approximately 13,900 linear feet of the fuel pipeline leading from the 29 tank sites, and the associated vaults and valve pits were cleaned, excavated and removed.

In September 1998, Tank 7 and associated piping were removed. Laboratory analytical results for the seven primary soil samples collected from the UST excavation were above ADEC Level B cleanup criteria for DRO, gasoline-range organics (GRO), benzene and total xylenes. Work was performed under project FXSB19957110 RD SERA Phase II LUST. Project findings are presented in a report titled UST Decommissioning and Site Assessment-AFID 707, USAF, Elmendorf AFB, Alaska (USAF April 1999).

Closure sampling conducted in 2000 found that continued operation of the bioventing systems was unlikely to reduce contaminant levels below cleanup criteria at tank locations 4,5 and 6. Sample results reportedly suggest that the subsurface soils are non-homogeneous, and that contamination is only present in isolated areas, and rapidly dissipates with distance from these localized areas. Additionally, during the 2000 Bioventing Closure Effort Report two areas along the pipeline at Stations 123+80 and 301+40 were identified as being contaminated above applicable cleanup levels.

## 1.3 ENVIRONMENTAL SETTING

The following discussion presents local conditions such as climate, geology and hydrology.

### 1.3.1 Climate

The climate of Elmendorf AFB is greatly affected by local and regional geographic features. Cook Inlet moderates the climate seasonally, while the four surrounding mountain ranges protect the area from Gulf of Alaska storms and extreme winter temperatures from the northern interior (USFWS 1983).

The temperature and precipitation data summarized here for Elmendorf AFB was collected from 1951 through 1997 (USAF 2001). The average summer temperatures range from 41 to 64 degrees Fahrenheit (°F) and winter temperatures range between 6 and 44°F. The average annual precipitation on Elmendorf AFB is 16.15 inches, with a range of 13 to 20 inches. The majority of the precipitation falls from July through September when the wind is from the southwest. Annual snowfall averages 77 inches (USFWS 1983).

### 1.3.2 Topography

Site ST32 is located on the Elmendorf end moraine, which is characterized by a gently arcing ridge or series of ridge segments deposited at the end (or terminus) of a glacier.

### 1.3.3 Geology and Soils

From north to south, Elmendorf AFB can be geologically divided into three areas: the Elmendorf ground moraine, the Elmendorf end moraine, and the outwash plain (Figure 1-2).

Site ST32 is located on the Elmendorf end moraine. Surficial soils are typically ice-marginal sediments deposited along the termini of glaciers. End moraines are composed of juxtaposed sequences of deposits from polygenic origins, primarily course gravel, fine well-sorted sand, dense silt and clay and diamictons (poorly sorted admixtures of silt, sand and gravel). (USGS 1976).

### 1.3.4 Hydrogeology

The Elmendorf terminal (end) moraine traverses Elmendorf AFB northeast to southwest (Figure 1-2). A groundwater divide closely matches the crest of the Elmendorf terminal moraine. ST32 is located within the terminal moraine and groundwater in this area generally flows to the South, toward the City of Anchorage (USAF 1999a).

Two aquifers have been identified in the ST32 investigation area: a shallow unconfined system and a deep confined system. The Bootlegger Cove clay forms an aquatard separating the shallow and deep aquifers. The presence of the shallow aquifer is based on lithologic data collected from borings and test pits, as well as water-level data collected from shallow

SOURCE:

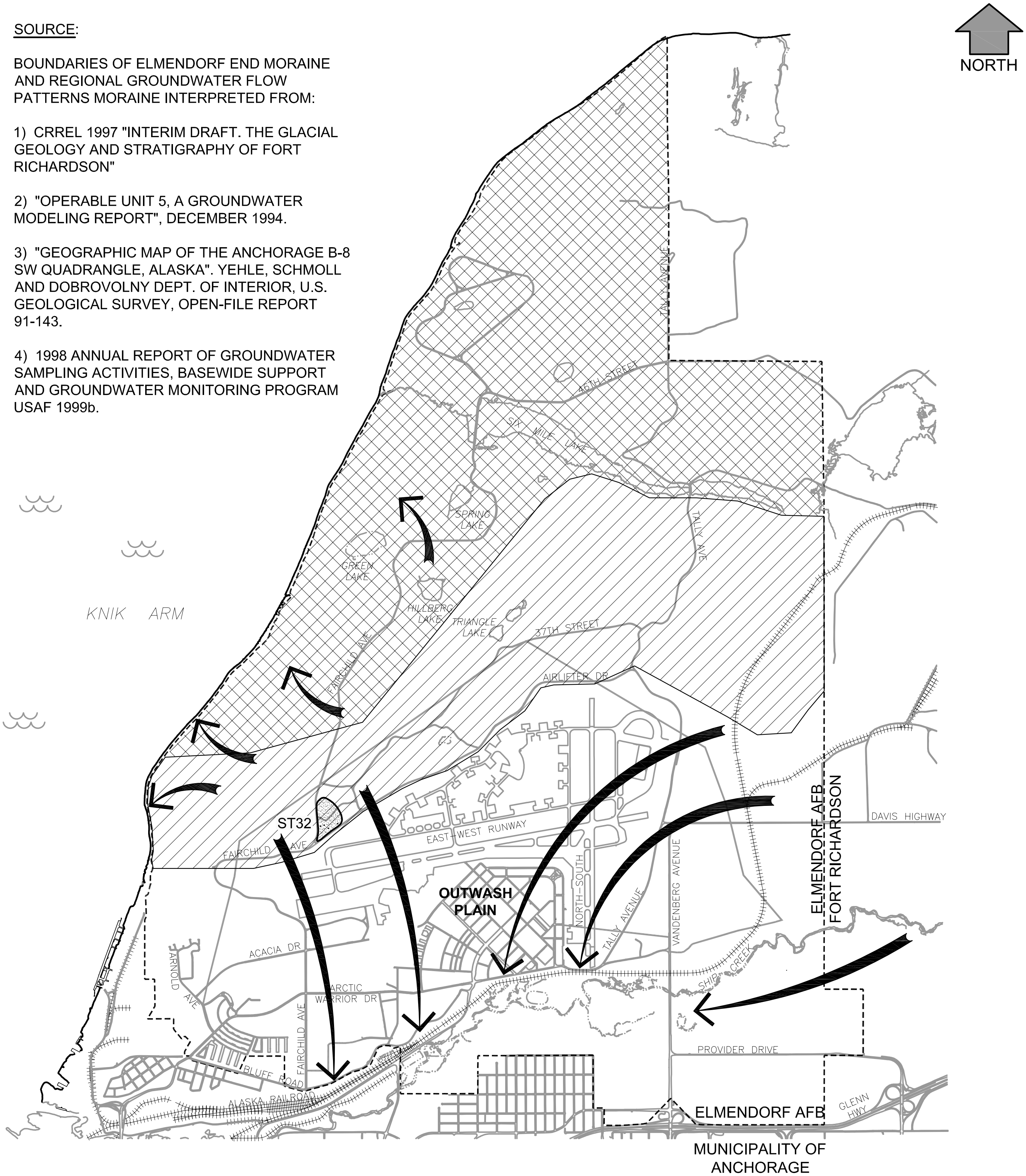
BOUNDARIES OF ELMENDORF END MORAINE AND REGIONAL GROUNDWATER FLOW PATTERNS MORAINE INTERPRETED FROM:

1) CRREL 1997 "INTERIM DRAFT. THE GLACIAL GEOLOGY AND STRATIGRAPHY OF FORT RICHARDSON"

2) "OPERABLE UNIT 5, A GROUNDWATER MODELING REPORT", DECEMBER 1994.

3) "GEOGRAPHIC MAP OF THE ANCHORAGE B-8 SW QUADRANGLE, ALASKA". YEHLE, SCHMOLL AND DOBROVOLNY DEPT. OF INTERIOR, U.S. GEOLOGICAL SURVEY, OPEN-FILE REPORT 91-143.

4) 1998 ANNUAL REPORT OF GROUNDWATER SAMPLING ACTIVITIES, BASEWIDE SUPPORT AND GROUNDWATER MONITORING PROGRAM USAF 1999b.




## LEGEND:

ELMENDORF GROUND MORAINE

APPROXIMATE LOCATION OF ELMENDORF END MORAINE

ELMENDORF AIR FORCE BASE BOUNDARY

GENERAL GROUNDWATER FLOW DIRECTION

0 2500 5000 10000

SCALE IN FEET

# REGIONAL GROUNDWATER FLOW PATTERNS

ELMENDORF AFB, ALASKA

| PROJECT MANAGER: | | FILE NAME: | DATE: |
|---|---|---|---|
| K. McGovern | | Groundwater Flow.dwg | July 28, 04 |
| | | LAYOUT TAB: Groundwater Flow | FIGURE NO.: 1-2 |
| JE | DRAWN BY: BJP | FILE LOCATION: Elmendorf \ 05BM1001 | |

G:\Autocad\Elmendorf\05BM1001\Groundwater Flow.dwg Sep 16,2004 -BPeratro groundwater monitoring wells. Groundwater in the shallow, unconfined aquifer beneath Site ST32 occurs in stratified sand and gravel between 8 and 32 feet below ground surface. The groundwater flow direction is northwesternly, toward the Knik Arm of Cook Inlet. Discharge of the unconfined aquifer can be observed along the beach in the form of numerous groundwater seeps that occur at the contract between the glacial till and the underlying Bootlegger Cove clay.

### 1.3.5 Land Use

The current land use designation for Site ST32 is industrial. According to the Elmendorf AFB *Management Action Plan* (USAF 1996), the future projected land use will remain the same. The area north of the site, toward Six Mile Creek, is designated open space and is used for outdoor recreation.

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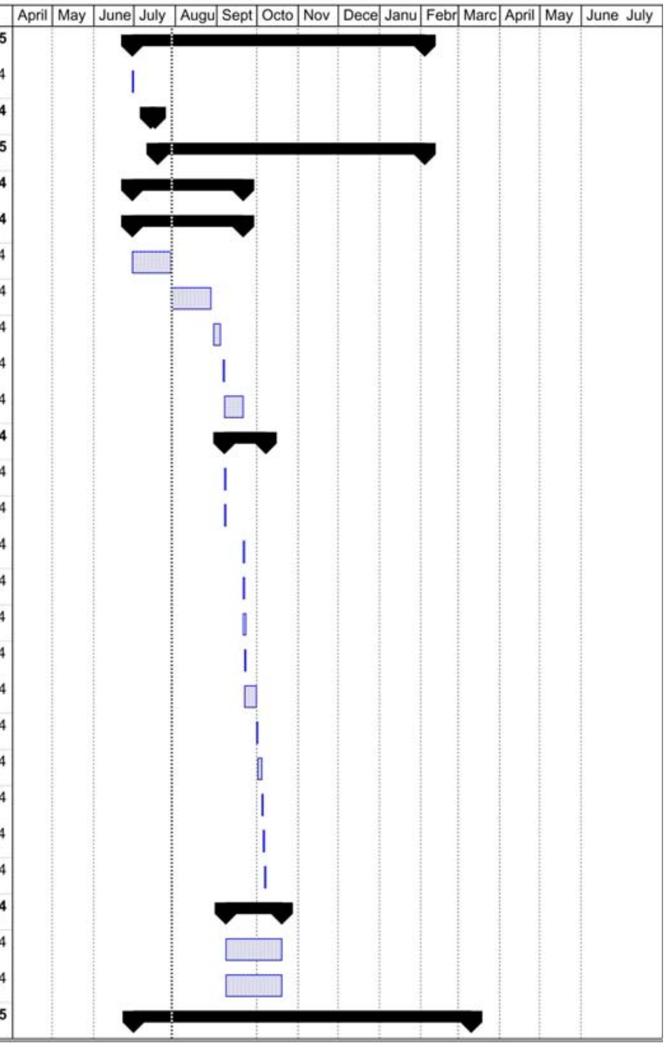
# 2.0 BASELINE SCHEDULE

A baseline project schedule is provided as Figure 2-1. This schedule is subject to change as the project develops.

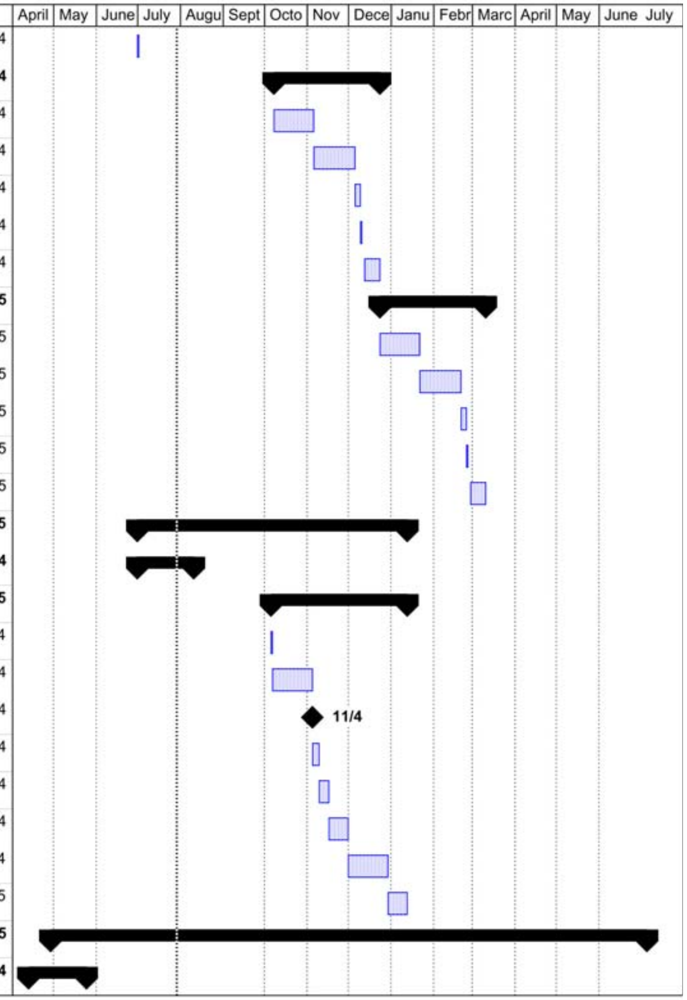
# Figure 2-1: Project Schedule

| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 1 | **1 MEETINGS AND PLANNING** | **157 days** | **Wed 6/30/04** | **Thu 2/3/05** |
| 2 | Post Award/Pre-Performance Meeting | 1 day | Wed 6/30/04 | Wed 6/30/04 |
| 3 | **Technical/regulatory meetings/teleconference** | **3 days** | **Wed 7/14/04** | **Fri 7/16/04** |
| 7 | **Project Progress and Status Meeting** | **144 days** | **Mon 7/19/04** | **Thu 2/3/05** |
| 11 | **2 QUALITY PROGRAM PLANS** | **59 days** | **Wed 6/30/04** | **Mon 9/20/04** |
| 12 | **Workplan** | **59 days** | **Wed 6/30/04** | **Mon 9/20/04** |
| 13 | Draft | 21 days | Wed 6/30/04 | Wed 7/28/04 |
| 14 | Client Review | 30 days | Thu 7/29/04 | Fri 8/27/04 |
| 15 | Respond to Comments | 5 days | Mon 8/30/04 | Fri 9/3/04 |
| 16 | Comment Response Meeting | 1 day | Mon 9/6/04 | Mon 9/6/04 |
| 17 | Finalize report | 10 days | Tue 9/7/04 | Mon 9/20/04 |
| 18 | **3 FIELD ACTIVITIES** | **23 days** | **Tue 9/7/04** | **Thu 10/7/04** |
| 19 | Badging | 1 day | Tue 9/7/04 | Tue 9/7/04 |
| 20 | Permits | 1 day | Tue 9/7/04 | Tue 9/7/04 |
| 21 | GPS survey/swing-tie excavation/mark well | 1 day | Tue 9/21/04 | Tue 9/21/04 |
| 22 | lock-out/tagout of biovent system | 1 day | Tue 9/21/04 | Tue 9/21/04 |
| 23 | Decommission monitoring well | 2 days | Tue 9/21/04 | Wed 9/22/04 |
| 24 | Biovent system removal | 1 day | Wed 9/22/04 | Wed 9/22/04 |
| 25 | Excavations | 8 days | Wed 9/22/04 | Thu 9/30/04 |
| 26 | Data generation | 1 day | Fri 10/1/04 | Fri 10/1/04 |
| 27 | Follow-up Excavations | 2 days | Sat 10/2/04 | Mon 10/4/04 |
| 28 | Data generation | 1 day | Tue 10/5/04 | Tue 10/5/04 |
| 29 | Backfill and compaction | 1 day | Wed 10/6/04 | Wed 10/6/04 |
| 30 | Grading and seeding | 1 day | Thu 10/7/04 | Thu 10/7/04 |
| 31 | **Report Submitals as Necessary** | **30 days** | **Wed 9/8/04** | **Tue 10/19/04** |
| 32 | Notification requirements(UXO, etc) | 30 days | Wed 9/8/04 | Tue 10/19/04 |
| 33 | OSHA submittals | 30 days | Wed 9/8/04 | Tue 10/19/04 |
| 34 | **4 TECHNICAL REPORTS** | **181 days** | **Thu 7/1/04** | **Thu 3/10/05** |



## Figure 2-1: Project Schedule (continued)

| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 35 | Misc Tech Reports | 1 day | Thu 7/1/04 | Thu 7/1/04 |
| 36 | **Field Report** | **55 days** | **Fri 10/8/04** | **Thu 12/23/04** |
| 37 | Draft | 21 days | Fri 10/8/04 | Fri 11/5/04 |
| 38 | Client Review | 30 days | Sat 11/6/04 | Sun 12/5/04 |
| 39 | Respond to Comments | 4 days | Mon 12/6/04 | Thu 12/9/04 |
| 40 | Comment Response Meeting | 1 day | Fri 12/10/04 | Fri 12/10/04 |
| 41 | Finalize report | 9 days | Mon 12/13/04 | Thu 12/23/04 |
| 42 | **Closure Report** | **55 days** | **Fri 12/24/04** | **Thu 3/10/05** |
| 43 | Draft | 21 days | Fri 12/24/04 | Fri 1/21/05 |
| 44 | Client Review | 30 days | Sat 1/22/05 | Sun 2/20/05 |
| 45 | Respond to Comments | 4 days | Mon 2/21/05 | Thu 2/24/05 |
| 46 | Comment Response Meeting | 1 day | Fri 2/25/05 | Fri 2/25/05 |
| 47 | Finalize report | 9 days | Mon 2/28/05 | Thu 3/10/05 |
| 48 | **5 DATA MANAGEMENT** | **140 days** | **Thu 7/1/04** | **Wed 1/12/05** |
| 49 | **Performance Sample** | **29 days** | **Thu 7/1/04** | **Tue 8/10/04** |
| 54 | **Project Data** | **71 days** | **Wed 10/6/04** | **Wed 1/12/05** |
| 55 | Last Sample to lab | 1 day | Wed 10/6/04 | Wed 10/6/04 |
| 56 | Lab Analysis | 21 days | Thu 10/7/04 | Thu 11/4/04 |
| 57 | Receive analytical data | 0 days | Thu 11/4/04 | Thu 11/4/04 |
| 58 | Completeness check | 3 days | Fri 11/5/04 | Tue 11/9/04 |
| 59 | Data review | 5 days | Wed 11/10/04 | Tue 11/16/04 |
| 60 | Draft ERPIMS development | 10 days | Wed 11/17/04 | Tue 11/30/04 |
| 61 | Client review | 21 days | Wed 12/1/04 | Wed 12/29/04 |
| 62 | Final ERPIMS | 10 days | Thu 12/30/04 | Wed 1/12/05 |
| 63 | **6 TASK ORDER MANAGEMENT** | **309 days** | **Thu 4/29/04** | **Tue 7/5/05** |
| 72 | **7 PROPOSAL PREPARATION** | **30 days** | **Tue 4/13/04** | **Mon 5/24/04** |



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# 3.0 CLEANUP LEVELS

Soil cleanup levels have been established in the Decision Document for Site ST32. The cleanup levels correspond to Method 1, Category D for GRO and DRO, and Method 2, Table B1, less than 40” annual precipitation zone. These target cleanup levels are presented in Table 3-1.

**Table 3-1**
**ST32 Site Cleanup Levels[1]**

| Analyte | Cleanup Levels (mg/kg) |
|---|---|
| Benzene | 0.02 |
| Toluene | 5.4 |
| Ethylbenzene | 5.5 |
| Total Xylenes | 78 |
| GRO | 1,000 |
| DRO | 2,000 |

Notes:
[1] ADEC cleanup levels per 18 AAC 75 (2003).
mg/kg = milligrams per kilogram
For additional definitions, see acronyms and abbreviations list.

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# 4.0 DETAILED FIELD INVESTIGATION APPROACH

Eight areas at site ST32 are scheduled for soil excavation and treatment during the 2004 field season. Prior to field activities, an initial site assessment was performed at each area to establish estimated boundaries of contaminated soil. Initial boundaries were determined by reviewing task order specific documents specified in Section 2.3 of the statement of work. The extent of the excavations will be determined in the field using a combination of photoionization detector (PID), visual and olfactory observation and laboratory results. In addition to the excavations, a bioventing system will be removed.

Prior to excavation, the bioventing system at Tanks 4,5 and 6 will be removed. It is assumed that, other than vertical structures (i.e. monitoring wells, well points, injection probes and production probes), all equipment to be removed will not require excavation. Therefore, the bioventing system will be decommissioned via appropriate lock out/tag out procedures (Attachment D2 of the HSP) electrically disconnecting the system, and removing all above ground structures (piping, blower and blower shed) and below ground injection wells, monitoring points, product probes, or vertically installed structures pertaining to the bioventing system. Wells at all of the former tank sites will be decommissioned with the exception of well 59-WL-30 (at Tank 5).

Excavated soil will either be placed directly into a dump truck or stockpiled for shipment to the thermal treatment facility.

If overburden appears to be contaminant free, it will be screened using a PID; if screening results indicate that the soil is not contaminated it will be left onsite pending analytical results. If analytical results indicate the soil is below site cleanup limits, it will be used as backfill. If results are above site cleanup limits, the soil will be shipped offsite to the thermal treatment facility. The POL-contaminated soil will be treated by low temperature thermal de-sorption. Pending laboratory analysis, the excavations will be backfilled with clean soils and the site restored. Restoration activities may include excavation, fill, backfill, hauling, grading, compaction, contouring, topsoil replacement, and seeding.

## 4.1 GENERAL SITE ACTIVITIES

### 4.1.1 UXO Awareness Training

The potential exists at site ST32 for the presence of unexploded ordnance (UXO). USAF has provided a UXO safety training disk to be used by Jacobs Engineering Group Inc. (Jacobs) and subcontractor field personnel to assist them with recognition of UXO and chemical warfare materials. UXO is not anticipated to be present at the site; however, any UXO discovered during field activities shall be reported immediately to the Base Point of Contact and Contracting Officer Representative. Elmendorf Explosive Ordnance Disposal (EOD) will respond to inspect and remove suspicious items if necessary. EOD response will be expedited to prevent delays in fieldwork. Work shall not recommence until the Contracting Officer authorizes clearance.

### 4.1.2 Utility Locates

The estimated location of any overhead or underground utility installations shall be determined prior to the commencement of any excavation activities via Elmendorf AFB's Base Civil Engineer Work Clearance Request. Utility clearances shall be signed off by Elmendorf AFB personnel. All intrusive work shall comply with HSP requirements and procedures.

## 4.2 AREA DESCRIPTIONS

**This section presents brief descriptions of the ST32 area scheduled for work under this scope.**

Figures 4-1, 4-2 and 4-3 depict the site layout and features of Tanks 4, 5 and 6. Figures 4-4 and 4-5 indicate the approximate locations of 123+80 and 301+40 pipelines.

Table 4-1 specifies the estimated cubic yards of POL-contaminated soil to be removed from each of the 8 excavations, from 5 sites. The total volume to be treated is estimated at 280 cubic yards. A density of 1.7 tons/cubic yard is assumed. Excavation confirmation samples will be collected and analyzed for GRO, DRO/residual-range organics, and BTEX. These samples should be collected at each site at the bottom of the excavation and the sidewalls, two bottom samples and one sample per side. Specific soil excavation and sampling field procedures are provided in the SAP.

**Table 4-1**
**2004 Field Activities by Area**

| Area | Estimated Amount of Soil to be Treated (cy) | Depth Interval Exceeding Cleanup Levels (ft bgs) |
|---|---|---|
| **Tank 4** | | |
| 59BH94 | 15cy | 12-14 |
| 59BH96 | 30cy | 14-18 |
| **Tank 5** | | |
| 59BH98 | 20cy | 20-22 |
| 59BH99 | 30cy | 14-20 |
| **Tank 6** | | |
| BH101 | 20cy | 14-16 |
| BH102 | 50cy | 12-18 |
| **Pipeline Location** | | |
| 123+80 | 80cy | 8-13 |
| **Pipeline Location** | | |
| 301+40 | 35cy | 8-13 |

Notes:
Groundwater surface is estimated to be encountered at a depth of 17 feet bgs at the ST32 site.
bgs = below ground surface
cy = cubic yards
ft = feet
For additional definitions, see acronyms and abbreviations list.

## 4.3 FIELD SCREENING

It is anticipated that the same procedures with be utilized at each of the eight excavation sites identified in Table 4-1.Visual observation and PID screening will be used to determine the limits of each excavation. PID field screening will be performed in accordance with the FSP Section 2.1. The final perimeter of each excavation and approximate sample locations will be surveyed using a global positioning system (GPS) unit and tied to local control points such as monitoring wells.

## 4.4 BIOVENTING SYSTEM REMOVAL

Prior to removal of the bioventing system, the electrical panel associated with this system will be disconnected by a civil subcontractor via the Lockout and Tagout procedure identified in Attachment D2 of the HSP. Subsurface structures to be removed are:

- nine soil implants,
- injection well BV-04-01 at Tank 4
- three monitoring wells at Tanks 4, 5 and 6 (wells 59-WL-19, T40503, and 59-WL-17)

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NOTES

1. WELL 59-WL-19 IS NOT PART OF THE BASEWIDE ENVIRONMENTAL MONITORING PROGRAM.
2. GROUNDWATER IS 16.75 FEET BGS.
3. RESULTS ARE IN mg/kg UNLESS OTHERWISE NOTED.

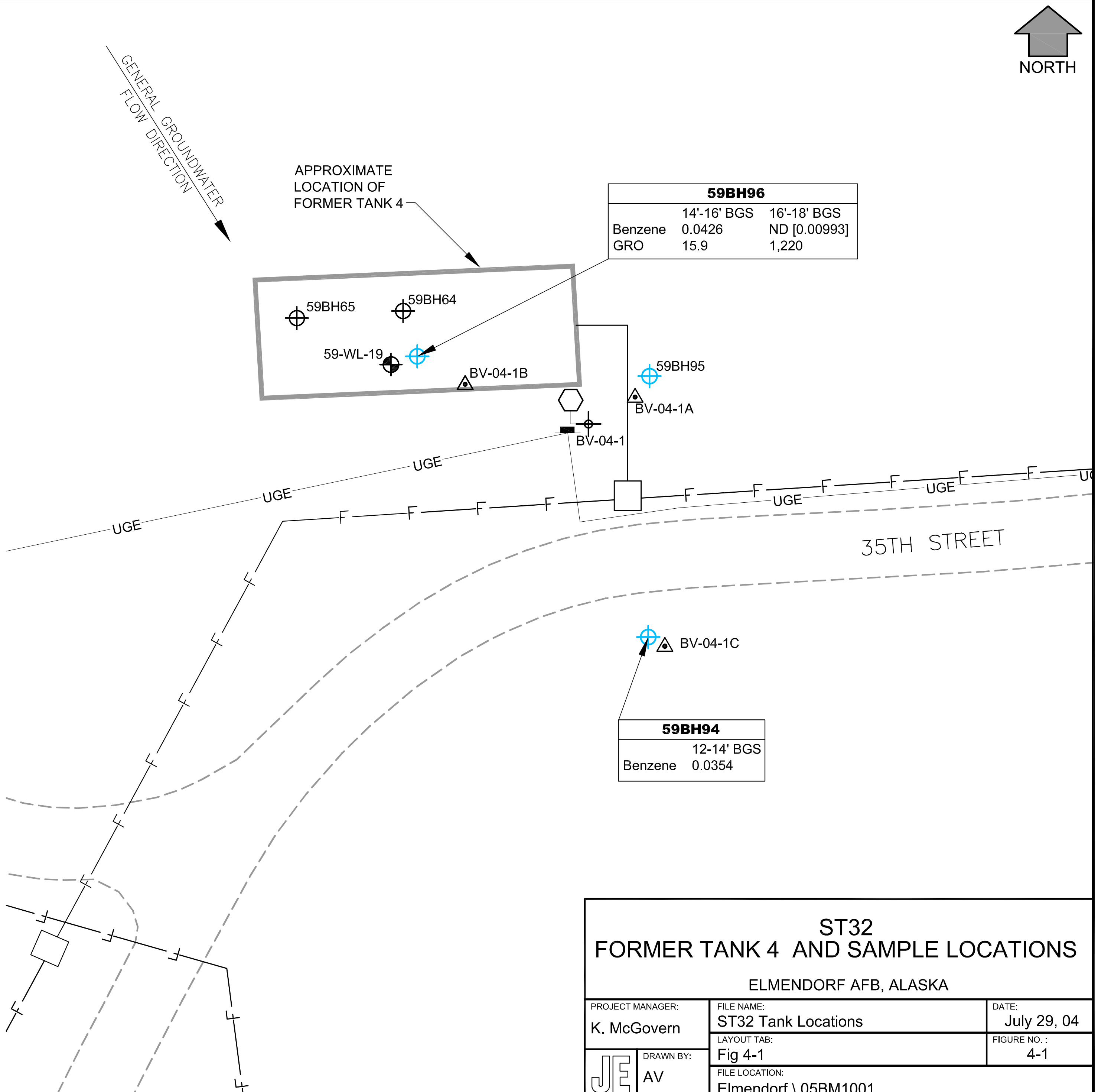
ABBREVIATIONS \ ACRONYMS

| | |
|---|---|
| BGS | BELOW GROUND SURFACE |
| GRO | GASOLINE-RANGE-ORGANICS |
| mg/kg | MILLIGRAMS PER KILOGRAMS |
| ND | NOT DETECTED. REPORTING LIMITS ARE NOTED IN BRACKETS |

LEGEND

2000 SOIL BORING
SERA PHASE II SOIL BORING
SERA PHASE II MONITORING WELL
INJECTION WELL
EXISTING SOIL IMPLANT AND LOCATION OF SERA PHASE II SOIL BORING
BLOWER ASSEMBLY
BIOVENTING CONTROL PANEL
GRAVEL ROADWAY
FUEL LINE
UGE UNDERGROUND ELECTRIC LINE

0 15 30 60
SCALE IN FEET




| 59BH96 | | |
|---|---|---|
| | 14'-16' BGS | 16'-18' BGS |
| Benzene | 0.0426 | ND [0.00993] |
| GRO | 15.9 | 1,220 |

| 59BH94 | |
|---|---|
| | 12-14' BGS |
| Benzene | 0.0354 |

ST32
FORMER TANK 4 AND SAMPLE LOCATIONS

ELMENDORF AFB, ALASKA

| | | |
|---|---|---|
| PROJECT MANAGER: K. McGovern | FILE NAME: ST32 Tank Locations | DATE: July 29, 04 |
| | LAYOUT TAB: Fig 4-1 | FIGURE NO.: 4-1 |
| JE DRAWN BY: AV | FILE LOCATION: Elmendorf \ 05BM1001 | |

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NOTES

1. WELL T40503 IS NOT PART OF THE BASEWIDE ENVIRONMENTAL MONITORING PROGRAM.
2. WELL 59-WL-30 IS PART OF THE BASEWIDE MONITORING PROGRAM AND WILL NOT BE DECOMMISIONED.
3. GROUNDWATER IS 31-35 FEET BGS.
4. RESULTS ARE IN mg/kg UNLESS OTHERWISE NOTED.

ABBREVIATIONS \ ACRONYMS

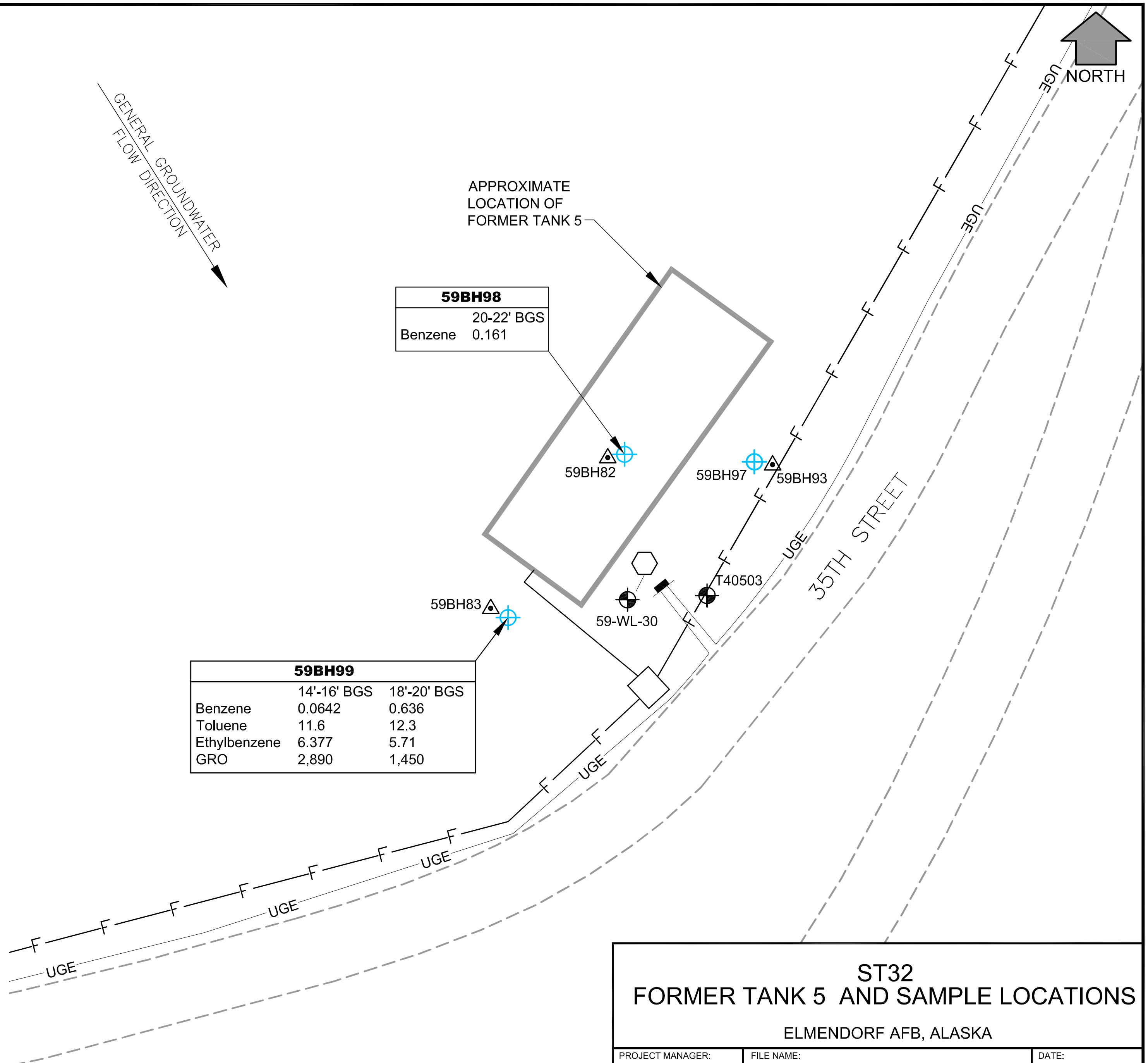
BGS BELOW GROUND SURFACE
GRO GASOLINE-RANGE-ORGANICS
mg/kg MILLIGRAMS PER KILOGRAMS

LEGEND

2000 SOIL BORING
SERA PHASE II MONITORING WELL
EXISTING SOIL IMPLANT AND LOCATION OF SERA PHASE II SOIL BORING
BLOWER ASSEMBLY
BIOVENTING CONTROL PANEL
GRAVEL ROADWAY
FUEL LINE
UNDERGROUND ELECTRIC LINE

0 15 30 60

SCALE IN FEET




| 59BH98 | |
|---|---|
| | 20-22' BGS |
| Benzene | 0.161 |

| 59BH99 | | |
|---|---|---|
| | 14'-16' BGS | 18'-20' BGS |
| Benzene | 0.0642 | 0.636 |
| Toluene | 11.6 | 12.3 |
| Ethylbenzene | 6.377 | 5.71 |
| GRO | 2,890 | 1,450 |

# ST32
# FORMER TANK 5 AND SAMPLE LOCATIONS

ELMENDORF AFB, ALASKA

| PROJECT MANAGER: | FILE NAME: | DATE: |
|---|---|---|
| K. McGovern | ST32 Tank Locations | July 29, 04 |
| DRAWN BY: AV | LAYOUT TAB: Fig 4-2 | FIGURE NO.: 4-2 |
| | FILE LOCATION: Elmendorf \ 05BM1001 | |

NOTES

1. WELL 59-WL-17 IS NOT A PART OF THE BASEWIDE ENVIRONMENTAL MONITORING PROGRAM.
2. WELL 59-WL-17 USED AS AN INJECTION WELL.
3. GROUNDWATER IS 19 FEET BGS.
4. RESULTS ARE IN mg/kg UNLESS OTHERWISE NOTED.

ABBREVIATIONS \ ACRONYMS

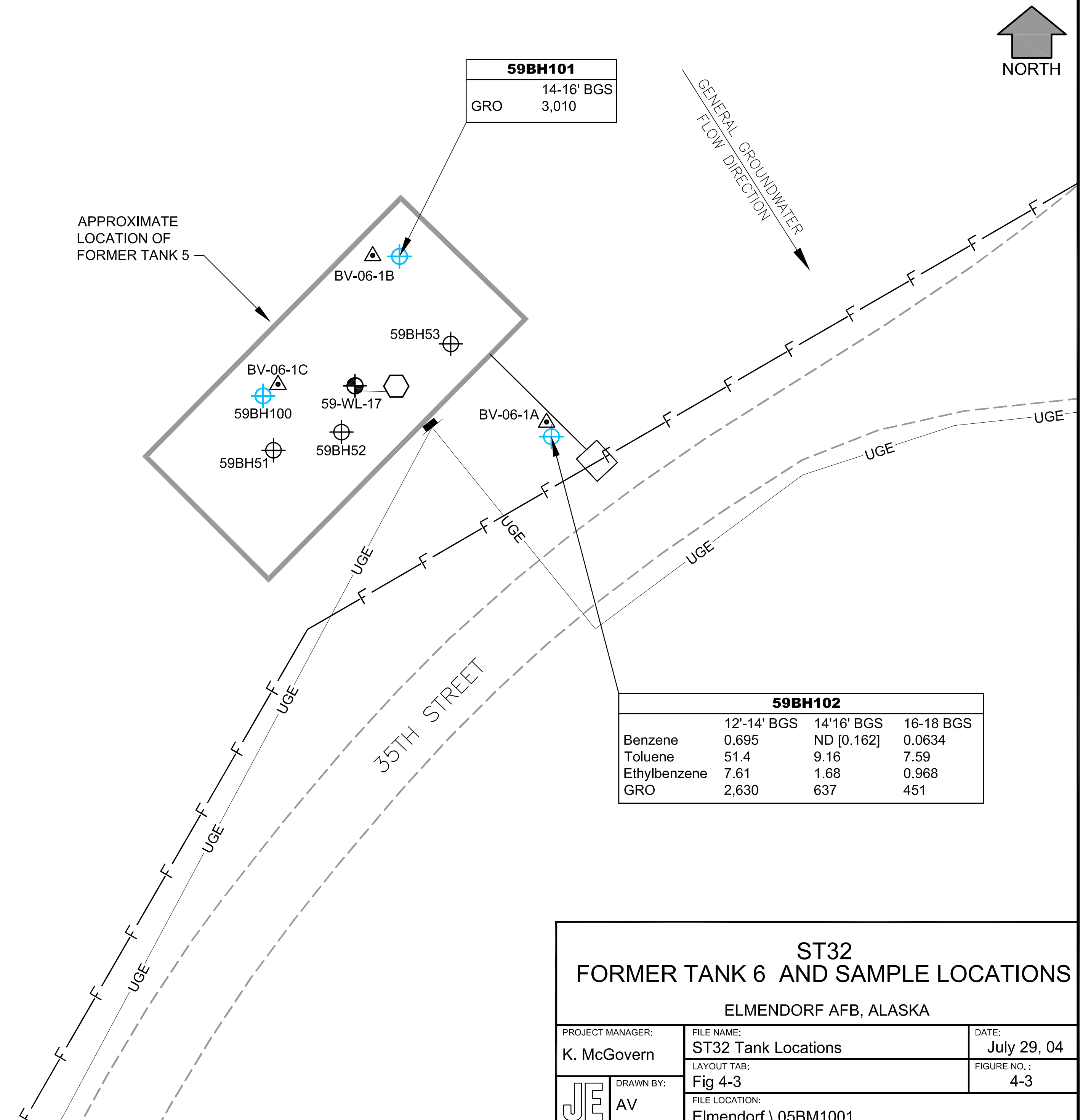
| | |
|---|---|
| BGS | BELOW GROUND SURFACE |
| GRO | GASOLINE-RANGE-ORGANICS |
| mg/kg | MILLIGRAMS PER KILOGRAMS |
| ND | NOT DETECTED. REPORTING LIMITS SHOWN IN BRACKETS |

LEGEND

- 2000 SOIL BORING
- SERA PHASE II SOIL BORING
- SERA PHASE II MONITORING WELL
- INJECTION WELL
- EXISTING SOIL IMPLANT AND LOCATION OF SERA PHASE II SOIL BORING
- BLOWER ASSEMBLY
- BIOVENTING CONTROL PANEL
- GRAVEL ROADWAY
- FUEL LINE
- UNDERGROUND ELECTRIC LINE

0 15 30 60

SCALE IN FEET




| 59BH101 | |
|---|---|
| | 14-16' BGS |
| GRO | 3,010 |

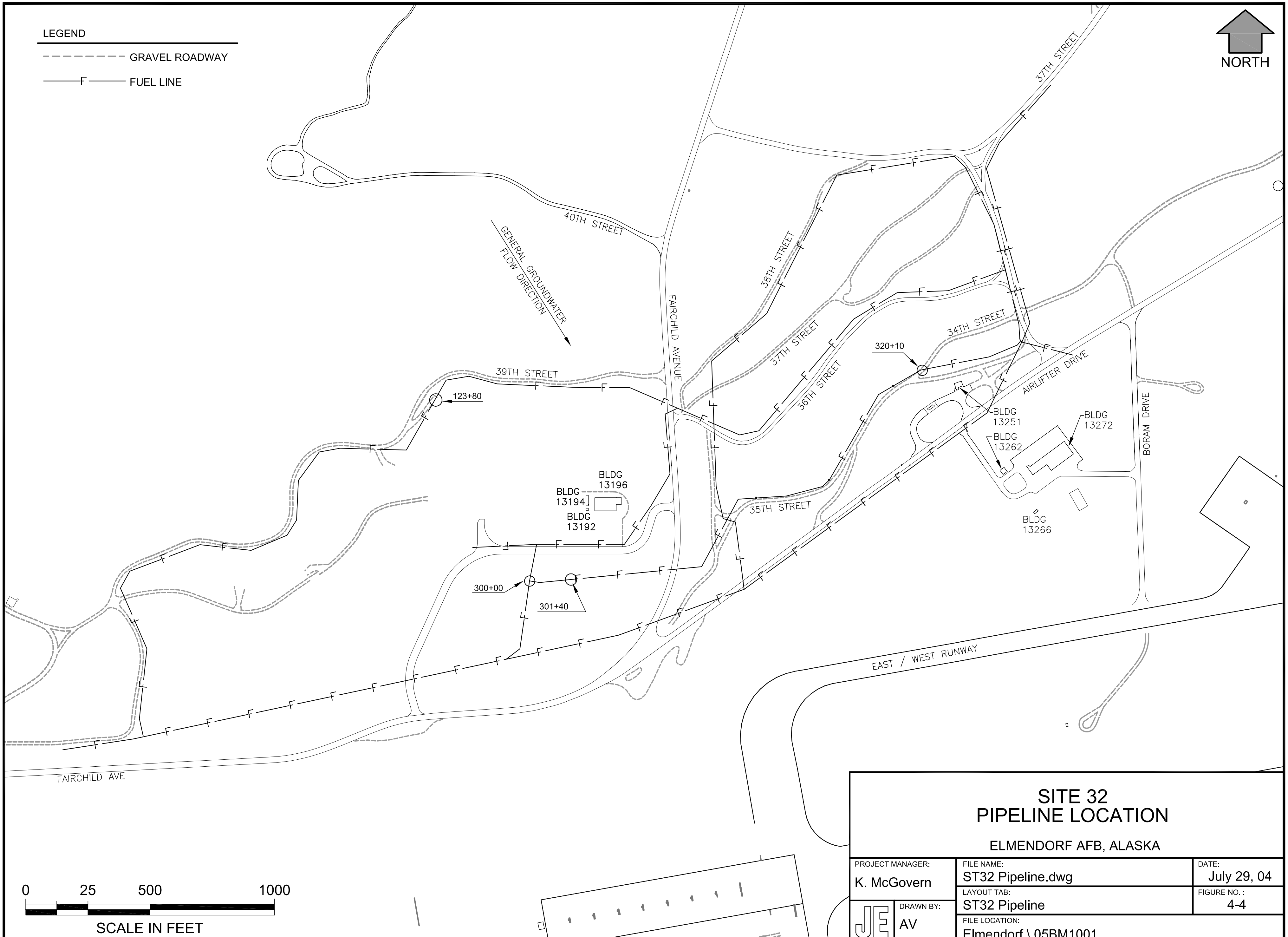
| 59BH102 | | | |
|---|---|---|---|
| | 12'-14' BGS | 14'16' BGS | 16-18 BGS |
| Benzene | 0.695 | ND [0.162] | 0.0634 |
| Toluene | 51.4 | 9.16 | 7.59 |
| Ethylbenzene | 7.61 | 1.68 | 0.968 |
| GRO | 2,630 | 637 | 451 |

ST32
FORMER TANK 6 AND SAMPLE LOCATIONS

ELMENDORF AFB, ALASKA

| PROJECT MANAGER: K. McGovern | FILE NAME: ST32 Tank Locations | DATE: July 29, 04 |
|---|---|---|
| JE / DRAWN BY: AV | LAYOUT TAB: Fig 4-3 | FIGURE NO.: 4-3 |
| | FILE LOCATION: Elmendorf \ 05BM1001 | |

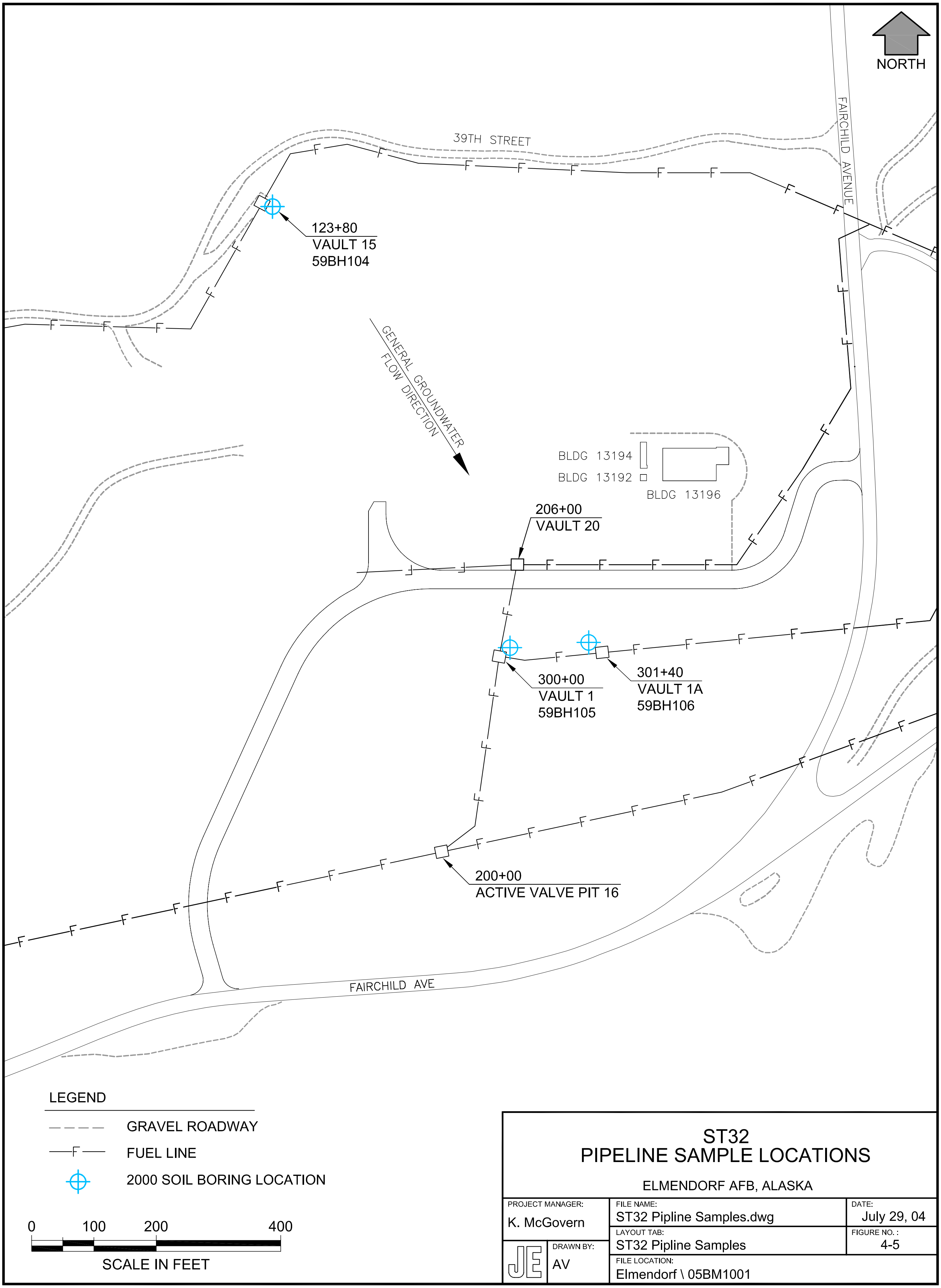
G:\Autocad\Elmendorf\05BM1001\ST32 Pipeline.dwg Sep 15,2004 -BPeratro




# SITE 32
# PIPELINE LOCATION

ELMENDORF AFB, ALASKA

| PROJECT MANAGER: | FILE NAME: | DATE: |
|---|---|---|
| K. McGovern | ST32 Pipeline.dwg | July 29, 04 |
| JE / DRAWN BY: AV | LAYOUT TAB: ST32 Pipeline | FIGURE NO.: 4-4 |
| | FILE LOCATION: Elmendorf \ 05BM1001 | |




G:\Autocad\Elmendorf\05BM1001\ST32 Pipeline Samples.dwg Sep 15,2004 -BPeratro

It is assumed that, other than surface accessible vertical structures, equipment removal will not require excavation.

Well decommissioning will be conducted in accordance with ADEC Recommended Practices for Monitoring Well Design, Installation and Decommissioning and American National Standards Institute/American Water Works Association Standard A100-97, Appendix H. Decommissioning methods may be a combination of perforating the casing and removing the casing to within 5 feet below the surface to the surface, or removing the entire casing. The borehole will be filled with bentonite or grout as the casing is being withdrawn using either method.

## 4.5 EXCAVATION METHODS

A civil contractor will be utilized for all excavations. The contractor will conform to applicable Occupational Safety and Health Administration health and safety requirements

It is not anticipated that personnel will enter an excavation. Samples will be collected from equipment buckets as described in Part I of the QPP, SAP Section 2.3.1. However, if it becomes necessary for personnel to enter an excavation that is greater than or equal to five feet deep, the excavation will be sloped or benched at 1.5 to 1. Means of egress (ladders) will be provided for entry into excavations deeper than four feet.

Prior to completion of work for the day, construction fence will be placed around the perimeter of each excavation to prohibit entry. All material removed from the excavation will be placed a sufficient distance from the excavation edge to prevent caving.

Excavations will be left open until confirmation sample results are received. All contaminated, stockpiled soil will be transported to an approved facility for thermal treatment and disposal. To the extent possible, all contaminated material will be loaded immediately into dump trucks. All loads will be covered during transport. If it is necessary to stockpile soil on site, the soil will be placed on temporary liners. If the soil is not shipped off site prior to the end of the workday, it will be covered with plastic sheeting to prevent infiltration of rainwater.

Any material that is not to be treated, such as clean overburden (based on PID screening), shall be placed on a temporary liner away from the work zone. Overburden that meets site cleanup levels based on laboratory analysis will be used as backfill.

## 4.6 PHOTO DOCUMENTATION

Digital photo documentation to include sites, buildings under investigation and/or construction, field activities and sample locations will be performed. Six digital shots per site will be taken to document excavation activities. Camera use on base will be coordinated through the installation, customer or facility Point of Contact.

## 4.7 SAMPLING

All sampling will be performed by Jacobs personnel according to the procedures in Section 2.0 of the FSP.

## 4.8 DECONTAMINATION, WASTE MANAGEMENT, AND DISPOSAL

All equipment will be decontaminated prior to being removed from the site. Decontamination procedures are outlined in Section 2.6 of the FSP.

Waste Management will be conducted throughout the duration of the project. Waste management while at the project work areas will consist primarily of incidental refuse collection and ensuring that other wastes are properly disposed of or contained. Site trash/refuse will be disposed at the local landfill. All POL-contaminiated soil will be transported to Alaska Soil Recycling for treatment.

## 4.9 DEMOBILIZATION

All equipment will be decontaminated before being removed from the site. When work is completed, all earth-moving equipment will be dry decontaminated.

## 4.10 SITE RESTORATION

All excavated areas within site ST32 will be restored. All temporary facilities installed will be removed. Soil, concrete foundations and reject material from the gravel pit located near the corner of Talley Avenue and the Davis Highway may be used for backfilling the excavations. Pieces of concrete will be placed in layers with soil in between to minimize settling. Soil will be field compacted with the excavator bucket and passed over the site with the excavator.

Compaction testing will not be required. The area will be reseeded, if required, to prevent erosion.

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## 5.0 REPORTING

A Technical Field Report will be submitted weekly during field activities.

Following completion of field work, separate Project Summary and Closure Reports will be submitted. These reports will include a summary of field methods and findings, conclusions and recommendations. In addition, each report will include an Analytical Data Report and a Waste Disposal Report.

An Environmental Resources Program Information Management System deliverable and an Fact Sheet are also scheduled for submittal.

Documentation will be provided verifying the well decommissioning meets ADEC requirements along with GPS coordinates of injection wells and monitoring points removed.

Photo documentation will be included in the project summary. An index will be provided for each set of photographs to include the base, project number, contractor and a brief description. Digital photos will be submitted in JPEG format unless otherwise specified.

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# 6.0 REFERENCES


Alaska Department of Environmental Conservation (ADEC). ADEC. 2002. *Underground Storage Tanks Procedures Manual.*

ADEC. 2003 (January). *Oil and Hazardous Pollution Control Regulations* (18 AAC 75).

USAED-AK (U.S. Army Engineer District-Alaska). 1994 (August). *The Cold War in Alaska: A Management Plan for Cultural Resources, 1994-1999.*

USAF (U.S. Air Force). 2003 (August ). *Decision Document for ST32, Elmendorf AFB, Alaska*

USAF. 2001 (May). *2000 Bioventing Closure Effort Report.*

USAF. 1999a (March). *Preliminary Assessment/Site Investigation Report: Limited Field Investigation.* Environmental Restoration Program.

USAF. 1999b (April) UST Decommissioning and Site Assessment-AFID 707, United States Air Force, Elmendorf Air Force Base, Alaska

USAF. 1995 (July). *SERA Phase II Site Assessment Report*, Final, 2 Volumes.

USGS (U.S. Geological Survey). 1976. "Relative Permeability of Surficial Geologic Materials, Anchorage and Vicinity, Alaska." 1:24,000. Prepared by G.W. Freethey. Folio I-787-F.

USGS 1959. "Surficial Geology of Anchorage and Vicinity, Alaska." U.S. Geological Survey Bulletin 1093. Prepared by R.D. Miller and E. Dobrovolny.

USFWS (U.S. Fish and Wildlife Service, Special Studies). 1983. "Natural Resource Inventory of Elmendorf Air Force Base, Alaska." Prepared by T.C. Roth, S.H. Laninan, P.A. Martin, and G.F. Tande.

U.S. Army Corps of Engineers, April 2000 "Glacial Geology and Stratigraphy of Fort Richardson, Alaska" Prepared by Lewis E. Hunter, Daniel E. Lawson, Susan R. Bigl, Peggy B. Robinson and Joel D. Schlagel

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# UNITED STATES AIR FORCE
# ELMENDORF AIR FORCE BASE, ALASKA

*ENVIRONMENTAL RESTORATION PROGRAM*

## ST32 REMOVAL ACTION WORK PLAN
## APPENDIX A - SAMPLING AND ANALYSIS PLAN PART 1 – FIELD SAMPLING PLAN

**FINAL**

**SEPTEMBER 2004**

## TABLE OF CONTENTS

**SECTION** **PAGE**



## TABLES



## ATTACHMENT

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## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ADEC | Alaska Department of Environmental Conservation |
| AFCEE | Air Force Center for Environmental Excellence |
| CoC | chain-of-custody |
| DRO | diesel-range organics |
| FSP | field sampling plan |
| GRO | gasoline-range organics |
| Jacobs | Jacobs Engineering Group Inc. |
| oz. | ounce |
| PID | photoionization detector |
| ppm | parts per million |
| QA | quality assurance |
| QAPP | quality assurance project plan |
| QC | quality control |
| SAP | sampling and analysis plan |
| STL | Severn Trent Laboratories |
| VOCs | volatile organic compounds |
| °C | degrees Celsius |

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# 1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) is prepared to guide sampling activities at Site ST32 on Elmendorf Air Force Base, Alaska. This SAP is arranged as follows:

- Part I - Field Sampling Plan (FSP);
- Part II - Quality Assurance Project Plan (QAPP)

The basic objectives of the SAP are as follows:

- Establish guidelines for field screening and sampling protocol
- Describe field screening methods
- Describe field sampling methods and sample density or frequency
- Present sample documentation protocol
- Establish laboratory analytical methods, estimate the number of samples and analyses required to meet project objectives, and the frequency of quality assurance/quality control (QA/QC) samples.

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# 2.0 FIELD SAMPLING PLAN

This FSP details the requirements and procedures for all fieldwork at ST32 and describes techniques that will be used to accomplish the scope of work for this project. The methods and procedures detailed in this FSP are consistent with Air Force Center for Environmental Excellence (AFCEE) guidance (AFCEE 1997).

Specific analytical methods for the analyses to be performed are presented in the QAPP contained in Part II of this SAP.

## 2.1 FIELD SCREENING

Field screening will be performed in order to guide the direction and extent of contaminated soil excavation. Field sampling personnel will perform headspace soil sample field screening with a photoionization detector (PID), which will be used to monitor volatile hydrocarbon concentrations in the soil and aid in determining sampling locations. Field screening sample locations will be selected based on field observations and olfactory indicators. The field screening procedure will be performed according to the *Underground Storage Tank Procedures Manual* (ADEC 2002), Section 4.4.2, Head Space Analytical Screening Procedure (November 7, 2002).

Soil without visible free product will be screened using a PID. Soils to be field screened include the following:

- Soils present at the limits of excavation after visible free product has been removed will be screened to guide further excavation and to support site management decisions. At a minimum, one field screening sample will be collected for every 10 cubic yards of excavated soil.
- Potentially clean soils removed to access contaminated soil, such as overburden stripped to access underlying contamination, will be screened to support disposition decisions at a minimum frequency of one per 10 cubic yards of soil.

A summary of the field screening procedure is as follows:

- The field sampling personnel will calibrate (or verify calibration of) the PID at the beginning of each day. The instrument will be calibrated to yield “total organic vapors” in parts per million (ppm) using a 100 ppm isobutylene standard. If significant drift in the instrument is suspected or observed, proper calibration will be reverified. Operation, maintenance, and calibration will be performed in accordance with the manufacturer's specifications. All calibration information will be recorded in a calibration notebook that accompanies the PID.

- The field sampling personnel will fill a plastic resealable bag (approximately 40 percent full) with the soil to be analyzed, ensuring that there is sufficient headspace to allow vapors to accumulate.
- Headspace vapors will be allowed to develop in the bag for at least 10 minutes and no longer than one hour. The bag will then be shaken or agitated for 15 seconds at the beginning and end of the headspace development period to assist volatilization. The temperature of the headspace will be brought to at least 40 degrees Fahrenheit.
- Subsequent to headspace development, the field sampling personnel will insert the instrument probe into the bag to a point about one-half the headspace depth. Following probe insertion, the highest meter reading will be recorded in the field notebook and, as applicable, on the borehole log.
- Erratic meter response may occur at high organic vapor concentrations or conditions of elevated headspace moisture, in which case a note to that effect will accompany headspace data.
- Background concentrations will be established by analyzing no less than three soil samples collected from the same soil type as the (potentially) excavated soils. These samples will be analyzed with the PID following the above protocol. The results will be averaged and the final result documented in the field logbook. This result will become the background concentration. All samples with results above this average will be considered potentially contaminated.

## 2.2 SOIL SAMPLING PROTOCOL

Three types of soil samples will be collected as part of this project.

1. Field screening samples will be collected as needed to guide the direction and extent of excavation.
2. Confirmation samples for laboratory analysis will be collected from the limits of excavation to verify soils above the target cleanup level have been removed. Samples will be collected at a minimum frequency of six samples per excavation, or one per 250 square feet of excavation area. Of the minimum 6 samples, 2 will be collected from the floor of the excavation, and one sample will be collected from each sidewall.
3. Stockpile characterization samples for laboratory analysis will be collected from excavated soils to verify that field screening has been effective in segregating clean soils from contaminated soils. A secondary purpose is to provide characterization data for the contaminated soils to be treated. Samples will be collected and laboratory analyzed at a minimum frequency of two for the first 50 cubic yards stockpiled, and one for every 100 cubic yards thereafter.

## 2.3 SOIL SAMPLING PRACTICES

### 2.3.1 Excavations

Soil sampling from excavations will follow the general procedures below and may include sampling from excavator buckets at varying depths in the excavation to a maximum anticipated depth of 22 feet. Sampling from excavator buckets will include observing safe work practices around moving equipment, such as resting the bucket on the ground and turning off the excavator when a sample is obtained, maintaining line of site with the operator at all times, and observing safe work zones (e.g., avoiding being between the bucket and the excavation). Samples will be collected from the center of the bucket or where the soil appears the least disturbed. Sample collection methods will be as described in Section 2.4.

### 2.3.2 Stockpile Sampling

Excavated soil that field screening indicates is below action levels will be stockpiled on a 10 mil high-density polyethylene liner pending laboratory confirmation. Samples will be collected at a frequency or two for the first 50 cubic yards and one for each additional 100 cubic yards thereafter. Samples will be collected at this specified frequency as soil accumulates in the stockpile. Sample collection methods will be as described in Section 2.4.

## 2.4 SAMPLE COLLECTION METHODS

All sample locations shall be placed on the daily excavation figure as well as logged on the sample summary sheet.

Soil samples submitted for laboratory analysis will be packaged according to the guidelines in the QAPP. Container requirements, preservation requirements, and holding times for the samples to be collected are presented in Table 4-1 of the QAPP.

In general, laboratory confirmation soil sampling will be performed in accordance with the following procedures:

- A minimum of six inches of soil will be removed immediately before samples are collected from a newly exposed area. Samples will be collected using a disposable stainless steel spoon or spatula and placed in the appropriate sample container. Soil samples will be homogenized in a stainless steel bowl if multiple jars are required from one location (including duplicate and triplicate sample sets). Field samplers will not use plastic spoons to collect samples or plastic bags to temporarily store or homogenize samples. Soil samples collected for volatile organic compounds (VOCs) and/or gasoline range organics (GRO) analyses will not be homogenized.

- Soil samples will be collected from areas with the lowest free water content when possible. It is very important when collecting representative samples of the area to minimize collecting any free water. All soil samples will be collected according to volatility (VOCs first, diesel-range organics [DRO]/residual-range organics second, etc.) from a freshly uncovered area. Excess soil will be removed from the lip of the container using a paper towel before sealing the container with a Teflon®-lined lid. All volatile samples will be sealed with a Teflon®-lined septumated lid. The sample collection date, time, and sampler initials will be placed on the prepared label and chain-of-custody (CoC) form. Sample identification requirements are described in Section 2.5.
- Samples collected for AK101 or SW8021B/SW8260B analyses will be first preserved with methanol and placed in a pre-chilled cooler.
- Matrix spike/matrix spike duplicate will be designated on the CoC form at a frequency of one per 20 samples per matrix.
- Duplicate QA samples will be collected at a frequency of one per 10 soil confirmation samples.
- QA samples will not be collected on waste characterization samples or thermally remediated soil samples.
- One methanol trip blank per cooler will be included when shipping methanol-preserved soil samples for analysis.
- The field samplers will change their nitrile gloves after sample collection is completed at each sample location to minimize potential for cross-contamination.

### 2.4.1 Volatile Sample Collection

Volatile sample collection requires a specialized set of procedures as outlined below:

- Verify that the 4-ounce (oz.) container has a septumated lid and is identified as pre-tared.
- Document the tare weight, the name of the laboratory, and the preservative lot number located in the field logbook. The tare weight corresponds to the weight of the container determined by the laboratory before shipment.
- **Do not place a label on the pre-tared containers**. Each container should have a laboratory label. The CoC identification number shall be hand-entered on the existing label. If a container does not have a label, the CoC identification number will be recorded on the sample container lid with a permanent marker.
- Because this is considered a volatile sample, the sample will not be collected from the homogenized fraction collected for semivolatile or metals analysis. This aliquot will be collected directly from the sample location.
- Collect 25 to 40 grams into the pre-tared container to provide adequate volume to represent the site and ensure maximum reporting limits are achievable. This can be

ensured by filling the container one-third full and adding one volume (25 milliters) of methanol. If one volume does not completely cover the sample, additional volumes shall be added until the soil is completely submerged. A minimum one-to-one soil to methanol ratio must be maintained to ensure the lowest possible detection limits. If more than one volume of methanol is added to the sampling container, this information needs to be noted on the CoC and in the field logbook.

- Complete sampling information on the container label.
- Percent moisture can be taken from the same container provided for the analytical suite, with the exception of the methanol-preserved samples. The field sampler will provide an unpreserved sample aliquot for methanol-preserved samples, or designate an associated sample that can be used for moisture determination.
- Trip blanks are required for volatile soil samples, including methanol-preserved SW8021B/SW8260B and/or AK101 samples. One methanol trip blank per cooler containing 20 methanol-preserved samples will be included for analysis.

## 2.5 SAMPLE LABELING, NUMBERING, CHAIN OF CUSTODY, STORAGE, AND TRANSPORTATION

Sampling documentation provides the ability to trace the possession and handling of samples from the time of collection, through analysis and final disposition. This documentation is referred to as CoC. The components of this chain (i.e., sample seals, sample label with a sample number, a field log book, CoC records, and sample analysis request sheets) shall be utilized during field sampling activities. The following paragraphs describe the procedures required for adequate labeling, documentation, and shipping of samples.

### 2.5.1 Sample Labels

Sample labels are necessary to prevent misidentification of samples. Each sample container will have a sample label attached to it. Where necessary, the label will be protected from water and solvents with clear tape. Sample labels will include the following information:

- Project name or number
- Sampling date and time
- Sample number (CoC ID)
- Sampler's initials
- Analyses requested
- Preservatives
- Jar numbers (i.e., 1 of 2, 2 of 2)

### 2.5.2 Field Sample Sheets and Logs

Sample summary logs and daily activity logs will be used to record sampling activities (Attachment 1). Entries in the sample summary logs shall include the following information:

- Name of author, date, and time of entry
- Location of activity
- Names and affiliations of personnel on-site
- Sample collection or measurement methods
- Number of samples collected
- Sample identification numbers
- Sample distribution (laboratory)
- Field observations and comments

### 2.5.3 Sample Numbering

Sample containers will be labeled with preprinted labels that match the CoC records. At the time of sampling, appropriate sample numbers will be recorded in the field logbook. A 20-character alphanumeric sample identification system will be used.

- The first two digits represent the sampling agency (JE).
- The second two digits represent the year (04).
- The next four digits will represent the project identification code (ST32).
- The next three digits represent the area within ST32.
- The next three numbers are sequential numbers representing the sample (001, 002, 003, etc)
- The next four numbers are the depth or the date of the sample at that unique location.
- Finally, two letters will represent the matrix type.

| Collection Agency | Year | Project Identification Code | Area Code | Number | Depth or Date | Matrix Description |
|---|---|---|---|---|---|---|
| **JE** | **04** | **ST32** | **MPA** | **001** | **01 or MM/DD** | **See Key** |

An example would be JE04ST32 T6A001-0715-SO representing the first soil sample collected from Tank 6, excavation A on July 15, 2004.

Sample identification codes have been established as follows:

- T4A – Tank 4, Excavation A
- T4B - Tank 4, Excavation B
- T5A – Tank 5, Excavation A
- T5B - Tank 5, Excavation B
- T6A – Tank 6, Excavation A
- T6B - Tank 6, Excavation B
- 123 - Pipeline Location 123+80
- 301 – Pipeline Location 301+40

Examples of matrix descriptions are as follows:

- WW - Waste Water
- SO - Soil
- SH - Solid Hazardous Waste

### 2.5.4 CoC Records

Once a sample is collected, it will remain in the custody of the field team individual who collected the sample, or a designee, until it is shipped to the designated analytical laboratory. When the sample is transferred, a CoC form will be signed by the person(s) transferring custody of the sample containers. Samples will be placed in a cooler or other appropriate shipping container. A properly completed CoC form for the samples contained in the cooler will be placed in a self-sealing-type bag, which will then be taped to the inside lid of the cooler before sealing the cooler for shipment. A separate CoC form shall be completed for each cooler. If shipped, each cooler will be taped closed on the outside with strapping or duct tape, and sealed with signed-and-dated custody seals placed on opposite sides and diagonally across the corners of the lid. The cooler shall have a unique identification placed on the shipping label and referenced on the CoC form.

### 2.5.5 Sample Packaging and Shipping

All samples collected in the field will be placed into coolers for shipping. One liter poly cubitainers, filled with water and frozen, will be used to maintain the cooler temperature at approximately 4 degrees Celsius (°C) plus or minus 2°C for transport to the designated laboratory. Sample jars designated for shipment to the laboratory will be wrapped in bubble wrap and sealed in a self-sealing plastic bag before being placed in the cooler. A temperature blank (distilled water in a screw-top 500 milliliter plastic bottle labeled “Temp Blank”) will be included in each cooler to measure the approximate temperature of samples upon arrival at the laboratory. The cooler will have approximately 3 inches of inert packing material (vermiculite) in the bottom. After the samples, cubitainers, and temperature blank are packed inside the cooler, the contents will be secured with bubble wrap.

The cooler will be sealed shut with a minimum of three complete wraps of tape at both ends, as well as a tape seal where the cooler lid seals against the cooler body. Cooler drains will be sealed with shipping tape or equivalent.

“This Side Up” labels will be placed on all four sides of the cooler and “Fragile” labels placed on at least two sides. “DO NOT FREEZE, REFRIGERATE” label will be placed on two sides of each cooler.

The laboratory will be informed of cooler shipments via telephone, e-mail and/or facsimile message. The laboratory shall complete a Jacobs Engineering Group Inc. (Jacobs) cooler receipt form when samples are received and shall document all sampling and shipping discrepancies. All cooler receipt forms will be provided to the project chemist within 24 hours of cooler receipt as well. The project chemist will be notified of all discrepancies by the laboratory within 24 hours of receipt as well. A verbal, as well as a written report, shall be provided.

Any cooler shipments containing regulated quantities of methanol will be shipped using the appropriate hazardous materials shipping procedures.

## 2.6 DECONTAMINATION

Disposable sampling and protective equipment will be utilized wherever possible to minimize the need for decontamination. All tools and equipment that may directly or indirectly contact samples will be decontaminated prior to each use. The following procedure shall be used to decontaminate large pieces of equipment such as the excavator and bucket: remove large, easily dislodged deposits of soil and other contaminated medial prior to exiting the site (exclusion zone) using dry methods (brooms, wipes, shovels, etc.).

The following procedure will be used to decontaminate sampling devices such as mixing bowls and trowels:

- Scrub the equipment with a solution of potable water and Alconox, or equivalent.
- Rinse equipment with potable water.
- Rinse with de-ionized water.
- Air dry equipment on a clean surface such as Teflon, stainless steel, or aluminum. If the sampling device will not be used immediately after decontamination, wrap it in aluminum foil.
- Reagent-grade water will be purchased, stored, and dispensed only in glass, stainless steel, or Teflon containers. These containers shall have Teflon caps or cap liners.

Clean, disposable gloves will be worn during and after decontamination to avoid contamination of equipment.

## 2.7 FIELD QA/QC

The following types of field QC procedures will be followed and samples collected during the entire investigation in accordance with frequencies and methods outlined in the QAPP.

- Trip blanks
- Field duplicate samples
- Matrix spikes

Trip blanks will be provided by the laboratory and will accompany the associated sample containers while they are being filled and until they are received back at the laboratory for analysis.

## 2.8 RECORD KEEPING

Field records will be kept on the appropriate field forms with a field logbook tracking daily activities.

The records kept for all activities conducted during the investigation will include the location, date and time, identity of people performing the activity, and weather conditions.

These records will be archived upon completion of the project in an easily accessible form and will be available upon request to Alaska Department of Environmental Conservation (ADEC), AFCEE and the U.S. Air Force.

## 2.9 LABORATORY ANALYTICAL METHODS

Laboratory analytical services will be performed by:

Severn Trent Laboratories (STL)-Sacramento
880 Riverside Parkway
Sacramento, CA 95605
Phone: 916-373-5600
Fax: 916-372-1059

STL has been validated, audited, and approved by AFCEE and Jacobs to perform the analytical services for the ST32 field program. STL maintains current laboratory validation by U.S. Army Corps of Engineers Hazardous, Toxic, and Radioactive Waste Center of Expertise, Missouri River Division. STL also maintains current laboratory validation by State of Alaska to perform ADEC AK101, AK102, and AK103 methodology. Soil samples submitted for laboratory analysis will be analyzed by the following methods:

- GRO – AK Method 101
- DRO – AK Method 102
- Benzene, toluene, ethylbenzene, xylenes – Method SW8021B of SW8260B

Table 2-1 summarizes the anticipated number of samples of each type to be laboratory analyzed, the analytical methods to be employed, and the turnaround time required. Table 2-2 presents the anticipated number of duplicate samples and trip blanks to be laboratory analyzed to provide QC. Table 2-3 presents the sample containers, sample preservation, and holding times for the required analyses.

**Table 2-1**
**Site ST32 Laboratory Analytical Schedule**

| ANALYTE | METHOD | QUANTITY | TURN-AROUND TIME |
|---|---|---|---|
| **Excavation Confirmation Samples** | | | |
| GRO | AK101 | 24 | 3 day |
| DRO | AK102 | 24 | 3 day |
| BTEX | SW8021B | 24 | 3 day |
| GRO | AK101 | 24 | 1 day |
| DRO | AK102 | 24 | 1 day |
| BTEX | SW8021B/SW8260 | 24 | 1 day |
| **Contaminated Soil Stockpile Characterization Samples [1]** | | | |
| GRO | AK101 | 5 | 7 days |
| DRO/RRO | AK102 | 5 | 7 days |
| BTEX | SW8021B/SW8260 | 5 | 7 days |
| **Clean Soil Stockpile Characterization Samples** | | | |
| GRO | AK101 | 10 | 1 days |
| DRO/RRO | AK102 | 10 | 1 days |
| BTEX | SW8021B/SW8260 | 10 | 1 days |

Notes:
[1]Number of samples is based on a quantity of 280 cy of contaminated soil with two samples collected from the first 50 cy and one sample collected from each 100 cy thereafter.
BTEX-benzene, toluene, ethylbenzene, xylenes
For additional definitions, see acronyms and abbreviations list.

**Table 2-2**
**Duplicate Quality Control and Trip Blank Samples**

| Analysis | Method | Duplicate QC Samples[1] | Matrix Spikes/Matrix Spike Duplicates[2] | Trip Blanks[3] |
|---|---|---|---|---|
| GRO | AK101 | 5 | 3 | 6 |
| DRO | AK102 | 5 | 3 | N/A |
| BTEX | SW8021B/SW8260 | 5 | 3 | 6 |

Notes:
[1] A field duplicate will be collected for every ten samples.
[2] Matrix spike/Matrix spike duplicate will be analyzed for every 20 samples.
[3] The number of Trip Blanks is estimated. One blank is needed per cooler.
BTEX = benzene, toluene, ethylbenzene, xylenes
N/A = not applicable
For additional definitions see acronyms and abbreviations list.

**Table 2-3**
**Sample Containers, Sample Preservation, and Holding Times**

| Parameter | Method Analysis | Sample Container Description* | Preservation of Sample | Maximum Holding Time |
|---|---|---|---|---|
| **SOILS** | | | | |
| GRO | AK101 | 4-oz. WM Amber Glass w/TLC | Field/Methanol BFB surrogated MeOH, Cool to 4°C † | 28 days |
| DRO | AK102/AK103 | 8-oz. WM Amber Glass w/TLC | Cool to 4°C | 14 days pre-extraction<br>40 days post-extraction |
| BTEX | SW8021/SW8260B | 4-oz. WM Amber Glass w/TLC | MeOH, Cool to 4°C † | 14 days to analysis |

Notes:

* For Matrix Spike/Matrix Spike Duplicate Samples: Soil samples will require one additional container if project sample is completely full per sample container description. .

† Soil samples being submitted for either GRO or VOC analysis must be accompanied by a separate jar of soil (not extracted with methanol) that can be used to determine percent moisture. If samples being submitted for GRO or VOC analysis are also being submitted for DRO analysis, the percent moisture can be determined from the aliquot for the DRO analysis.

BFB = 4-bromofluorobenzene
BTEX = benzene, toluene, ethylbenzene and xylene
TLC = Teflon-lined cap
WM = wide-mouth container
For additional definitions, see acronyms and abbreviations list.

# 3.0 REFERENCES

ADEC (Alaska Department of Environmental Conservation). 2002 (July) *Oil and Other Hazardous Substances Pollution Control.* 18 AAC 75.

AFCEE. (Air Force Center for Environmental Excellence). 1997 (March). *AFCEE Model FSP, Version 1.1*.

USAF (United States Air Force). 2002 (February). Engineering Evaluation/Cost Analysis SS83. Final . Elmendorf Air Force Base, Alaska. Environmental Restoration Program.

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# ATTACHMENT 1

## Field Forms

Record of Photographs
Sample Tracking Form
Waste Tracking Form
Contractor Cooler Receipt Forms
Chain-of-Custody

## RECORD OF PHOTOGRAPHS

**Project Number**: ______________________________

| | |
|---|---|
| **Camera** ______________________ | **Roll No.** ______________________ |
| **ASA Number** | |

| Photo No. | Date | Time | Photographer | Weather Conditions | Location | Description of Photograph |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
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| 18 | | | | | | |
| 19 | | | | | | |
| 20 | | | | | | |

______________________________
**Signature of Photographer**

## Sample Summary Sheet

| Sample Id. | COC No. | Matrix | Date | Time | Depth | GRO | DRO | BTEX | Other | Container Size | # | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
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POC: Tom Tompkins
(907) 751-3330

**Current as of:**

| Container Number | Type of Waste (if Haz-waste, list codes) | Start Date/O.S.D. Date m/d/yy | Sample/ MSDS and Profile Number | Source and Process | Product Phase Description (Waste stream physical characteristics) | Type of Containers | No. of Containers | Weight Pounds |
|---|---|---|---|---|---|---|---|---|
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## COOLER RECEIPT FORM

***Fax or email (email is preferred) this form and the CoC records to Jacobs Program/Project Chemist within 24 hours of receiving sample.***

**CoC Number** ______________________ **(One receipt form per cooler)**
**Cooler Number/Name on CoC** ______________________
**Laboratory and Location** ______________________________________________
**Lab SDG** ______________________________________________

| | | | |
|---|---|---|---|
| 1. | Were custody seals on outside of cooler? | **YES** | **NO** |
| | If yes, how many and where? ______________________ | | |
| | Were signatures and dates correct? | **YES** | **NO** |
| 2. | Were custody papers taped to lid inside of cooler? | **YES** | **NO** |
| 3. | Were custody papers properly filled out (ink, signed, etc.)? | **YES** | **NO** |
| 4. | Did you sign custody papers in the appropriate place? | **YES** | **NO** |
| 5. | Did you attach shipper's packing slip to this form? | **YES** | **NO** |
| 6. | What kind of packing material was used? ______________________ | | |
| 7. | Was sufficient ice used (if appropriate)? | **YES** | **NO** |
| 8. | Were all bottles sealed in separate plastic bags? | **YES** | **NO** |
| 9. | Did all bottles arrive in good condition? | **YES** | **NO** |
| 10. | Were all bottle labels complete (number, date, signed, analysis, pres., etc.)? | **YES** | **NO** |
| 11. | Did all bottle labels and tags agree with custody papers? | **YES** | **NO** |
| 12. | Were correct bottles used for the tests? | **YES** | **NO** |
| 13. | Were VOA vials checked for absence of air bubbles, and if present noted? | **YES** | **NO** |
| 14. | Was sufficient amount of sample sent in each bottle? | **YES** | **NO** |
| 15. | Temperature blank reading ______________________ | | |
| | Ambient Cooler temperature. ______________________ | | |
| | Identification number of thermometer ______________________ | | |
| 16. | Is temperature within 4+/- 2°C? | **YES** | **NO** |
| 17. | Were labels correctly associated with pre-tared containers? (not placed directly on jars)? | **YES** | **NO** |

***CORRECTIVE ACTION FORM ATTACHED*** ***YES*** ***NO***

***Jacobs Project Chemist contacted? Date/Time*** ______________________

***Attach associated CoC record and Conversation Confirmer forms.***

Explain any discrepancies: ______________________________________________

______________________________________________

______________________________________________

# Chain-of-Custody Report

Collection Organization: Chain-of-Custody: Cooler ID: Admin Number:

Project Number: Laboratory: Bill To: Report To:

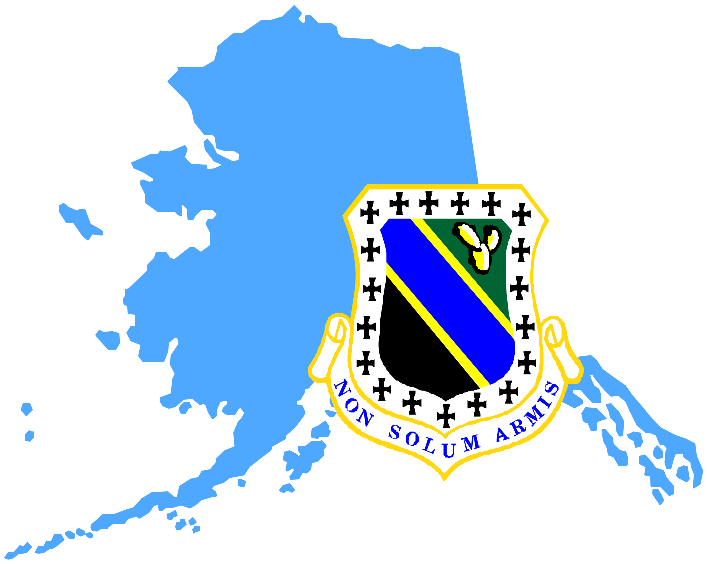
| COC Sample ID | Collection Date | Time | Sampler | Containers Number | Type | Volume | Preservative | Matrix | Analyses Requested Group | QC | TAT | Contents Caution | Dispose or Return Samples | Level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

Comments:

Special Instructions:

Relinquish By:

Received By: / /




# UNITED STATES AIR FORCE
# ELMENDORF AIR FORCE BASE, ALASKA

*ENVIRONMENTAL RESTORATION PROGRAM*

## ST32 REMOVAL ACTION WORK PLAN
## APPENDIX A - SAMPLING AND ANALYSIS PLAN
## PART 2 – QUALITY ASSURANCE PROJECT PLAN

**FINAL**

**SEPTEMBER 2004**

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(continued)

**SECTION** **PAGE**



## TABLES

# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ADEC | Alaska Department of Environmental Conservation |
| AFB | Air Force Base |
| AFCEE | Air Force Center for Environmental Excellence |
| BTEX | Benzene, toluene, ethylbenzene, and total xylenes |
| CLP | contract laboratory program |
| CoC | chain-of-custody |
| COR | Contracting Officer's Representative |
| DAR | Data Assessment Report |
| DQO | data quality objective |
| DRO | diesel-range organics |
| EDD | electronic data deliverables |
| EPA | U.S. Environmental Protection Agency |
| ERP | Environmental Resources Program |
| ERPIMS | Environmental Resources Program Information Management System |
| FSP | Field Sampling Plan |
| GC | gas chromatography |
| GRO | gasoline-range organics |
| Jacobs | Jacobs Engineering Group Inc. |
| LCS | laboratory control sample |
| MB | method blank |
| mL | milliliter |
| MS | matrix spike |
| MSD | matrix spike duplicate |
| PB | preparation blank |
| POL | petroleum, oil, and lubricant |
| QA | quality assurance |
| QC | quality control |
| QAPP | Quality Assurance Project Plan |
| RRO | residual -range organics |
| SAP | Sampling and Analysis Plan |
| SOP | Standard Operating Procedure |
| VOA | volatile organic analysis |
| VOC | volatile organic compounds |

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# 1.0 PROJECT DESCRIPTION

## 1.1 BACKGROUND

This Quality Assurance Project Plan (QAPP) is the second of two parts of the Sampling and Analysis Plan (SAP) for the ST32 Hot Spot Removal Action at Elmendorf Air Force Base (AFB), Alaska.

## 1.2 OBJECTIVE AND SCOPE

This QAPP presents the standard operating procedures (SOPs), quality assurance (QA) procedures, quality control (QC) measures, and measurement objectives of chemical analysis associated with the field sampling program addressed in the Work Plan.

Tasks for achieving the goals of ST32 are as follows:

- Petroleum, oil, and lubricant (POL) contaminated soil removal at eight areas of known contamination.
- Thermal treatment of POL contaminated soil.
- Removal of three bioventing systems.

The purpose of this QAPP is to provide appropriate QA procedures and QC measures to be applied to all activities related to the sampling of soil and groundwater, with particular emphasis on:

- sample collection and preservation,
- sample handling and documentation,
- laboratory analyses,
- data validation and interpretation, and
- data presentation.

The Field Sampling Plan (FSP, Part One of the SAP) details field assessment activities such as field screening. 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.

### 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.

### 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 hot spot removal will be generated as definitive data. Rigorous SW-846 analytical procedures (EPA 1986) and updates to methodology (EPA 1994b, 1996), and Alaska Department of Environmental Conservation (ADEC) methodology (ADEC 2002, 2003) 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 EPA-recognized protocol (EPA 1994a, 1999) will be implemented.

## 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 Quality Assurance Objectives for Measurement Data
- Section 3.0 Calibration Procedures and Frequency
- Section 4.0 Internal Quality Control Checks
- Section 5.0 Procedures Used to Assess Data Quality
- Section 6.0 Corrective Action
- Section 7.0 Quality Assurance Reports to Management
- Section 8.0 References

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# 2.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

This section describes the project-specific requirements that ensure the project and analytical DQOs are met. Chemical data will be of sufficient quality to accurately characterize the ST32 sites. In addition, the data shall comply with ADEC and Jacobs Engineering Group Inc. (Jacobs) requirements, and all project-specific DQOs, as defined in the Work Plan. This section was prepared in accordance with applicable Air Force Center for Environmental Excellence (AFCEE) and EPA guidance (EPA 1997, 1998).

The following chemical analyses will be performed under this project:

Soil is the only media to be sampled during implementation of this project. Analysis methods are defined by EPA SW-846 (EPA 1986, 1994a,b, 1996), and ADEC.

- AK 101, gasoline-range organics (GRO)
- AK 102, diesel-range organics (DRO)
- SW 8021B/8260B

The project DQOs are to confirm that residual POL-contamination has been removed from the former tank or pipeline sites. The analytical DQO parameters and rationales that support the project DQOs are defined in Table 2-1 of this SAP:

**Table 2-1**
**Analytical Data Quality Rationales**

| Parameter | Rationale |
|---|---|
| AK 101, GRO | • Confirmation samples to evaluate POL remediation<br>• Characterization of stockpiled soil for treatment |
| AK 102, DRO | • Confirmation samples to evaluate POL remediation<br>• Characterization of stockpiled soil for treatment |
| SW 8021/8260B, BTEX | • Confirmation samples to evaluate POL remediation<br>• Characterization of stockpiled soil for treatment |

Notes:
BTEX = benzene, toluene, ethylbenzene, and xylenes
For additional definitions, see acronyms and abbreviations list.

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# 3.0 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 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 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.

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 probes, batteries, and electrodes will be kept on site to minimize downtime. Preventive maintenance for field instrumentation will be performed according to manufacturer's instructions and applicable SOPs.

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# 4.0 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 4-1.

## 4.1 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.

### 4.1.1 Field Duplicate Samples

Project data precision to include both field practices and analytical precision, will be assessed by analyzing field duplicate samples.

Duplicates taken in the field and analyzed in the laboratory are used to evaluate both the sample matrix variability and variability in sampling and analytical practices.

Field duplicates will be collected for volatile organic analysis (VOA) (GRO, benzene, toluene, ethylbenzene, and xylenes [BTEX], and volatile organic compound [VOC]) before other analysis parameters to ensure the integrity of the sample and minimize potential loss of volatile compounds. VOA for soil samples (GRO/BTEX) will not be homogenized in the field and will be collected as discreet co-located samples.

Field duplicates for soil samples submitted for non-volatile analysis (e.g., DRO, residual-range organics [RRO], polycyclic aromatic hydrocarbon, polychlorinated biphenyl, and metals) will be homogenized in the field, with two sets of containers filled simultaneously, using the same sampling procedure, and submitted to one laboratory as separate samples. Each QC duplicate sample will receive an independent sample number that will be indistinguishable to the laboratory, and submitted "blind" to the laboratory to mask its identity as a duplicate.

Field duplicates will be collected for one out of every 10 samples (10 percent) for each matrix and parameter to be analyzed for all samples submitted for analysis.

## Table 4-1
## Quality Control Sample Summary

| Analysis | Field QA/QC Samples* | | | Laboratory QC Samples | | | |
|---|---|---|---|---|---|---|---|
| | Equipment Blanks | Trip Blanks | Field Duplicates | Method Blanks | Matrix Spike Samples † | Laboratory Control Samples‡ | Matrix Duplicates |
| Soil | | | | | | | |
| BTEX | N/A | One Methanol Trip Blank per transport | 10 % (1/10) | 5 % (set/20) | 5 % (set/20) | 5 % (set/20) | 5 % (set/20) |
| GRO | | | | | | | |
| DRO/RRO | | N/A | | | | | |

Notes:

* Temperature blanks will be included and accompany every cooler shipment.
† One matrix spike/matrix spike duplicate (MS/MSD) set per batch of 20 samples processed for organic analysis. One spike sample analysis and matrix duplicate per batch of 20 samples processed for metals and general chemistry analysis.
‡ One Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) per batch of 20 samples processed.
For definitions, see acronyms and abbreviations list.

### 4.1.2 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.

### 4.1.3 Trip Blanks

Trip blanks (also referred to as travel blanks), consisting of laboratory distilled water, accompany empty sample containers from the laboratory and are transported to the sampling site to aid demonstration that the containers and samples are not contaminated in transit.

Trip blanks will pertain only to VOA (i.e., VOC, BTEX or GRO) data collection activities and will consist of three 40-milliliters (mL) glass VOA vials prepared by the laboratory and which will accompany project samples. The trip blanks are required to accompany any shipment cooler of VOC samples prepared from a unique site.

One trip blank, representing the specific VOA (i.e., VOC, BTEX or GRO), will be included for every cooler that contains aqueous VOC samples. VOA samples will be packed into a unique cooler to minimize the potential of cross-contamination effects from high-level hydrocarbons samples (DRO/RRO analysis) and minimize the number of trip blank samples submitted.

Soil trip blanks will consist of 25 grams of Ottawa sand and 25 mL of methanol and will be supplied by the laboratory. One soil trip blank, representing the specific VOA (i.e., VOC or GRO), will be included for every cooler that contains soil VOC or GRO samples. One soil trip blank shall be sent with no more than twenty project samples in a given shipment.

### 4.1.4 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 chain-of-custody (CoC) documentation in the cooler and on the cooler receipt form.

## 4.2 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.

### 4.2.1 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 MB will be re-extracted and re-analyzed.

One MB or PB will be prepared every day and/or for each batch of 20 samples processed (5 percent), and will be analyzed for all parameters.

### 4.2.2 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.

Soil samples must be collected in one container so that MS samples can be prepared. Soil MS samples require no extra volume if the containers are completely filled. However, aqueous MS samples must be collected at triple the volume for GRO/VOC, and double the volume for hydrocarbon analysis.

Sample containers will be identified as MS samples on sample labels and chain-of-custody forms. This will allow field observations to initiate MS analysis to evaluate potential matrix interference (i.e., peat or high-organic sample content).

All MS samples are performed in duplicate for organic analysis with the duplicate sample referred to as an 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 (5 percent) submitted per sample matrix (e.g., groundwater, soil).

### 4.2.3 Surrogate Spikes

Surrogate spikes assist in data quality assessments for gas chromatography (GC) analysis. Surrogate spikes will be used to fortify all project samples and MB, laboratory control sample (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 control limits specified in ADEC guidance (2002, 2003) for organic analysis. Corrective actions will be initiated if percent recovery exceeds method-specified and/or laboratory-generated established control limits.

### 4.2.4 Laboratory Control Samples (LCS)

The LCSs are an internal QC check applied by the laboratory. Analytical measurement accuracy and precision will be assessed by preparing and analyzing duplicate LCS. 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.

Duplicate LCS will be prepared and analyzed with every preparatory batch of 20 samples for less.

#### 4.2.5 Spike Sample Analysis

The spike sample analysis is designed to provide information about the effect of the sample matrix on the digestion and measurement methodology for inorganics metals and general chemistry analysis. The spike is added before digestion (i.e., prior to the addition of other reagents; EPA 1986). All target analytes are included in the spiking solution for metals analysis.

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

#### 4.2.6 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.

# 5.0 PROCEDURES USED TO ASSESS DATA QUALITY

## 5.1 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/mass spectroscopy detected compounds are correctly identified, and QC sample results are appropriately summarized and within established control ranges.

## 5.2 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.

## 5.3 DATA REVIEW 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 locations and 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; and
- review of blank contamination and detection capability for the remaining samples.

Jacobs will perform data review procedures on the analytical results for a systematic and independent verification to determine method compliance and assess data quality. Validation will be performed from the laboratory-provided sample result sheets, summary QC sheets, and supplied raw data.

Data review will follow EPA (1994a, 1999) contract laboratory program (CLP) National Functional Guidelines for Data Review. Qualification of the data will follow the EPA guidance for the EPA methods employed, even though technically the CLP-designated methodology will not be specified in the analytical scope of work. Recommendations for qualifications of GRO, DRO, and RRO target analytes by ADEC methodology follow professional judgment.

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. No third party independent data validation is planned for this project.

## 5.4 ELECTRONIC DATA MANAGEMENT SYSTEMS

Data collected from ST32 at Elmendorf AFB will be electronically delivered in the Environmental Resources Program (ERP) Information Management System (ERPIMS) format. ERPTools/PC V.2.2 will be used as a data loading tool for pertinent data elements to include site location, soil boring, lithology, well instillation, and field sampling parameters.

The Project Chemist or designee will be responsible for verification procedures to include a cross-checking of the electronic data deliverables (EDD) with hardcopy analytical results at a frequency of 100 percent. Changes to the EDD will be requested from the laboratory if found during verification procedures.

## 5.5 DATA REPORTING

Data reporting deliverables will include:

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

# 6.0 CORRECTIVE ACTION

Corrective action will be initiated when potential or existing conditions are identified that may adversely impact data quantity or quality. All personnel are trained to recognize and report out-of-control conditions to supervisors. It will be the responsibility of the individual who first recognizes an out-of-control event to initiate corrective action. Corrective action for either field or analytical operations includes: notification to Jacobs project chemist and site manager, response, re-establishment of control, and documentation. Corrective actions will be approved by the appropriate Quality Assurance (QA) personnel (i.e., the site manager and project chemists). The implementation of these corrective actions will be documented, and documentation will be maintained and provided with deliverables. All variances to the Work Plan will be communicated to the Jacobs site manager and project chemists immediately upon identification.

Events that may require corrective action include, but are not limited to, the following: violation of established procedures; violation of established analytical procedures or controls; and unsatisfactory results of performance, system, or project QA audits. Corrective action may include checking calculations or field forms, inspecting instruments for proper setup and calibration, and reanalysis of the control item. The Jacobs project manager, site manager, project chemist, and sampling and laboratory personnel may be involved in the corrective action. The contract administrator will be notified when change impacts subcontract specifications. QA personnel are authorized to stop work until the need for corrective action is assessed.

Immediate corrective action is usually applied to spontaneous, nonrecurring problems. Instrument and equipment malfunctions, and nonconforming field procedures are amenable to this type of action. The individual who suspects nonconformance to previously established criteria or protocol in equipment, instruments, data, or methods will immediately notify his/her supervisor. The supervisor and the appropriate task leader will investigate the extent of the problem and take the necessary corrective steps. If a large quantity of data is affected, the task leader will prepare a memorandum to the project chemist. The Jacobs Project Manager and AFCEE COR will collectively decide how to proceed.

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# 7.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

## 7.1 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.

## 7.2 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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# 8.0 REFERENCES


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

Alaska Department of Environmental Conservation (ADEC). 2002. *Underground Storage Tanks Procedures Manual. Guidance for Remediation of Petroleum-Contaminated Soil and Water and Standard Sampling Procedures*. March.

__________. 2003. Oil and Hazardous Substances Pollution Control Regulations. Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances. 18 AAC 75.

United States Environmental Protection Agency (EPA). 1983. *Methods of Chemical Analysis of Water and Wastes*. EPA-600/4-79-020. March.

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

__________. 1990. *Guidance for Data Usability in Risk Assessment*. Office of Emergency and Remedial Response. EPA/540/R-94/012.

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

__________. 1994a. *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. Office of Emergency and Remedial Response. EPA 540/R-94/013. February.

__________. 1994b. *SW-846 Test Methods for Evaluating Solid Waste*. Final Update II. September.

__________. 1996. *Test Methods for Evaluating Solid Waste.* Final Update III, SW-846. December.

__________. 1999. *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*. Office of Emergency and Remedial Response. EPA 540/R-99/008. October.

United States Naval Energy and Environmental Support Activity (NEESA). 1991. *Data Validation Presentation*. ERCE PACDIV Clean Program, Revision 0. July 1991.

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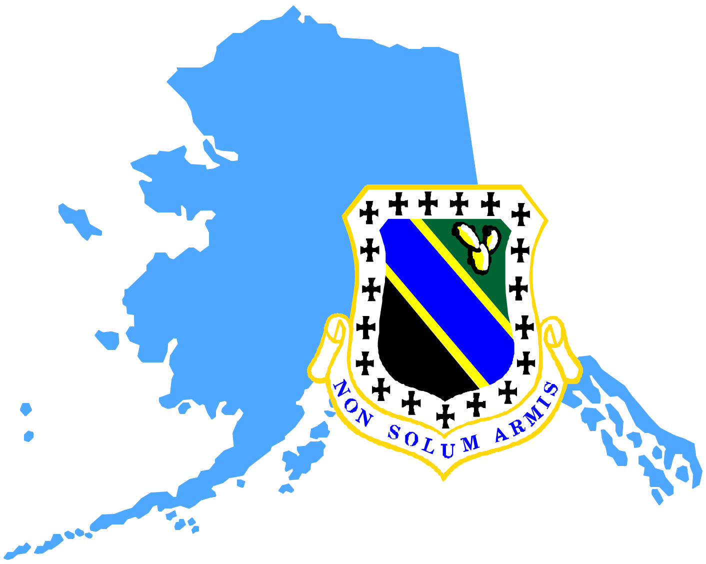


# UNITED STATES AIR FORCE
# ELMENDORF AIR FORCE BASE, ALASKA

*ENVIRONMENTAL RESTORATION PROGRAM*

## ST32 REMOVAL ACTION WORK PLAN
## APPENDIX B - HEALTH AND SAFETY PLAN

**FINAL**

**SEPTEMBER 2004**

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## TABLES

## ATTACHMENTS

## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ACGIH | American Conference of Governmental Industrial Hygienists |
| AFB | Air Force Base |
| AFCEE | Air Force Center for Environmental Excellence |
| bgs | below ground surface |
| BTEX | benzene, toluene, ethylbenzene, and xylene |
| CFR | Code of Federal Regulations |
| COC | contaminant of concern |
| COR | Contracting Officer's Representative |
| DRO | diesel-range organics |
| $^{o}$F | degrees Fahrenheit |
| HSE | health, safety and environment |
| HSEP | health, safety and environment procedure |
| HSM | Health and Safety Manager |
| HSP | Health and Safety Plan |
| Jacobs | Jacobs Engineering Group Inc. |
| LEL | lower explosive limit |
| MSDS | Material Safety Data Sheet |
| NIOSH | National Institute for Occupational Safety and Health |
| OSHA | Occupational Safety and Health Administration |
| PCB | polychlorinated biphenyl |
| PEL | permissible exposure limit |
| PID | photoionization detector |
| PM | Project Manager |
| POL | petroleum, oil and lubricants |
| PPE | personal protective equipment |
| ppm | parts per million |
| RA | removal action |
| RCRA | Resource Conservation and Recovery Act |
| SCBA | self-contained breathing apparatus |
| SM | site manager |
| SOR | Safety Observation Report |
| SPA | Safe Plan of Action |
| SSHO | Site Safety and Health Officer |

| | |
|---|---|
| STEL | short-term exposure limit |
| TLV | threshold limit value |
| TWA | time-weighted average |
| USAF | U.S. Air Force |
| UST | underground storage tank |
| UXO | unexploded ordnance |

# 1.0 INTRODUCTION

This Health and Safety Plan (HSP) has been prepared to establish the health and safety procedures required to minimize any potential risk to personnel while conducting fieldwork activities for the U.S. Air Force (USAF) during the ST32 Removal Action (RA) as described in the Work Plan (USAF 2004). The investigation is being performed for the Air Force Center for Environmental Excellence (AFCEE) under Contract No. FA8903-04-D-8673-0002, Task Order 0002 at Site ST32 on Elmendorf Air Force Base (AFB), Alaska. This field effort is being conducted as a follow-up to the 2003 Decision Document, which requires excavation and treatment of soil from eight petroleum, oil, and lubricant (POL)-contaminated areas, and removal of a bioventing system.

This HSP directly applies to Jacobs Engineering Group Inc. (Jacobs) personnel and subcontractors who will be potentially exposed to safety and/or health hazards related to the work. Subcontractors also must comply with all applicable Federal 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 based upon current knowledge of the specific chemical and physical hazards known or anticipated for the operations that will be conducted during this project.

This HSP has been written to comply with the requirements of the Jacobs Health and Safety Policy 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. These include the OSHA General Industry Standards in 29 Code of Federal Regulations (CFR) 1910.120 and the OSHA Construction Industry Standards in 29 CFR 1926. Personnel covered by this HSP who cannot or will not comply with these requirements will be excluded from site activities.

Personnel working on this site must sign the "sign-off" sheet provided as Attachment B-1. Subcontractors must submit a "sign-off" sheet from their own, equally stringent HSP or, if choosing to follow this HSP, they must also sign this form. Any changes to this HSP must be recorded on the Approval of Modifications form (Attachment B-2) and approved by the Health and Safety Manager (HSM); changes must also be coordinated through the AFCEE Contracting Officer Representative (COR).

# 2.0 SCOPE OF WORK

## 2.1 SITES COVERED BY THIS HSP

The overall scope of work covered by this HSP includes the fieldwork methods to complete the RA activities at Site ST32 on Elmendorf AFB, including excavation, removal of bioventing system, soil sampling, and thermal treatment of contaminated soil.

## 2.2 SUMMARY OF ANTICIPATED FIELDWORK

Specific field activities included under this HSP are:

- Pre-mobilization coordination, obtain base permits necessary for intrusive work, unexploded ordnance (UXO) recognition training, subcontractor pre-mobilization coordination and meetings
- Mobilization and site setup
- Removal of Bioventing System
- POL contaminated soil excavation
- Confirmation soil sample collection
- Thermal treatment of POL-contaminated soil
- Backfilling
- Equipment and personnel decontamination
- Handling and disposal of investigation-derived waste

Twenty-nine 50,000-gallon underground storage tanks (USTs) were originally buried over this site. The USTs were interconnected by a pipeline and delivered fuel to the flight line by gravity flow.

Based on previous site investigations, it is assumed that soil is contaminated with POL only and is not regulated by the Resource Conservation and Recovery Act (RCRA) or Toxic Substances Control Act. Ordnance is not anticipated at this site. Confirmation soil samples may be collected from the ST32 area for analysis of the following constituents:

- AK101, gasoline-range organics
- AK102, diesel-range organics (DRO)
- AK103, residual-range organics
- SW8260B, Benzene, toluene, ethylbenzene, and xylene (BTEX)

Refer to the Work Plan for further information.

## 2.3 PROJECT HEALTH AND SAFETY RESPONSIBILITIES

The following sections describe roles and responsibilities for Jacobs and Subcontractor personnel and site visitors.

### 2.3.1 Jacobs Personnel

The following paragraphs describe the roles and responsibilities of Jacobs personnel.

#### 2.3.1.1 Project Manager

The Project Manager (PM) has, by designation, the primary responsibility to ensure the overall health and safety of personnel associated with this project. The PM, therefore, has the primary responsibility to ensure 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:

- Ensuring that on-site personnel have read and understand this HSP and have completed the sign-off sheet
- Ensuring that a Safe Plan of Action (SPA) 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 this HSP and all identified 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 to field personnel
- Ensuring that all subcontractor personnel submit documentation demonstrating employee participation in a medical monitoring program and training program
- Ensuring that any changes to this HSP are recorded on an Approval of Modifications form (Attachment B2) and approved by the HSM
- Maintaining a high level of health and safety consciousness among employees at the work site
- Maintaining regular communication with the HSM

#### 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 HSM duties include:

- Advising the PM and SSHO 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 evaluate site conditions regularly 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 the HSP and to assure compliance with it as well as this HSP
- Monitoring where required and where deemed necessary to determine the adequacy of protective measures and PPE specified by this HSP
- Coordinating 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
- Conducting accident/incident investigations and preparing accident/incident investigation reports
- Conducting briefings, when necessary, to apprise personnel of the contents of this HSP and the known site hazards

#### 2.3.1.3 Site Safety and Health Officer

The SSHO must enforce the requirements of this HSP once on-site fieldwork begins. The SSHO has the authority to immediately correct all situations where noncompliance is noted and to stop work immediately in cases where an immediate danger is perceived. Specific SSHO responsibilities include:

- Ensuring that an SPA is completed, communicated, and adhered to 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 are in good working order

- Monitoring workers' exposure to hazardous substances/chemicals and activities as deemed necessary to determine appropriate engineering and administrative personnel protective 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. Specific field personnel responsibilities include:

- Obtaining a copy of this HSP and reading it in its entirety prior to the start of on-site work
- Bringing any questions or concerns regarding the HSP's content to the PM or HSM prior to the start of fieldwork
- Following the SPA requirement and assisting in identifying activities and hazards not addressed on the SPA
- Reporting all accidents and incidents to the PM
- Complying with requests made by the SSHO while on site

### 2.3.2 Subcontractor Personnel

Subcontractors shall implement and follow this plan and will perform the following specific duties:

- Follow the requirements set forth in this plan.
- Attend Supervising for Safety Training at Jacobs prior to site mobilization.
- Attend site-specific orientation.
- Agree to abide by this HSP by signing the sign-off sheet (Attachment B1), before working on-site. This sign-off sheet will be retained by the SSHO.
- Provide SSHO Material Safety Data Sheet (MSDS) copies for hazardous chemicals brought on site.
- Provide SSHO copies of required training certifications and medial authorizations to work on site, including those required by 29 CFR 1910.120 and 29 CFR 1926.65.
- Develop activity hazard analyses/SPA that address specific hazards associated with tasks to be performed for each phase of work (e.g., locations of overhead utility lines, traffic patterns), including developing and providing specific work procedures to Jacobs for review of potential hazards.

- Ensure workers are trained in safe and proper use of all tools they may use.
- Appoint an on-site Competent Safety Representative for each job site.
- Provide all necessary PPE to employees and ensure its proper use.
- Maintain all necessary records and submit required reports.
- Conduct daily safety briefings.
- Obtain all work permits as required.
- Conduct safety inspections and report discrepancies using the Safety Observation Report (SOR) form (Attachment B4), and promptly correct unsafe conditions.
- Conduct regular inspections of equipment. Defective or unsafe equipment must be red-tagged and immediately taken out of service or repaired.
- Provide inspection documentation and corrective actions to SSHO on a weekly basis.
- Provide other subcontract information and subcontractor safety performance requirements, as required.

The site manager (SM) will inform the subcontracting foreman or leader of any safety and health violations. The SSHO or SM can cease subcontractor work under eminently dangerous conditions, and resume work when the unsafe condition is corrected. Repeated violations could cause termination of the subcontract.

### 2.3.3 Site Visitors

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

In some instances, visitors (client or agency personnel) may require access to restricted site zones. If a visitor has a justified need for site access, 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 the 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, and the respirator type must match the specifications detailed in this HSP.

If a workable, safe arrangement cannot be agreed upon, or if the activities of the visitor jeopardize on-site activities, 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 are delineated in Section 2.2 of this document, along with the potential materials of concern.

SPAs shall be used for any task that could reasonably present a risk of injury, illness, or environmental damage. Specifically, they should be used before proceeding with any field or shop task. SPAs are also a valuable tool for office environments. The SPA will define activities being performed and identify work sequences, specific hazards anticipated, and control measures used to eliminate or reduce each hazard to an acceptable level. The ST32 SPA Procedure (Attachment C1) outlines the requirements for preparing and implementing SPAs for the project.

SPAs have been developed for each of the definable features of work, and are presented in Attachment D. These SPAs were prepared in the Anchorage office and will require updating as site conditions change. Each SPA is a living document and shall be inclusive of all work activities. The plan identifies each site and the specific work to be conducted there, along with contaminants of concern (COCs). A list of the project-specific chemical hazards is found in Attachment C2.

## 3.1 MATERIALS OF CONCERN

Table 3-1 summarizes the most common chemical contaminants that can reasonably be expected at ST32. For each COC, the American Conference of Governmental Industrial Hygienists (ACGIH) has published exposure limit guidelines for respiratory protection. These guidelines are listed beside each substance as time-weighted averages (TWAs) and short-term exposure limits (STELs). These values are taken from *Threshold Limit Values (TLVs), and Biological Exposure Indices for 2002*, ACGIH, except where noted.

**Table 3-1**
**Summary of 8-Hour TWAs & 15-Minute STELs for Hazards to Field Personnel**

| Substance | Time Weighted Average (ppmv) | Short-Term Exposure Limit (ppmv) |
|---|---|---|
| **Petroleum Hydrocarbons** | | |
| Gasoline | 300 | 500 |
| Diesel/Jet Fuel | N/A | N/A |
| **Site-Related Volatile Organic Compounds (**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 |
| **Chemicals Brought Onsite by Jacobs** | | |
| 2,4-D | 10 $mg/m^3$ | N/A |
| 2,4,5-T | 10 $mg/m^3$ | N/A |
| Alconox | None | None |
| Methanol | 200 | 250 |
| HazCat® Test Kit | * | * |

Notes:
*Follow manufacturers instructions.
$mg/m^3$ = milligrams per cubic meter
N/A = not applicable
ppmv = parts per million volume
VOC = volatile organic compound
For additional definitions, see acronyms and abbreviations list.

## 3.2 HAZARDS ASSOCIATED WITH THE MATERIALS OF CONCERN

Hazards associated with gasoline, diesel fuel, and BTEX are described below.

### 3.2.1 Hazards Associated with the Contaminants of Concern

#### 3.2.1.1 <u>Gasoline</u>

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 TWA exposure limit for gasoline of 300 parts per million (ppm) and an STEL of 500 ppm.

#### 3.2.1.2 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 diesel vapor concentrations 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 in 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 are 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.

#### 3.2.1.3 Volatile Organic Compounds (Benzene, Toluene, Ethylbenzene and Xylene Compounds)

BTEX, 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. Xylenes 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 on site to verify that benzene is not present at concentrations greater than 0.5 ppm.

The OSHA permissible exposure limit (PEL) for benzene is 0.5 ppm, with an STEL of 2.5 ppm. Its olfactory detection level is 5 ppm. Benzene is very flammable, with a flash point of 12 degrees Fahrenheit ($^{o}$F). 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 xylenes is 100 ppm, with an STEL of 150 ppm. The immediately dangerous to life or health level is 1,000 ppm. Xylenes have a flash point of 81$^{o}$ F.

### 3.2.2 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 fuel oil vapors. However, inhalation of low concentrations of the vapor may cause mucous membrane irritation. Inhalation of high vapor concentrations 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.

### 3.2.3 Hazardous Substances Brought Onsite by Jacobs and Subcontractors

A MSDS must be available for each hazardous substance that Jacobs or subcontractors bring to the site. This includes solutions/chemicals that will be used to decontaminate sampling equipment, calibration gases for monitoring instrumentation, or reagents for field test kits. <u>All containers of hazardous materials must be labeled in accordance with OSHA's Hazard Communication Standard</u>.

Jacobs anticipates using Alconox for personnel decontamination, as well as calibration gasses consisting of isobutylene, carbon dioxide, methane, oxygen, and hydrogen sulfide during fieldwork. Methanol, hexane, and sulfuric acid will be used in sampling and in field test kits. MSDSs for these substances are provided in Attachment C2. Information for substances brought onsite by subcontractors will be provided to Jacobs prior to initial use the substance on site. A copy of these MSDSs will be submitted to the Civil Engineer Squadron/Restoration Program in advance of fieldwork.

### 3.2.4 HazCat Kit

In the event that leaking tanks are discovered containing substances that are not readily identifiable, a HazCat kit will be used to characterize a representative sample of the contents. This kit contains chemicals and reagents, which, if used improperly, have the potential to cause harm; therefore, only properly trained individuals will be authorized to conduct tests. Use of this kit, even by properly trained individuals can still generate potentially harmful vapors. For this reason, testing of samples will be conducted only in a well-ventilated area free from locations where vapors may accumulate.

## 3.3 PHYSICAL HAZARDS

### 3.3.1 Underground and Overhead Utilities/Installations

The estimated location of utility installations, such as communications, sewer, telephone, electric, water lines, and other underground installations that may be encountered, shall be determined prior to excavating via Elmendorf AFB's Base Civil Engineer Work Clearance Request. Elmendorf AFB personnel shall sign off utility clearances. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated in a manner that maintains a minimum clearance of 10 feet. The site shall be established to avoid existing utilities and communication antennas, as well as their respective grounding grids in the area. A copy of the Utility Clearance Form (Health, Safety and Environment Procedure [HSEP] 7.3.3) is provided in Attachment D2.

### 3.3.2 Ordnance and Chemical Warfare Materials

ST32 has been inspected previously for the presence of UXO. While no UXO has been identified yet on site, the potential does exist for UXO to be present at ST32. For this reason, all Jacobs field personnel will receive awareness training concerning UXO and chemical warfare materials. The awareness training will be provided by the USAF, prior to commencement of the project. If UXO or suspected UXO is encountered, all work will stop and the USAF PM, as well as the PM and HSM, will be contacted immediately. The USAF PM will have the explosive ordnance disposal team remove the suspected item from the site prior to commencement of work.

### 3.3.3 Back Safety

Using proper technique 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 all 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.

### 3.3.4 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.

#### 3.3.4.1 Heat Exhaustion

- Symptoms: Usually begins with muscular weakness, dizziness, nausea, and a staggering gait. Vomiting is frequent. The bowels may move involuntarily. The victim appears very pale, his skin is clammy, and he or she may perspire profusely. The pulse is weak and fast; his breathing is shallow. The victim may faint unless he or she lies down. These symptoms may pass without treatment but can also continue, and death may occur.
- First Aid: Immediately move the victim to a shady or cool area with good air circulation and remove all protective outerwear. Call a physician. Treat the victim for shock: make him or her lie down with feet raised 6 to 12 inches. Keep the victim cool and loosen all clothing. If the victim is conscious, offer sips of water. Transport victim to a medical facility as soon as possible.

#### 3.3.4.2 Heat Stroke

- Symptoms: **A MEDICAL EMERGENCY!** Heat stroke is the most serious reaction to heat stress because the body excessively overheats, reaching temperatures as high as 107°F to 110°F. The first symptoms often include head pain; dizziness; nausea; and skin that is dry, red, and hot. Unconsciousness follows quickly and death is imminent if exposure continues.
- First Aid: Call 9-1-1 for medical help. Immediately move the victim to a cool and shady area. Remove all protective outerwear and all personal clothing. Lay the victim on his or her 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. Moisten 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.

### 3.3.5 Excavation and Exploratory Trenching

Physical hazards associated with excavation and exploratory trenching may be the most significant hazards encountered during work to be conducted at this site. An excavation is any manmade cut, cavity or trench, or any depression in an earth surface formed by earth removal.

Trenches will be advanced within the work area in an attempt to identify potentially contaminated debris or drums containing potential contaminants. To accomplish this, trenches will be dug from surface level down to no greater than 17 feet below ground surface (bgs), or when groundwater is encountered (whichever comes first). At no time may any personnel enter these trenches.

The following additional general safety procedures will apply while conducting excavation activities and while working around open excavations.

- Physical barricades such as chain link fence panels or their equivalent must be placed around all unattended excavations.
- No person shall be permitted under loads handled by digging or lifting equipment.
- No person shall remain near a vehicle being loaded. Operators may remain inside the closed cab of the vehicle.
- All excavation work must have the prior approval of the SM, all permits must be obtained, and utilities located prior to start of work.
- At no time may personnel enter an excavation at this site. If a sample needs to be collected from the excavation, the excavator operator will collect a scoop of soil using the excavator

bucket from the desired sample location. The operator will then set the bucket on the ground and lock out the controls prior to the sampler approaching the bucket for sample collection.

- Periodic atmospheric testing shall be conducted to ensure that the work area remains free of all potentially hazardous atmospheres.
- Except in stable rock, excavation below the level or base of footing of any foundation or retaining wall shall not be permitted unless the wall is first underpinned and all other precautions taken to ensure the stability of the adjacent walls and the safety of employees involved in the work.
- All excavations shall be closed or protected before the end of shift.
- Excavations left open will be inspected and the inspection documented using Jacobs' daily trench/excavation inspection form or its equivalent.
- Excavated and other materials shall be kept at least 2 feet from the excavation edge or behind retaining devices sufficient to prevent material or equipment from falling or rolling into the excavation.
- Excavations will not be deeper than 20 feet bgs and sidewalls will not be sloped. No personnel will enter the excavations at any time for any reason.
- A minimum safe distance will be maintained between overhead utilities and operating equipment. A spotter should be used as needed to ensure these safe distances are maintained.

At a minimum, these activities must comply with the health and safety practices specified in 29 CFR 1926 (the OSHA Construction Standards). If a damaged drum of unknown contents is encountered, work in that area will stop pending review and evaluation of the situation.

### 3.3.6 Hazards Associated with Drums

Although not anticipated at ST32, a drum could be uncovered during excavation activities. If a drum of contents not readily identifiable by markings or other characteristics is encountered, the Jacobs PM and HSM will be notified. Upon notification, the Jacobs PM will notify the AFCEE COR and USAF PM.

Opening the drum and characterizing the drum contents requires a higher level of respiratory and skin protection. At a minimum, level B protection will be utilized when handling and opening, and during sampling and characterization of drums having unknown contents.

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

In the event that leaking drums are discovered, they will be removed from the excavation and placed into overpacks. If drums that cannot be placed into overpacks due to their crushed state are removed from the excavation, they will be placed into a lined fish tote, supersack, or other appropriate outer container capable of preventing further release of its contents. The contents of the damaged drum will then be transferred to a new container appropriate for transportation and disposal.

### 3.3.7 Wildlife

Evidence of moose and bears at Site ST32 has been observed. Field personnel should be observant and follow procedures and guidelines in Working Safely Around Wild Animals (HSEP 7.4) Attachment C8.

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## 4.0 HEALTH & SAFETY ENVIRONMENTAL PROCEDURES / SOPS

This HSP is not intended to repeat or duplicate Jacobs Corporate HSEPs, and Safe Operating Procedures. Nor is it intended to duplicate U.S. Army, USAF, or CFR requirements. In the case of conflicting guidelines, the most-stringent requirements shall apply.

Field personnel shall participate in a medical surveillance program. Specifics for the baseline, interim, and periodic physicals can be found in the Medical Monitoring Program for Environmental Project Work (HSEP 4.1) in Attachment C7. Field workers must provide documentation to the SSHO of their participation in the medical program and evidence they are current. Workers with medical limitations, as well as employers of subcontract employees, are responsible for notifying the PM and the SSHO of said limitations so that work tasks can be appropriately assigned. For guidance, the SSHO may contact Jacobs occupational medical consultant for issues such as chemical exposure, necessary medical testing, presence of on-site pesticides, determining baseline cholinesterase levels, etc.

Each worker is responsible for completing a monthly Hazardous Material Exposure and Field Activity Report form (Attachment B-16) and for notifying management if an incident or exposure occurs. The Jacobs Anchorage Safety and Health Office ensures distribution of blank forms to appropriate employees, collects completed forms, and forwards completed forms to corporate health and safety in Denver for review and retention.

Teaming partners and/or subcontractors shall provide the SSHO documentation of their employees' participation in a medical surveillance program, evidence they are current, and any medical restrictions before their employees are sent to a field project.

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# 5.0 AIR MONITORING

## 5.1 GENERAL

Under SSHO supervision, monitoring will be conducted to verify that the field team is using appropriate types and levels of PPE. The type and extent of monitoring conducted will depend upon the site-specific conditions and potentially contaminated debris encountered at the time of sampling. The information contained in this section is provided as background reference to the participants in this project. Under SSHO guidance, air monitoring will be implemented following the guidelines in this section. Section 7.0 of this document provides PPE recommendations for the expected level of substances that field personnel may encounter. Special circumstances--such as encountering drums of unknown contents--will require a PPE upgrade until exposure levels warrant reduction. The HSM, with the assistance of trained field personnel, will identify these conditions and may influence additional PPE measures.

## 5.2 MONITORING GUIDELINES

Previous work activities at Site ST32 have shown that hazardous atmospheres have not been present at the site. Soil and water analytical results from previous investigations indicate the presence of chromium and lead above screening criteria. Arsenic and methylene chloride were also detected, but appear to be due to background concentrations (arsenic) and laboratory contamination (methylene chloride). DRO were also detected in one bluff soil sample during the 2000 investigation; arsenic was detected in two soil samples during the 2003 engineering evaluation/cost analysis (USAF 2002). Additional data on analyses performed and analytical results is provided in the Work Plan.

Although hazardous levels of gases or vapors have not been identified during previous sampling activities, monitoring will be conducted because there is the possibility of unknowns. A photoionization detector (PID) or equivalent instrument equipped with a (minimum) 10.6 electron volt lamp will be used to monitor the breathing zone of workers performing activities associated with all tasks and to monitor levels of contamination in excavated soil. Based on PID monitoring results, a Draeger pump fitted with benzene colorimetric tubes, or equivalent instrument, will also be used to monitor the workers' breathing zone. Monitoring will be conducted for benzene because it is a carcinogen and the TLV and PEL for benzene are more conservative than other volatile organics of concern at ST32. If benzene is detected above allowable limits, passive dosimeters for volatile organics will be used. A four-gas meter that measures the percent of lower explosive limit (LEL), oxygen, hydrogen sulfide, and carbon dioxide also will be used while work is conducted on-site. Air monitoring requirements and action levels are provided in Table 5-1.

The PID will be used to monitor the breathing zone during site activities. When monitoring using a PID, the background level of the area must be established by monitoring outside the exclusion zone and upwind of the site. Action levels are based on detections above background levels. PID action levels, frequency, and PPE requirements are provided in Table 5-1.

To evaluate the presence of benzene at the site, first site characterization data and any previous monitoring should be reviewed. If information is not available to support the absence of benzene a sampling pump and benzene detector tubes will be used to monitor the area. Monitoring should occur periodically throughout excavation activities as site conditions change. If benzene is detected at the site, personnel should stop work, get out of the area, dicuss the situation with the SSHO, review and follow the PPE and the air monitoring guidelines found in Table 5-1. Passive personal dosimeter for benzene will be required to be worn at this time to ensure personnel's exposure is measured and recorded. Exposure samples will be collected from the site worker with the greatest potential for exposure and at a location downwind to document potential contamination migrating offsite. A third blank sample will be submitted to the laboratory for quality control purposes. Results of the monitoring must be communicated to workers formerly within 15 working days of receipt of the results. Table 5-1 provides action levels, frequency, and PPE requirements.

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.

**Table 5-1**
**Project-Specific Air Monitoring Requirements**

| Instrument | Tasks | Action Levels | | Frequency [1] | Calibration [2] |
|---|---|---|---|---|---|
| PID: Minimum 10.6 eV, calibrated with IsoButylene | All Tasks | 0-10 ppm BZ<br>>5-25 ppm BZ<br>10-50 ppm<br>50-100 ppm<br>>25 to 50 ppm BZ<br>>100 ppm BZ<br><br>Note: Detections above background levels. | Level D<br>Level C, use tubes for benzene<br>Level B<br>Stop work; reevaluate | Monitor the breathing zone at the beginning of operations and whenever site conditions change. PPE levels C and B require continuous monitoring. | Daily – pre- and post-use |
| Direct reading instrument: Colorimetric Tubes: Benzene | All Tasks | <5 ppm BZ<br>5 – 50 ppm BZ<br>>50 to 100 ppm BZ<br>>100 ppm BZ | Level D<br>Level C, 15 minute period<br>Level B<br>Stop work; reevaluate | When PID readings indicate need for Level C or when benzene levels exceed PEL, conduct periodic colorimetric measurements to document concentrations and justify PPE levels. Also, passive dosimeters will be used if benzene concentrations exceed the PEL in the breathing zone. | Not required |
| Combustible Gas Meter [3] | All Tasks | ≥10% LEL | Stop work; reevaluate (explosion hazard) | Continuous monitoring of a confined space. Screening during excavating or before performing hot work. | Daily - pre- and post-use |
| Oxygen Meter | Confined Space Entry | <19.5%<br><br>>23.5% | Provide alternate air source (Level B)<br>Explosion hazard, stop work, reevaluate | Screening before entering confined space. | Daily - pre- and post-use |

Notes:
1 Air monitoring shall be documented using field logs or monitoring forms.
2 Calibrations shall be documented in the field logs or calibration logs.
3 Oxygen must be > 15 percent for LEL reading to be accurate.

BZ = Breathing Zone    < = less than
eV = electron volts    > = greater than

For additional definitions, see acronyms and abbreviations list.

There is no method for real-time monitoring of polychlorinated biphenyl or metals contamination. Neither is a volatile air contaminant; however, production of large amounts of potentially contaminated airborne dust could contribute to exposure. Dust levels will be controlled to prevent exposure; however, if control is not possible, respiratory protection should be worn when noticeable or irritating levels of dust are encountered. Activities should be conducted in a manner that keeps personnel upwind of the work area.

Confirmation that action levels are no longer exceeded will countermand PPE 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 USAF PM will be notified.

## 5.3 CALIBRATION AND RECORD KEEPING

The PID will be calibrated with isobutylene each day prior to use and as needed during the day (e.g., if PID drift is noted). All instruments used on site will be calibrated in accordance with the manufacturer's instruction manual. All calibrations will be recorded in the Air Monitoring Record Form (Attachment B-5) for personal monitoring and for other area samples, use the Health and Safety Calibration Log (Attachment B-10). All results will be recorded on the Air Monitoring Record form for personal monitoring (Attachment B-5) or for air sampling, the Exposure Monitoring Log (Attachment B-6). PID readings collected during soil sampling will be recorded in the field logbook.

Copies of field logbook pages containing results from air monitoring conducted (e.g., four-gas meter and PID readings) on site and equipment calibrations will be maintained within the project files. PPE worn on site during sampling and monitoring activities also will be noted in the field logs or monitoring forms.

# 6.0 HAZARD COMMUNICATION PROGRAM

The Hazard Communication Program has been established to inform workers and subcontractors of potential site-specific hazards.

## 6.1 HAZARD COMMUNICATION TRAINING

The SSHO will present Hazard Communication training in accordance with Site ST32 Elmendorf AFB Hazard Communication Program (Attachment C3). Hazard Communication Training will be provided before starting work. This training will be documented using the Hazard Communication and Right to Know Standards form located in the back of the program.

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# 7.0 PERSONAL PROTECTIVE EQUIPMENT

The proper use of PPE is critical to protect workers from immediate and long-term toxic effects resulting from chemical releases. PPE also includes the appropriate foul-weather clothing and other life-safety equipment and devices that are intended to promote worker safety. There are four PPE levels: Level A, Level B, Level C, and Level D. The general respiratory and clothing requirements of each level are described below. The minimum requirements for all site work and information on PPE items are described in Sections 7.1 through 7.4.

## 7.1 LEVELS OF PERSONNEL PROTECTIVE EQUIPMENT

Descriptions of each PPE level follow.

### 7.1.1 Level A

- Positive pressure, full face-piece self-contained breathing apparatus (SCBA) or positive pressure supplied air respirator with escape SCBA, approved by the National Institute for Occupational Safety and Health (NIOSH).
- Totally encapsulating chemical-protective suit.
- Coveralls (optional)
- Long underwear (optional)
- Gloves, outer, chemical-resistant.
- Gloves, inner, chemical-resistant.
- Boots, chemical-resistant, steel toe and shank.
- Hardhat (under suit).

### 7.1.2 Level B

- Positive pressure, full face-piece SCBA or positive pressure-supplied air respirator with escape SCBA, approved by NIOSH.
- Hooded chemical-resistant clothing (overalls and long-sleeved jacket; coveralls; one or two-piece chemical-splash suit; disposable chemical-resistant overalls).
- Coveralls (optional)
- Gloves, outer, chemical-resistant
- Gloves, inner, chemical-resistant
- Boots, chemical-resistant, steel toe and shank

- Boot-covers, outer, chemical-resistant (disposable) (optional)
- Hard hat (under suit)(optional)
- Face shield (optional)

### 7.1.3 Level C

- Full-face or half-mask, air purifying respirators (Mine Safety & Health Administration/NIOSH approved)
- Hooded chemical-resistant clothing (overalls; two-piece chemical-splash suit; disposable chemical-resistant overalls)
- Coveralls (optional)
- Gloves, outer, chemical-resistant
- Gloves, inner, chemical-resistant
- Boots, chemical-resistant, steel toe and shank (optional)
- Boot-covers, outer, chemical-resistant (disposable) (optional)
- Hard hat (optional)
- Escape mask (optional)

### 7.1.4 Level D

When gross contamination is encountered:

- Coveralls
- Chemically resistant clothing (optional)
- Gloves, (chemical resistance is optional)
- Gloves, inner, chemical-resistant (optional)
- Boots, chemical-resistant, steel toe and shank (optional)
- Boot-covers, outer, chemical-resistant (disposable) (optional)
- Hard hat (optional)
- Safety glasses with side shields or chemical splash goggles (optional)
- Escape mask (optional)
- Face shield (optional)
- Hearing protection (optional)

## 7.2 PROTECTIVE CLOTHING AND EQUIPMENT

All workers involved in fieldwork activities are required to protect themselves appropriately from the chemical and physical hazards at the site. All field personnel should wear at a minimum the following PPE:

- Eye protection
- Hearing protection
- Hardhat
- Steel-toed boots
- High-visibility reflective vest

Clothing sufficient to protect workers from skin contact with substances, as well as heat and cold, also may be required as site conditions dictate. Additional PPE may be required depending upon the site conditions. Additional PPE levels deemed necessary will be discussed during the daily safety meetings and will be provided for use before commencing site activities.

### 7.2.1 Hearing Protection

Adequate hearing protection is required in all areas that may expose workers to high levels of noise. These work areas include those around heavy equipment, generators, compressors, and other noise-generating equipment. Hearing protection measures include:

- Engineering controls (when feasible)
- Ear plugs
- Ear muffs

### 7.2.2 Eye Protection

Basic eye protection, such as safety glasses, is required in all work areas. Additional eye protection equipment will be worn as site conditions dictate. Instances that would require an increase in eye protection include work conducted in dusty conditions or when handling substances that may splash. Eye protection includes:

- Safety glasses with side shields--minimal eye protection
- Goggles—splash, dust, and foreign object protection
- Face shields--splash and foreign object protection

### 7.2.3 Hardhats

Hardhats are required for workers where there is a potential for being struck from overhead or in areas adjacent to heavy equipment operations.

### 7.2.4 Clothing

When gross contamination is encountered (such as in an excavation), then clothing required for preventing skin contact with hazardous substances will be worn. Protective clothing that shall be maintained on site by individual site workers for use shall include the following:

- Splash protection coveralls such as Tyvek or Kappler (poly-coated for liquid contact)
- Neoprene boots, Tyvek booties, or rubber boots
- Nitrile gloves, with either a cotton or leather outer shell

If no apparent gross contamination is observed during work activities, the following clothing modifications will apply:

- General work clothing, including:
  - Long pants, long-sleeve shirts
  - No loose clothing
  - Coveralls (use encouraged)
  - Steel toed boots
- Gloves:
  - Double nitrile gloves for personnel handling samples
  - Single nitrile gloves under work gloves
  - Heavy nitrile gloves when steam cleaning (under-gloves not required)

Reflective vests are not required over protective coveralls, as this use may subject them to exposure from site contamination. PPE used during site activities that cannot be completely decontaminated shall be bagged at the worksite for disposal. Individual workers shall not remove PPE from the site until adequate decontamination has been conducted.

## 7.3 RESPIRATORY PROTECTION PROGRAM

All employees will be provided protection from occupational exposure where potential exposure to dusts, fumes, mists, radionuclides, toxic gases, vapors, or oxygen deficiency exists. Where feasible, exposure to contaminants at concentrations presenting potential health hazards will be eliminated using engineering controls. When effective engineering controls are not feasible, use of personal respiratory protective equipment will be required to achieve this goal. Respiratory protection measures will be instituted based upon worksite monitoring results, worker sensitivity, and pre-determined protection levels related to work conditions. Respiratory protection action levels are provided in Table 5-1.

Excavating activities could create contaminated dust and possibly low levels of vapors. Dust levels will be controlled to prevent exposure; however, if dust levels cannot be adequately controlled, workers will wear respiratory protection when noticeable or irritating dust levels are encountered. Activities should be conducted to keep personnel upwind of the work area.

If leaking drums are encountered, they will be removed from the excavation using the excavator. Once drums are uncovered, personnel shall stay upwind and Level C protection shall be used to conduct monitoring of the uncovered trench. The PID will be used to monitor the breathing zone; action levels for PPE upgrades are provided in Table 5-1. Sampling of drums will require level B protection until the drum contents can be characterized.

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 site conditions require respiratory protection upgrade (as described above), the AFCEE COR and the USAF PM will be notified. Refer to Attachment B-15 for the Respiratory Projection Program and Report forms.

## 7.4 OTHER SAFETY EQUIPMENT

The following additional safety equipment will be brought to and maintained for use at the work sites:

- Portable eye wash station or sufficient bottles to provide adequate eye irrigation
- First-aid kit
- Type A-B-C fire extinguisher

This equipment may be maintained inside site vehicles or equipment provided that its location is communicated to all personnel on site prior to the start of work.

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# 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 using the proper signage at the access point to the work site. 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 the HSP. 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 from the site by personnel or equipment. This will be accomplished using administrative controls because physical barriers may not be practical. 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 7.0 of this HSP.

The SSHO or a designee will be alert to persons attempting to enter the site's exclusion zone and will prohibit unauthorized or unprotected persons from entering these zones. Zones may be modified or expanded by the SSHO depending upon changing wind and site conditions.

## 8.2 WORK ZONES

Work areas or zones will be designated as suggested in the *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities* (NIOSH/OSHA/USCG/EPA 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

Clearly delineated work zones help ensure that:

- Site personnel are adequately protected from existing hazards.
- Specific activities and hazards are confined to the appropriate areas.
- Personnel can be accurately and quickly located and evacuated during an emergency.

Personnel will comply with HSEP 7.3.2, Site Control (Attachment C4). When establishing Work Zones, vehicles will be arranged to provide efficient evacuation due to wildlife or other emergencies.

For work areas with potential exposure to radiological hazards, radiological areas including the exclusion zone will be established and posted.

### 8.2.1 Exclusion Zone

The exclusion zone will consist of the immediate active work areas where sampling takes place. This is anticipated to be limited to the areas in which excavations and trenching will take place. The zone perimeter will be sufficiently large to prevent contact by unprotected personnel with either dusts or vapors arising from these operations. The exclusion zone perimeters will be marked and will be relocated along with the work activity. All personnel entering these areas must wear the prescribed level of PPE. Personnel entry into exclusion zones will be noted on the daily safety meeting form.

### 8.2.2 Contamination Reduction Zone

The contamination reduction zone will be located between the exclusion and support zones. If required, 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 protective coveralls (if applicable) should be removed when leaving the contamination reduction zone.

### 8.2.3 Support Zone

The support zone will consist of those areas around the exclusion zone where the equipment is staged (typically the support vehicles). Eating and drinking will be allowed in this area only.

## 8.3 BUDDY SYSTEM

The SSHO will designate personnel in contaminated or hazardous areas to work with a buddy capable of:

- Assisting his/her partner
- Monitoring partner for signs of chemical or other exposures (e.g., heat or cold)
- Periodically verifying the integrity of partner's PPE
- Notifying the SSHO when emergency help is needed

Personnel shall enter the exclusion zone through an access control point and the crew supervisor will verify that workers use the buddy system at all times. A buddy system should be used in all of our projects away from emergency medical care, in order to provide assistance if needed.

## 8.4 COMMUNICATIONS

Verbal communication at the sites could be impaired by on-site background noise caused by heavy equipment and by the use of PPE. Hand signals to be used among personnel within the exclusion zone will be reviewed during tailgate safety meetings (before starting work). Communication among personnel at the project site will be conducted using two-way common-band-frequency radios. Communication with personnel not located at the project site will be made via radio, cellular telephone, or digital pager. Specific telephone and digital pager numbers for personnel assigned to individual projects are listed in Attachment A, Table 1.

## 8.5 SITE SAFETY AND SECURITY

Site security is essential to:

- Prevent unauthorized, unprotected, or unqualified people from being exposed to site hazards.
- Prevent vandalism.
- Protect established and safe working procedures.
- Protect personnel from wildlife.

Site safety and security will be maintained by:

- Limiting access at control points to authorized and essential personnel.

- Assigning the responsibility for enforcing exit and entry requirements.
- Requiring the SSHO to approve all visitors to the site.
- Stopping work immediately if unauthorized personnel or wildlife attempt to or succeed in accessing the work area or exclusion zone. In this case, the worker shall notify the SSHO, site superintendent, and the PM immediately. If wildlife enters the work area, workers shall walk to the nearest vehicle and leave the job site.

## 8.6 DECONTAMINATION PROCEDURES

Decontamination protects workers, the public, and the environment by limiting exposure to harmful substances and by preventing the spread of contamination. The SSHO will oversee decontamination procedures to determine their effectiveness and will take corrective actions to rectify any deficiencies.

### 8.6.1 Personnel Decontamination

At areas where an exclusion zone is necessary, all personnel exiting the exclusion zone will follow decontamination procedures. Under no circumstances (except emergency evacuation) will personnel be allowed to leave the exclusion zone before decontamination. The SSHO may approve simplification of the procedures in the field when a determination has been made that decontamination procedures can be less stringent.

Decontamination procedures for the POL-contaminated sites are as follows:

- Deposit equipment used on site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on the plastic drop cloths or containers that are provided.
- Scrub boots and gloves in decontamination solution or detergent water. Rinse off using copious amounts of clean water.
- Step across to the next station and remove coveralls and gloves. Deposit them in a container with a plastic liner.
- Remove respirator while avoid touching the face with the fingers. Deposit the respirator on a plastic sheet or in a container.
- Wash hands and face thoroughly.

### 8.6.2 Equipment and Vehicle Decontamination

Small instruments and equipment will be protected from contamination by draping, masking, or otherwise covering the instruments with plastic to the degree possible without hindering operation of the unit. Contaminated protective coverings will be removed from the equipment and disposed of in the appropriate containers. Any dirt or obvious contamination on the equipment will be brushed or wiped with damp disposable wipes, or wiped using Liquinox. The equipment will then be dried. Instruments are to be checked, field calibrated, and recharged as necessary for the next day's operation.

Vehicles and equipment used on site will be gross-decontaminated prior to leaving the site to eliminate contaminant migration from the site, as well as the potential for cross-contamination between sites. Gross decontamination includes the removal of potentially contaminated materials by use of a shovel or other hand tools, and stiff bristle brushes. All materials removed during gross decontamination will be accumulated and managed along with similar waste streams in accordance with the ST32 Work Plan (see section 4.8). Equipment used on site will be completely decontaminated when it is no longer required on site, prior to its return.

## 8.7 WASTE HANDLING AND DISPOSAL

Waste generated on-site from field activities includes investigation-derived wastewater, contaminated soil, USTs, piping, concrete, PPE, laboratory waste, field trash, and office trash. Wastes will be minimized, segregated, packaged and managed on site in accordance with the ST32 Work Plan (see section 4.8). Disposal of all wastes will be in accordance with state and federal requirements.

## 8.8 CONFINED SPACE

Personnel are not expected to need to enter confined spaces to clean, inspect, repair, and perform other duties associated with equipment or processes as part of this field effort. Potentially hazardous confined spaces include but are not limited to:

- Space large enough and so configured that an employee can bodily enter and perform assigned work.
- Space with limited or restricted means of entry or exit (e.g., tanks, vessels, silos, storage bins, hoppers, vaults, and pits).
- Space not designed for continuous employee occupancy.

In the unlikely that confined space work will be required, Jacobs HSEP 7.2 Confined Space Entry (Attachment C5) will be followed when conducting confined space work.

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# 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 eight hours of refresher training within the last year. All site personnel must also have received training in the level of PPE, which they may be required to wear during the course of fieldwork. After arriving at the work site, all personnel will receive a site-specific orientation.

Managers or supervisors of personnel performing field activities must have completed the specified eight hours of management training in addition to the initial/refresher training. Personnel who will operate lift trucks or heavy equipment will have receiving training or have applicable experience. Additionally, key field personnel will attend USAF-provided training in UXO Awareness Class / Chemical Warfare Materials Awareness Class.

## 9.2 HEALTH AND SAFETY BRIEFINGS

A pre-entry health and safety briefing will be held prior to commencing fieldwork. The SSHO will lead the briefing, at which site-specific hazards and injury prevention will be discussed. Additional health and safety meetings shall be held whenever necessary (e.g., changes in activities or process). Attachment D1 contains the SPA form to be completed before each work activity; Attachment B17 contains the Health and Safety Briefing form used to document such meetings and personnel attendance.

## 9.3 MEDICAL SURVEILLANCE

All field personnel also must have completed and passed an annual and/or baseline occupational medical surveillance examination *within the last year*. Employees potentially wearing respirators must have passed a fit-test for the specific respirators and must have medical approval to wear the designated 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 site activities.

## 9.4 HAZARD COMMUNICATION

If subcontractors bring any hazardous material on-site, they must inform Jacobs and submit an MSDS for that material before its initial use on site. Jacobs will likewise inform the subcontractors of hazardous substances brought on site to which subcontractor employees may be exposed. All site employees will be informed of the potential hazards of all materials brought on site and to which they may be exposed, prior to the use of those substances.

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

A copy of all the MSDSs for products used on site will be maintained on site by the SSHO. The only exception to this will include products available to the general public when the product is used in the workplace in the same manner that a consumer would use the product, i.e., where the duration and frequency of use is not greater than what the typical consumer would experience.

# 10.0 INSPECTIONS

Site and equipment inspections will be performed on a routine basis as described below.

## 10.1 SITE INSPECTIONS SAFETY EVALUATION

The following inspections are required:

- The HSM will conduct periodic project audits and will use the Safety Evaluation Review (Attachment C6) or equivalent.
- The SM shall conduct a health, safety and environment (HSE) review of the job site before any new phase of work is initiated, and monthly thereafter.
- The SSHO shall conduct daily HSE inspections of each project site. Observations noted during the inspection will be documented on SORs (Attachment B-4) and noted in the Daily Health and Safety report provided in Attachment B-8).

All site inspection results should be reviewed with the SM and subcontractors as applicable. All deficiencies should be corrected. Serious deficiencies must be corrected immediately.

## 10.2 EQUIPMENT INSPECTIONS

Any machinery or mechanized equipment shall be inspected and tested by a competent person and certified to be in safe operating condition prior to use at the site. Inspections and tests shall be in accordance with the manufacturer's recommendations and shall be documented. Test and inspection records shall be recorded on the Jacobs equipment inspection form (Attachment B14). All forms shall be maintained at the project site.

### 10.2.1 Daily/shift Inspections and Tests

All machinery and equipment shall be inspected daily (when in use) to ensure safe operating conditions as indicated below:

- Tests shall be made at the beginning of each shift during which the equipment is to be used, to determine that brakes and operating systems are in proper working condition and that all required safety devices are in place and functioning.
- Whenever any machinery or equipment is found to be unsafe, or when a deficiency affecting the safe operation of equipment is observed, the equipment shall be immediately taken out of service and its use prohibited until unsafe conditions have been corrected.

- A tag indicating that the equipment shall not be operated, and that the tag shall not be removed, shall be placed in a conspicuous location on the equipment. Where required, lockout tag-out procedures shall be used.
- The tag shall remain in its attached location until it is demonstrated to the individual dead lining the equipment that the equipment is safe to operate.
- When corrections are complete, the machinery or equipment shall be retested and re-inspected before being returned to service.

### 10.2.2 Vehicle Inspections

All motor vehicles owned or rented by Jacobs or our subcontractors will be inspected prior to use. During the inspection all deficiencies found will be noted and corrected prior to equipment use (Attachment B-13). Vehicles that cannot be brought to safe operating condition will not be used. In addition to pre-use inspections, the vehicle's primary driver will be responsible for ensuring that scheduled and periodic maintenance is performed to maintain it in a safe operable condition. At no time will anyone operate a vehicle they believe to be unsafe.

## 10.3 SAFETY OBSERVATION REPORTS

All site personnel, not just the site SSHO, are to complete an SOR form when real or potential unsafe acts or unsafe conditions have been identified. (The success of this program increases when the number of SORs completed by non-health, safety, and environment (HSE) specialists exceeds those completed by HSE specialists. This means all personnel are developing safety-conscious attitudes.)

SORs shall also be used to encourage and reward safe behavior. Providing positive reinforcement of a job or task well executed is far more encouraging than only recognizing unsafe behavior. Encouragement can be rewarding throughout the whole project and can lead to achieving a better and healthier project environment.

Any corrective measures shall be documented on the SOR form. A blank SOR form is included in Attachment B4.

All SORs shall be submitted to the SSHO within 24 hours of their completion. Completed forms shall be maintained with project records and a copy forwarded to the Anchorage HSE Group each week.

# 11.0 EXTREME WEATHER SITE WORK

For the purposes of this work plan, temperatures below –15°F will be referred to as extreme cold weather. The 2004 field activities are scheduled for the summer. However, weather conditions causing extreme cold temperatures at the site are discussed in the event this project continues into the colder seasons or abnormal weather patterns occur.

Wind's effect on skin and threshold temperatures should be taken into account when assigning work activities (Attachment C, Tables 2 and 3). Personnel assignments will be made to minimize prolonged sitting or standing still in unheated areas. In addition, warm up areas will be designated when the temperature drops below –20°F and shall be used at the onset of the following:

- Heavy shivering
- Frostnip (minor frostbite)
- Feelings of excessive fatigue
- Drowsiness
- Irritability
- Euphoria

The frequency and duration of warm-up time shall be dictated by the severity of the exposure to extreme cold conditions. All non-emergency work in unheated spaces should cease when temperatures reach –45°F.

In addition to the extreme cold, site personnel should be prepared for warmer temperatures during the summer months. Field personnel wearing additional PPE during hazardous waste management activities may be more susceptible to heat stress. Four environmental factors affect the amount of stress workers experience in hot work areas: temperature, humidity, sun (radiant heat), and air velocity (wind). Additional stress levels are associated with age, weight, fitness, medical condition and acclimation to heat. Symptoms of heat stress are heat rash (prickly heat), increased heart rate, loss of concentration, and irritability. These symptoms may lead to fainting or death. The following steps are recommended to reduce the risk of heat stress:

- Move to a cooler place.
- Reduce workload or pace.
- Rest in cool areas (may consider taking longer breaks and monitor stress).

- Wear lightweight clothing (if allowed given site conditions).
- Perform strenuous activities during hours when the sun is less intense or temperatures are cooler.
- Drink plenty of water (1 quart per person per hour).

## 11.1 TEMPERATURE SAMPLING

When ambient air temperature falls below 30°F or above 80°F, the SSHO will monitor and log the temperature and wind speed every 4 hours or as conditions change. These readings will be maintained on site in a logbook. Temperature and wind-speed readings will be taken into account when making personnel assignments. The SSHO will notify the SM when a wind chill factor of –15°F is recorded.

# 12.0 EMERGENCY PROCEDURES

The following sections describe pre-emergency planning, emergency equipment and supplies, emergency contacts, emergency procedures, emergency response and accident follow up, evacuation information, contacts, post-incident notifications, record keeping, and vehicle accident reporting procedures.

## 12.1 PRE-EMERGENCY PLANNING

The SSHO and SM will coordinate with applicable emergency service providers for all job site locations. Contacts, contact numbers, and primary gathering points will be reviewed prior to mobilization to ST32 at Elmendorf AFB. An Emergency Contact List is provided in Attachment A, Table 1 and includes numbers for fire, state troopers, medical facilities and the U.S. Coast Guard.

## 12.2 EMERGENCY COMMUNICATION

In addition to communication methods described in the HSP, the following communication and contact methods will be used:

- Land line phone
- Two-way radio
- Cellular phone

The following visual hand signals will be used:

- Clutching throat = Personal distress
- Arm waving and pointing towards the exit direction = Evacuate the area

When calling for an emergency response, by telephone or radio, report the following information:

- Your name
- Your company's name
- Type of emergency
- Location of accident or injury
- Time of incident
- Type of first aid or response being given

**DO NOT HANG UP** until the operator or emergency dispatcher has received the complete information and directs you to hang up.

Notify the SSHO or SM and your immediate supervisor immediately after hanging up the phone. Further information or assistance may be needed from you to complete the accident investigation process.

## 12.3 INJURY/ILLNESS/EMERGENCY MEDICAL TREATMENT

Should a person become injured, an Authorization for Medical Treatment form (Attachment B7) shall be taken to the medical facility with the employee. The site personnel shall complete the top portion of the form and the doctor at the medical facility shall complete the bottom portion of the form. The acting site supervisor (lead) shall:

- Secure the accident area and complete an accident report with all applicable witness statements.
- Prepare descriptive figures depicting the general site layout, directions, emergency contacts, and the location of the medical facility.

An accident with any of the consequences listed below shall be reported immediately to the Jacobs HSM. A government-designated representative will also be notified if following events occur:

- Fatal injury
- One or more persons admitted to a hospital
- Property damage in an amount specified by the designated authority

Daily records of all first aid treatments not otherwise reportable shall be maintained on First Aid register and furnished to the HSM weekly.

## 12.4 FIRE

Upon notification of a fire on site, all non-emergency responders will assemble at a predetermined area. If the site fire prevents personnel from reaching the field office, a second assembly point is located at the Anchorage office. Equipment to prevent the spread of any fire in remote locations will be available on site at all times.

A fire watch shall be assigned while hot work is in progress. A Welding/Brazing/Hot Work Permit (Attachment B9) shall be completed and approved by the SSHO prior to hot work activities. Upon completion of hot work, the fire watch keep watch of the work area for an additional 30 minutes to ensure a fire does not develop.

## 12.5 PERSONAL PROTECTIVE EQUIPMENT FAILURE

If any site worker experiences a PPE failure, that person and his/her buddy will immediately leave the exclusion zone through the decontamination area. The SSHO shall be notified of any defect or failure of PPE. Reentry into the exclusion zone will not be permitted until the equipment has been properly repaired or replaced.

### 12.5.1 Other Equipment Failure

If other equipment on site fails to operate properly, the equipment shall be red-tagged and removed from service and the SSHO notified. After completion of repairs, the equipment shall be re-inspected, evaluated, and appropriate actions taken. The SSHO will evaluate the safety hazards to site personnel before continuing operations.

## 12.6 EVACUATION

If an evacuation of the work area is necessary, the following steps should be followed:

- After receiving the signal to evacuate, all non-response personnel are to leave the work area in an upwind direction and assemble at a predetermined point.
- After the location has been evacuated, if appropriate and safe, the SSHO and a designated buddy shall remain at or near the work location to assist local responders and advise them of the nature and location of the incident.
- The supervisor will account for field team members at the assembly point(s).
- The supervisor will complete an incident report with applicable witness statements as soon as possible after an incident.

Evacuation routes and assembly points shall be designated to facilitate access and provide direction for emergency responders. All on-site personnel will be advised of evacuation routes and assembly points during the safety orientation and/or daily tailgate meetings. The SSHO or SM shall document the actual evacuation routes and assembly points, whenever evacuation occurs.

## 12.7 EMERGENCY RESPONSE AND ACCIDENT FOLLOW-UP

Elmendorf AFB Hospital personnel will respond to any medical emergency 9-1-1 calls on Base. Medical attention that does not warrant a 9-1-1 emergency response will be managed by a medical facility off Base. A map showing the locations of the local hospitals is provided in Attachment A.

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 completion of an accident/incident report and submittal to the report to the HSM in accordance with Jacobs Health and Safety Policy. The investigation will begin 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 repeated or similar occurrences can be avoided. A copy of procedure for accidents, and incidents is included as Attachment B11. If required, Jacobs will promptly notify OSHA in the event of any serious or fatal accident.

Following any incident or emergency, the SM or designee shall directly notify the HSM, the PM, and the client as soon as possible. The SM shall be prepared to provide the following information:

- SSHO name
- Project name and number
- Exact location of incident
- Name of victim and their employer
- Nature and extent of injuries
- The name and address of medical facility (if personnel were transported off site)
- The name of physician providing off-site care
- A phone number where the SSHO can be contacted during the next 24 hours

An on-site first-aid kit will be maintained. The kit will contain gloves and a cardiopulmonary resuscitation shield for protection from blood-borne pathogens. An on-site portable eyewash also will be maintained.

The client representatives (USAF and AFCEE) must be notified of any accident or injury. Copies of the USAF notification forms are provided in Attachment B18.

## 12.8 EXPOSURE TO BLOOD BORNE PATHOGENS

The following procedures will be implemented when a potential exposure to blood-borne pathogens occur:

- The SSHO must be notified immediately when a first aid incident occurs.
- The SSHO shall provide a report to the HSM, as required by reporting procedures.
- The report shall include names of all first aid providers who rendered assistance, and a description of the incident including time, date, and types of barriers used.
- If a blood-borne pathogen or other potentially infectious material exposure has occurred, the description of the incident (above) must include a determination. This determination is necessary to ensure proper post-exposure evaluation and prophylaxis occurred, and that follow-up procedures were made immediately available (a Jacobs policy requirement).
- Hepatitis B vaccination must be offered to all workers who have occupational exposure to blood or other potentially infectious materials.
- The report shall be recorded on the First Aid register.

## 12.9 VEHICLE ACCIDENT

The SM and SSHO shall be promptly notified of any accidents involving vehicles. The SM will be responsible for notifying the PM, HSM, and the client representative. A determination of operator drug testing will be made at that time. HSEP Vehicle Accident procedures shall be followed and report forms completed. (Attachment B12).

## 12.10 INJURY AND ILLNESS

An initial accident investigation will begin in accordance with HSEP 5.1, Accident and Incidents (Attachment B11). At a minimum:

- The scene will be secured with no movement of material or equipment until a review of the accident is completed.
- Signed statements from witnesses will be obtained.

If an employee is taken into a medical facility for treatment, the Authorization for Medical Treatment form shall be completed (Attachment B7). This form should be faxed to the HSM after the physician has completed it.

## 12.11 SPILL OR RELEASE PROCEDURES

The SSHO and SM shall be notified immediately when a spill or release occurs. The SSHO or SM shall notify the PM and client as soon as the site is under control and an SPA has been developed and implemented. No one shall enter the site until the SPA is in place and approach has been approved. Regulatory agencies will be notified by the PM or the client.

Personnel involved with containment or cleanup shall wear appropriate PPE as defined in the SPA for specific contaminants. Immediately notify the SSHO or SM. The SSHO or SM will be responsible for notifying the PM and the client. The client and PM will determine the strategy for notifying regulatory agencies.

Appropriate methods to contain, control, or remove product released shall be followed by personnel involved.

# 13.0 ORIENTATION AND TRAINING

Prior to the start of work activities, all personnel working on this project and any new person visiting or conducting work on this project shall be briefed on this plan. All personnel shall sign the Site Project Safety and Health Agreement Sign-Off Sheet (Attachment B1) indicating they have been briefed and understand the requirements contained in this HSP.

Prior to work, a daily safety tailgate meeting will be held to discuss planned work activities, safety precautions, activity hazard analysis, emergency response updates, employee concerns, SOR, site conditions, monitoring results, injury/illnesses that may have occurred, exclusion zone entries, client issues, and other topics of concern to employees. The Safety Tailgate Meeting and Exclusion Zone Entry Log (Attachment B17) will be used to document the meeting. (Note: Tailgate meetings should begin with and emphasize daily work activities. Subcontractors should be leading this portion of the meeting with assistance from the SM and the SSHO.)

(intentionally blank)

# 14.0 SITE POSTINGS

There will not be a site trailer onsite, therefore there will be no bulletin board for site postings.

(intentionally blank)

# 15.0 REFERENCES

ACGIH *(*American Conference of Governmental Industrial Hygienists *)* 2002. *TLVs, Threshold Limit Values and Biological Exposure Indices for 2002*. American Conference of Governmental Industrial Hygienists.

DOSH (Division of Occupational Safety and Health, Alaska). (1987, amended 1991). *Hazardous Waste Operations and Emergency Response Standard*. State of Alaska Department of Labor Administration DOSH.

NIOSH/OSHA/USCG/EPA. 1985 (November). *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities.*

OFR (Office of the Federal Register). 1999 (July). *Hazardous Waste Operations and Emergency Response.* National Archives and Records Administration. 29 CFR 1910.120 and 1926.65.

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**ATTACHMENT A**

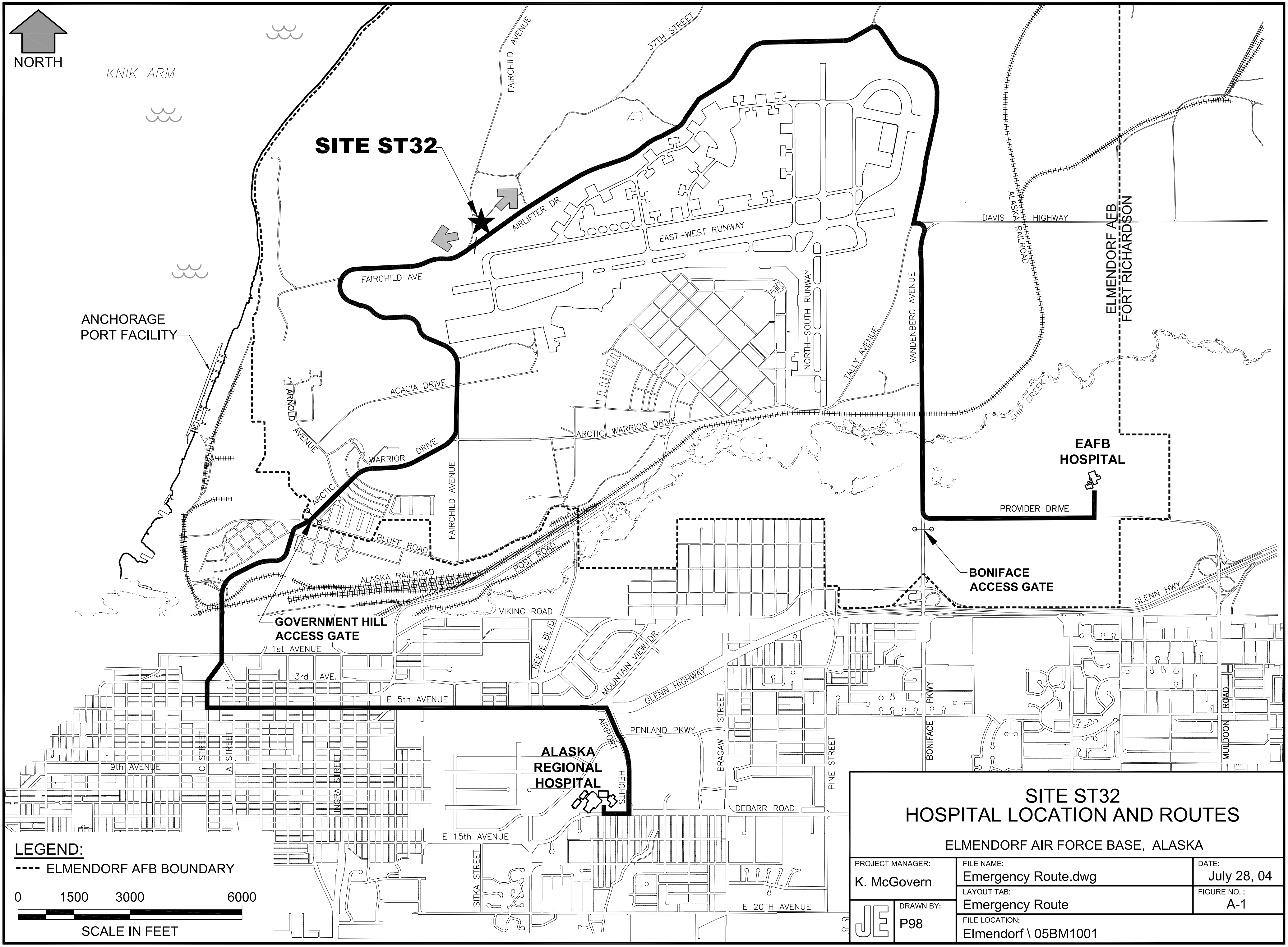
**Project-Specific Contacts and Maps**

**TABLE A1**
**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<br>Providence Alaska Medical Center | 264-1222<br>261-3111 |
| National Response Center | 1-800-424-8802 |
| Poison Control | 1-800-222-1222 |
| CHEM-TEL Customer: Peach ID #JACO 01 | 1-800-255-3924 |
| Alaska State Troopers | 907-428-7200 |
| **ST32 Hot Spot Removal Key Project Team Members** | |
| Project Manager<br>Kelly McGovern | <br>751-3350 (wk)<br>345-6095 (home) |
| **Health and Safety Representatives** | |
| Health and Safety Manager, Anchorage, AK<br>Brad Burns | <br>751-3387 (wk)<br>907-223-8713 |
| **Client Representatives** | |
| AFCEE CO<br>Linda Fellows<br>AFCEE COR<br>Kevin Thomas | <br>552-9762<br><br>552-4112 |
| EAFB Project Manager<br>Ellen Godden | <br>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 operators and must ask to be connected to the Elmendorf AFB emergency operator.** | |

Directions to Hospitals (Figure A1):
**Call 911 and follow instructions**.

G:\Autocad\Elmendorf\05BM1001\Emergency Route.dwg Sep 15,2004 -BPeratro)




# SITE ST32
# HOSPITAL LOCATION AND ROUTES

ELMENDORF AIR FORCE BASE, ALASKA

| PROJECT MANAGER: | FILE NAME: | DATE: |
|---|---|---|
| K. McGovern | Emergency Route.dwg | July 28, 04 |
| DRAWN BY: P98 | LAYOUT TAB: Emergency Route | FIGURE NO.: A-1 |
| | FILE LOCATION: Elmendorf \ 05BM1001 | |

# ATTACHMENT B

## Project-Specific Jacobs Forms

Attachment B1: Site Project Safety and Health Agreement Sign-Off Sheet

Attachment B2: Approval of Modifications

Attachment B3: Visitor Check-in Log

Attachment B4: Safety Observation Report

Attachment B5: Personal Air Monitoring Record Form

Attachment B6: Exposure Monitoring Log

Attachment B7: Authorization for Medical Treatment

Attachment B8: Daily Health and Safety Report

Attachment B9: Welding / Brazing / Hot Work Permit

Attachment B10: Health and Safety Calibration Log

Attachment B11: Vehicle Accident Procedure and Report Forms

Attachment B12: HSE Procedure – Vehicle Accidents

Attachment B13: Rental Equipment Condition Report for Automobiles / Trucks

Attachment B14: Standard Equipment Inspection Form

Attachment B15: Respiratory Program and Report Forms

Attachment B16: Hazardous Material Exposure and Field Activity Report

Attachment B17: Site Tailgate Meeting and Exclusion Zone Entry Log

JACOBS ENGINEERING GROUP INC.

**Attachment B1**

**SITE PROJECT SAFETY AND HEALTH AGREEMENT SIGN-OFF SHEET**

| Title | Signature | Date |
|---|---|---|
| **Client: AFCEE** | | |
| Ellen Godden, Project Manager | | |
| | | |
| | | |
| **JACOBS:** | | |
| | | |
| Brad Burns, HSE Manager | | |
| Kelly McGovern, Project Manager | | |
| Kelly McGovern, Site Manager | | |
| | | |
| | | |
| **Project Team:** | **"I have read and agree to abide by this SSHP Addendum and Standard SSHP."** | |
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JACOBS ENGINEERING GROUP INC.

## Attachment B2

## APPROVAL OF MODIFICATIONS

| **Change Number** | **Effective Date** | **Table Number Changed** | Content of Change | **Jacobs Approval Health and Safety Manager and Project Manager** | **Client Approval** |
|---|---|---|---|---|---|
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JACOBS ENGINEERING GROUP INC.

**Attachment B3**

**VISITOR CHECK-IN LOG**

| **Project Name:** | | **Project No.:** | **Date:** | |
|---|---|---|---|---|
| **Name** | **Representing** | **Destination** | **Time (24-Hour)** | |
| | | | **In** | **Out** |
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JACOBS ENGINEERING GROUP INC.

## Attachment B4

## SAFETY OBSERVATION REPORT

**Date:** ____________ **Time:** _________ **Originator:** ______________________________

**Project:** ________________________ **Supervisor:** ______________________________

**Location:** ________________________ **Action Person:** ______________________________

**Observation:**

________________________________________________________________

________________________________________________________________

________________________________________________________________

________________________________________________________________

________________________________________________________________

### Check Box That Applies:

☐ Safe Behavior Observed (No Further Action Required) Proper Procedures Followed
☐ Unsafe Behavior
☐ Unsafe Condition

☐ If Non-compliance describe non-compliance below:

________________________________________________________________

________________________________________________________________

________________________________________________________________

**Corrective Action:**

________________________________________________________________

________________________________________________________________

Further Action or Help Needed?

________________________________________________________________

________________________________________________________________

________________________________________________________________

| Action Person Signature: | Date Closed: | Action Person Notified: Yes/No |
|---|---|---|

JACOBS ENGINEERING GROUP INC.

# Attachment B5

## AIR MONITORING RECORD

**Employee Name:** ______________ **Employee No.:** ______________ **Company:** ______________ **Title:** ______________

**Project Name:** ______________________________ **Project Number:** ______________

**Date Sampled:** ______________________________ **Sampled By:** ______________________________

---

Sampling Method and Analyte: ______________________________

Collection Media:

____ Charcoal Tube ____ Filter (Total) ____ Passive Dosimeter Collector Mfg: ______________

____ Silica Gel ____ Filter (Resp.) ____ Other: __________ Size/Type: ______________

____ Chromosorb ____ Impinger ______________ Lot #: ______________

Sample Type:

____ Personal - TWA ____ Blank Does Sampling Represent Typical Exposure? ______________

____ Personal Peak ____ Bulk Temperature ______________ Collector Mfg: ______________

____ Area ____ Other ______ Humidity: ______________ Wind: ______________

____ Source ______________________________

---

Activities During Sample Collection:

______________________________

______________________________

---

Sample Pump: Mfg & Model #: ______________________________ Serial #: ______________

Calibrator: Type: ______________ Mfg & Model #: ______________ Serial #: ______________

Calibration Date: ______________ Calibrated By: ______________________________

| Sample # | Time On | Time Off | Total Time | Pre Cal Flow Rate | Post Cal Flow Rate | Average Flow Rate | Sample Volume | Analytical Result | TWA |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
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Descriptive Data: (Engineering controls or PPE used, work activities, sample interferences etc.)

______________________________

______________________________

Date: ______________ Signature: ______________________________

**Attachment B6**

# Exposure Monitoring Log

| Project Name: | | | Project No. | | | Date: | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Location Monitored: | | | | | Atmospheric Conditions | | | | | |
| Activity Monitored: | | | | | | | | | | |
| Site No. | | | | | | | | | | |
| | | Readings | | | | | | | | |
| **Time (24-Hour Clock)** | **Background** | **Monitor (depth)** | **FID (ppm)** | **PID (ppm)** | **%$O_2$** | **%LEL** | **$H_2S$** | **Mini-Ram** | **Other** | **Samplers Initials** |
| | | | | | | | | | | |
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JACOBS ENGINEERING GROUP INC.

## Attachment B7

## Authorization for Medical Treatment

TO: Dr. ___________________ Address: ____________________________ Date: ________________

This form signed by our representative is your authority to render treatment to:

_______________________________________________

(Employee)

in accordance with the provisions of and under the conditions prescribed by the Workers' Compensation Act. Unless the case is an emergency, kindly obtain authorization for surgery, radical procedures, or hospitalization from the insurance carrier. Send your bill and report to us at the address listed below.

_____________________________________________

Authorized Representative

Date of Injury: __________________ Location: _________________________ Job No. ______________

How Injury Occurred: ______________________________________________________________________

Please complete and return by mail to the following address to ensure prompt payment of charges:

Risk Manager
1111 South Arroyo Parkway
Pasadena, CA 99105

---

FOR DOCTOR'S USE ONLY

Diagnosis of Injury: ________________________________________________________________________

Disposition of Patient:

____ Occupational ____ Non-Occupational ____ Unable to Determine

____ Able to resume regular duties

____ Able to resume regular duties next workday

____ Able to resume restricted duties with the following limitations: ___________________________________

___________________________________

____ Unable to return to work, estimated length of disability: ___________________________________

Return for follow-up visit on __________(Date) __________________________

**Doctor's Signature**

JACOBS ENGINEERING GROUP INC.

## Attachment B8

## DAILY HEALTH AND SAFETY REPORT

**Contract Number / Delivery Order Number:** ______________________
**Project Title:** ______________________
**Location:** ______________________

**Date:** ____________ **List Contractors/Organizations Present:** ____________

### WEATHER CONDITIONS

| Temp Low: | | Temp Hi: | Comments: |
|---|---|---|---|
| | | | |

Wind Speed: ____________ Conditions: ______________________

### Zero Accident Process

Safe Plans of Action in effect today: **Yes** ☐ **No** ☐

Total Project SPAs generated to date: ______________________

Were any Safety Observation Reports (SORs) generated today? (List Individually) **Yes** ☐ **No** ☐

Total SORs for today: ____________ Total SORs since mobilization: ____________

### Health and Safety Inspections

Check any of the following inspections performed today:

| | |
|---|---|
| ☐ Heavy Equipment | ☐ Cranes |
| ☐ Hand Tools | ☐ Storage Areas |
| ☐ Site Office | ☐ Sanitation Facilities |
| ☐ Drill Rig | ☐ Monitoring Instruments |
| ☐ Misc. Electrical | ☐ Misc. Equipment |
| ☐ Excavation | ☐ Exclusion Zone |
| ☐ PPE | ☐ Operations |
| ☐ Other | List: |

Observation/Comments made during the daily inspections :

## Air Monitoring

| | | | |
|---|---|---|---|
| Was air monitoring performed within the breathing zone today? | ☐ N/A | ☐ Yes | ☐ No |
| Did the air monitoring results exceed the PEL? | ☐ N/A | ☐ Yes | ☐ No |
| **Have Air Samples Been Collected for Laboratory Analysis?** | | ☐ Yes | ☐ No |

| **Type of Test** (personal, area, perimeter) | Test Method/Matrix | Quantity of Samples |
|---|---|---|

## General Health and Safety

| | | | | | |
|---|---|---|---|---|---|
| Worker protection levels this date: | ☐ **Level A** | ☐ **Level B** | ☐ **Level C** | ☐ **Level D** | ☐ **N/A** |

| | | | |
|---|---|---|---|
| Was any work activity conducted within a confined space? | | ☐ Yes | ☐ No |
| Was any work activity conducted within an area determined to be immediately dangerous to life and health? | | ☐ Yes | ☐ No |
| Were approved decontamination procedures used on workers and equipment as required? | ☐ N/A | ☐ Yes | ☐ No |
| Was a Safety Tailgate Meeting held this day? (See attached) | | ☐ Yes | ☐ No |
| Was there any "Lost Time" accidents this day? (If YES, attach copy of completed accident report) | | ☐ Yes | ☐ No |
| Was hazardous waste/materials released into the environment? (If YES, attach copy of spill report) | | ☐ Yes | ☐ No |

(SM) ____________________ Health and Safety ____________________

Date ____________________ Date ____________________

JACOBS ENGINEERING GROUP INC.

**Attachment B9**

## WELDING/BRAZING/HOT WORK PERMIT PERMIT #__________

Issued by: ____________________

Approved by SSHO: ____________________

Date Permit Issued: ____________________ Time Permit Issued: ____________________ Expiration Date: ____________________

Operation to be Performed: ____________________

Location of Operation: ____________________

**Special Precautions:**

| TESTING | | | | |
|---|---|---|---|---|
| **Location of Testing** | **Time** | **Percentage of LEL** | **Percentage of $O_2$** | **Initials** |
| | | | | |
| | | | | |
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| CHECKLIST | | | |
|---|---|---|---|
| **Item** | **N/A** | **Yes** | **Initials of Inspector** |
| Surround equipment and operation safe for hot work | | | |
| Tank purged | | | |
| Extinguisher present | | | |
| No combustibles within 35 feet of operation or items protected by covers or removed from area | | | |
| No flammables within 50 feet | | | |
| Worker has proper protective equipment to perform function | | | |
| Safety blankets available | | | |
| Flammable gases greater than 10% present additional precaution needed to perform operation | | | |
| Fire watch required | | | |
| Welding unit inspected | | | |
| Adequate ventilation available | | | |

The location where the work is to be performed has been examined, necessary precautions taken to provide for worker safety and for the area to be a fire safe environment for performing these functions. Permission is granted for the work to be performed.

Signature of SSHO performing inspection and issuing the permit:

I am fully qualified to perform this operation and understand my responsibilities outlined by the inspection just conducted.

Signature of welder/on scene supervisor performing operation:

JACOBS ENGINEERING

Engineers and Constructors

ATTACHMENT B10

## Health and Safety Instrument Calibration Log

| Date | Time | Instrument | MFG Model # | Serial # | Calibration Gas | Lot # | Concentration | BKG Counts | Span Setting | Initials |
|---|---|---|---|---|---|---|---|---|---|---|
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**Attachment B11: Vehicle Accident Procedure and Report Forms**

Incident Reporting Process

HS&E Procedure – Accidents and Incidents

| HSE Procedure | Document No: HSEP 5.1 | Page: |
|---|---|---|
| **Accidents and Incidents** | Supersedes: CHSP 5.1<br>CHSP 5.1.1<br>CHSP 5.1.2<br>CHSP 5.1.3 | Rev. 2 |

| Issuing Department: | Approval: | Previous Rev. Date: | Current Revision Date: |
|---|---|---|---|
| Corporate HSE | Mike.Coyle@Jacobs.com | 1 Jun 97 | 9 May 03 |

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FIGURES

## 1.0 PURPOSE AND SCOPE

Investigations, reporting, and recording of all accidents, incidents, and illnesses is a key step in detecting trends and establishing measures to prevent recurrence. For this reason, it is imperative that all accidents, incidents, and illnesses be reported, investigated, and documented. This includes non-injury events and dangerous occurrences.

This HSEP applies to all employees and company subcontractors engaged in operations covered by the HSE Manual.

For incidents involving motor vehicles, refer to HSEP 5.2. For environmental incidents, refer to HSEP section 22.

## 2.0 RESPONSIBILITIES

General responsibilities for HSE procedures implementation are stated in HSEP 1.5. Additional responsibilities specific to this HSEP include the following.

### 2.1 SITE MANAGEMENT

Site Management shall organize accident investigations and actively participate in them, as required.

Site Management is responsible for analysis of safety records to measure the effectiveness of preventive/follow-up actions and the ongoing safety program.

### 2.2 SUPERVISION

For accidents, incidents, and illnesses involving their personnel, Supervisors must

- Promptly report them to the HSE Department and to Site Management,
- Lead investigations, and
- Ensure that all records are completed in a timely fashion.

### 2.3 EMPLOYEES

Employees must immediately report all accidents, incidents, and illnesses to their Supervisor or the HSE Department.

### 2.4 SITE HSE DEPARTMENT REPRESENTATIVE

The Site HSE Supervisor shall

- assist Site Management in organization of investigations and participate in them,
- assist Supervisors in properly reporting and recording all accidents, incidents, and illnesses,

- establish and maintain all records required by this HSEP and regulatory agency recordkeeping requirements, and
- assist Site Management in the analysis of records to measure the effectiveness of preventive and follow-up actions and the ongoing HSE program.

## 3.0 DEFINITIONS

| | |
|---|---|
| Accidents and Incidents | An unplanned, undesirable event, which disrupts work activity. This includes events that did not result in injury or property damage, but could have. |
| First Aid | Any one-time treatment and subsequent observation of minor scratches, cuts, burns, splinters, and so forth, which does not require medical care. Such treatment and observation are considered first aid even though provided by a physician or a licensed healthcare professional. |
| Illness | Any abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to environmental factors associated with employment. It includes acute and chronic illnesses or diseases, which may be caused by inhalation, absorption, ingestion, or direct contact. |
| Injury | Any injury such as a cut, fracture, sprain, amputation, etc., which results from a work incident or from a single instantaneous exposure in the work environment. It should be noted, conditions resulting form animal bites, such as insect or snakebites, and from one-time exposure to chemicals are considered to be injuries. |

## 4.0 PROCEDURE

In the event of a workplace incident involving injury or illness, the first priority is to provide the best assistance possible to employees who may need it and to ensure the safety of others who may be affected or acting as emergency responders.

### 4.1 ACCIDENT/INCIDENT INVESTIGATION

In order to eliminate incidents, both injury and non-injury, it is important to perform thorough investigations when accidents/incidents occur. An accident/incident investigation is not a fault-finding endeavor, rather it is a fact-finding effort. Immediate action taken to identify causes can be utilized to prevent recurrence of future incidents of a similar nature.

Investigations must be conducted whenever an accident/incident occurs, including non-injury and first-aid-type incidents. Participants in the basic investigation process should include, at a minimum:

- The person(s) involved and/or injured in the incident.
- First- and second-line supervisors of the person(s) involved in the incident.
- Site Manageror office manager.
- The local HSE professional.

In the event of serious incidents, it may be appropriate to add Company management and/or subject matter/discipline specialists to the investigation team.

The investigation team should examine the accident/incident scene, if appropriate, and then review all facts pertaining to the incident in a conference environment.

The task-specific safe work plan (Safe Plan of Action) should be examined as part of the investigation process.

## 4.2 INVESTIGATION REPORTS AND RECORDKEEPING

### 4.2.1 Investigation Report

The Accident/Incident Investigation Report (Figure 1) shall be completed by the first line supervisor as soon as possible following the incident. In the event of a serious incident, the responsibility for report preparation may be assigned to another investigation team member.

The original of the Accident/Incident Investigation Report shall be maintained at the jobsite. A copy shall be sent to the appropriate HSE Manager.

### 4.2.2 Witness Statement

The Witness Statement (Figure 2) shall be used to obtain a signed statement from witnesses of their factual observations, as soon as reasonably appropriate after the incident.

Statements should be written by the witness, however, another person may record his/her dictation if so requested by the witness.

Statements should be taken and prepared in a confidential and non-threatening environment.

Append the Witness Statement to the Accident/Incident Investigation Report.

### 4.2.3 Authorization for Medical Treatment

For incidents that require medical evaluation or treatment of a Company employee, a Company supervisor shall complete an Authorization for Medical Treatment form. A new form shall be sent with the employee upon each visit to the medical services provider. (See Figure 3 for a sample authorization form that can be tailored for local use.)

Ask the medical services provider to complete the disposition portion (lower half) of the form.

Since form distribution varies by location, check with the Corporate HSE Department for distribution in your area.

#### 4.2.4 Employer's First Report of Injury (US Only)

For US operations, an Employer's First Report of Injury (E-1) shall be completed for all injuries, which require referral to a physician for either evaluation or treatment. Contact your HSE Department to arrange for completion of the E-1.

This report and required accompanying reports must be promptly sent to HSE for review and forwarding to the Risk Management Department.

#### 4.2.5 First Aid Register

The First Aid Register (Figure 4) is the primary project injury log and must be kept on-site at all times.

All injuries and/or illnesses (job related or personal) treated or reported (actual or alleged) shall be entered in the log, no matter how minor.

### 4.3 COMMUNICATION OF INVESTIGATION FINDINGS

A review of the incident facts, identified causes, and actions to prevent recurrence should be documented and communicated to employees. Office and jobsite communications can take the form of safety meetings, Task Safety Analysis (TSA) meetings, etc. Findings should also be incorporated in future SPAs and task-specific safe work plans.

For incident findings that may be of value to other locations, Corporate HSE will circulate lessons learned in the form of Safety Alerts, Safety Shorts, Lessons Learned, etc.

### 4.4 RELEASES & EMPLOYEE EXPOSURES INVOLVING HAZARDOUS CHEMICALS

Incidents involving potential exposure to hazardous materials, including incidents on-site, in the office, during Company travel, and hazardous material releases in (EPA-RCRA in US) reportable quantities, must be reported to a Senior HSE Manager.

Report all releases or exposures even though the incident may be considered minor or even though no adverse health effects or symptoms are apparent at the time.

Further procedures and notifications of regulatory agencies and clients shall be followed as defined in the site-specific Health, Safety, and Environment Plan (HSP) or HASAP.

A copy of the investigation report shall be placed in the affected employee(s) corporate medical file.

The Site or Office Manager shall complete all other investigation and reporting requirements as outlined in this HSEP.

## 4.5 RECORDING WORK-RELATED INJURIES & ILLNESSES FOR REGULATORY PURPOSES

Many local HSE regulatory agencies have incident reporting, recording, and posting requirements, which will be followed by all Company entities operating in those areas. The local HSE Manager is responsible for ensuring compliance with these requirements.

### 4.5.1 Recordkeeping

For US operations, enter OSHA Recordable Cases within three days in the OSHA Form 300, the Log of Work-Related Injuries and Illnesses.

For US operations that are covered by MSHA, recordable cases shall be recorded on Form 7000-1, with copies sent to the designated MSHA offices within the 10th workday after learning of its occurrence.

Refer also to HSEP 5.3 for generation and maintenance of incident statistics.

### 4.5.2 Posting Requirements

For US operations, OSHA Form 300A, Summary of Work-Related Injuries and Illnesses, for the preceding year must be posted from February 1 to April 30.

When there were no injuries or illnesses during the year, zeros must be entered on the totals line, and the form posted.

## 4.6 SERIOUS OR FATAL INCIDENTS

Occasionally, serious incidents may occur at project sites or offices that involve Company employees or third parties (contractor, client, member of the public, etc.) and may include events such as

- Serious personnel injury and/or illness,
- Significant vehicle incidents,
- Significant equipment or structural damage, and/or
- Significant threat or damage to the environment.

In such cases, the following requirements may apply.

### 4.6.1 Internal Notifications

In the event of a fatal or serious incident, an immediate telephone report shall be made by the Site or Office Manager or Project Manager or the Site HSE Supervisor to the Operations Manager and Senior HSE Manager.

The Senior HSE Manager shall immediately notify the Vice President of HSE. The Operations Manager shall immediately notify the Group Vice President. These managers will notify other senior Company managers, as appropriate.

All notifications shall be made in person or via direct phone conversations, rather than by e-mail or voice messages.

#### 4.6.2 Regulatory Agency Notifications

Notification to local, state, and Federal agencies will be made by Corporate HSE, if necessary.

For US operations, Fed-OSHA reporting requirements can be found in 29 CFR 1904.8.

#### 4.6.3 Next of Kin Notification

Notification of the next of kin shall be coordinated through Corporate HSE or HR.

Notification shall be made in person by a member of Company management. If, in the event the employee's next of kin resides out of town or state, such notification should be coordinated through a local Company office or a local law enforcement organization.

Local management should consider the need for help with immediate, short-term transportation, lodging, or similar assistance for the next-of-kin.

#### 4.6.4 Accident Investigation

The incident scene shall be secured immediately. No movement of material or equipment shall be made until a review of the incident scene has been completed and documented. (Securing equipment or material, which could result in further injury, may be done.)

A team comprised of representatives from HSE, Operations, and Legal will conduct the investigation. The Legal Department will direct the investigation in order to assure attorney-client privilege, as necessary.

Investigations shall include:

1. Obtaining from witnesses signed statements of their complete and factual observations, as defined above. In the case of certain serious incidents, local law-enforcement personnel may participate in, or conduct, collection of witness statements.
2. Ensuring that adequate photographs are taken from several angles. Release of photographs shall be coordinated through the HSE Department with proper approval by the site owner or client and Company Legal Department.
3. Documentation management for all photos, measurements, statements, and handwritten notes, etc., in a single file. The HSE representative may designate the contents of this file as confidential, "Attorney – Client Privilege", as directed by the Corporate Legal Department.

#### 4.6.5 Media Relations

Some incidents may involve media interaction. Refer to Jacobs Global Policy Supplement, GPS1-105, Media Interaction, for directions and guidelines.

#### 4.6.6 <u>Client Assurance</u>

The client shall be assured that the Company is professionally investigating the incident and will make the necessary program adjustments or recommendations to prevent recurrence.

### 4.7 TRAINING

Supervisors must be trained in proper accident/incident investigation techniques and the recording and reporting requirements.

The Accident/Incident Investigation Report (Figure 1) must be issued and reviewed as part of this training.

## 5.0 REFERENCES


29 CFR 1904, Recording and Reporting Occupational Injuries and Illnesses

U.S. Department of Labor, Bureau of Labor Statistics, Record-keeping Guidelines for Occupational Injuries and Illnesses (the “Blue Book”)

**FIGURES**

## Figure 1 - Accident/Incident Investigation Report

Date of Accident/Incident:___________ Time of Incident:______________ Company:_________________________

Date of Investigation:___________________ Project Number:_______________ Client:_________________________

Location of Accident/Incident:________________________________________________________________________

Did injury result? Yes/No _____, If yes, provide Employee Name(s):________________________________________

S.S. No.:__________________ Skill:__________________Yrs. in this Skill:________Yrs. with Company:_________

Describe Type of Injury:______________________________________________________________________________

Was property damaged ? Yes/No _____, Describe damage/owner:____________________________________________

______________________________________________________________________________________________________

Is damaged property secured/maintained? Yes/No_____, Person Maintaining___________________________________

Names of Witnesses/Coworkers (With Social Security No.):__________________________________________________

______________________________________________________________________________________________________

Weather / Wind Conditions:_____________________________________________________________________________

List/Describe all personal protective equipment (PPE) in use by person exposed or injured:_______________________

______________________________________________________________________________________________________

**If Chemicals Involved:**

Name(s) of Chemical(s) Encountered:________________________________________________________________
______________________________________________________________________________________________________

Form of Chemicals (Solid, Liquid, Gas, Vapor, Dust, Mist Fume):_____________________________________________

Describe Radiological Materials (if any):______________________________________________________________

Volume or Quantity Released:________________________________________________________________________

**Description of Accident/Incident:**_______________________________________________________________

______________________________________________________________________________________________________

______________________________________________________________________________________________________

______________________________________________________________________________________________________

______________________________________________________________________________________________________

**Contributing Factors:**____________________________________________________________________________

______________________________________________________________________________

What **corrective actions** are being taken to prevent recurrence? Also list the person responsible for implementing and the target completion date for each item.

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

Was an SPA/JSA developed for the task being performed? Yes/No_____, If yes, attach a copy.

Was a permit issued? Yes/No _________, If yes, attach a copy of the permit in effect at time of the incident.

**Indirect** cause: **Lack of**: Training____, Resources____, Belief____ (*explain)

______________________________________________________________________________

**Basic** cause: **Failure to**: Plan____, Direct____, Organize____, Control____(*explain)

______________________________________________________________________________

**INVESTIGATION TEAM MEMBERS:**

| | | |
|---|---|---|
| Injured / Involved: | Name | Signature |
| Supervisor: | Name | Signature |
| Site/Office Manager: | Name | Signature |
| HSE Professional: | Name | Signature |
| Name (Others) | Title | Signature |
| Name (Others) | Title | Signature |

Client Representative(s) Contacted:_____________________________________________

Agency Representative(s) Contacted:_____________________________________________

* Attach additional sheets and supplemental data & information as necessary.

** Distribution: Original must be filed on-site; 1 copy must be sent promptly to the Corporate Health and Safety Department.

## Figure 2 - Witness Statement

Please print or type.

Name:______________________________________________________ Title:______________________

Social Security Number:_________________________________________Date:________ Time:________

Temporary Address:____________________________________________ Phone No.________________________

________________________________________________________________________

Permanent Address:____________________________________________ Phone No.________________________

________________________________________________________________________

Location at Time of Accident:________________________________________________________________

Describe, to the best of your knowledge, what happened just before, during, and just after the accident:

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

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____________________________________________________________________________________

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____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

______________________________________________
Signature

## Figure 3 - Authorization For Medical Treatment

To: ______________________ Address: ______________________ Date: _______

This form, signed by our representative, is your authorization to render **initial** medical treatment only to:

____________________________________________________
(Employee)

in accordance with the provisions of, and under the conditions prescribed by, the Workers' Compensation Act. Unless the case is an emergency, kindly obtain authorization for surgery, radical procedures, or hospitalization from the insurance carrier.

Fax this completed form to (*enter here the fax number for the local Jacobs Risk Management office point of contact*)

Send your bill and report to (*enter insurance carrier's mailing address and name of point-of-contact to whom the report and bill should be sent*)

____________________________________
Authorized Jacobs Representative

Date of Injury _______________ Location ________________________ Job No. ___________

How injury occurred ______________________________________________________

______________________________________________________________

---

**For Doctor's Use Only**

Diagnosis of Injury: ______________________________________________________

Disposition of Patient: ☐ Occupational ☐ Non-Occupational ☐ Unable to determine

- ☐ Able to resume regular duties.
- ☐ Able to resume regular duties next workday.
- ☐ Able to resume restricted duties with the following limitations: ____________________

  ______________________________________________________________
- ☐ Unable to return to work; estimated length of disability: ________________________

Return for follow-up visit on _________________________________ (Date)

Discharged from care on _________________________________ (Date)

____________________________________
(Doctor's Signature)

**Figure 4 - First Aid Register**

Company:____________________________________________________________

Project Name/Number:_________________________________________________

Jobsite Location:_____________________________________________________

Month / Year:_________________________________________________________

Site or Office Manager:_________________________________________________

**Page: _____ of _____**

| Date | Time | Name | Supervisor Or Foreman | Type of Injury, Body Part, and Brief Description of Injury | Class* |
|---|---|---|---|---|---|
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***Class** - Classification: **FAV** - First Aid Visit **E-1** - Doctor's Visit **OSHA** - OSHA Recordable **Other:**

# Attachment B12: HSE Procedure – Vehicle Accidents

JACOBS ENGINEERING GROUP INC.

| Work Instruction<br>HSE Procedure | | Document No:<br>HSEP 5.2 | Page:<br>5-2 of 3 |
|---|---|---|---|
| Vehicle Accidents | | Supersedes:<br>HSEP 5.2 | Rev.<br>3 |
| Issuing Department:<br>Corporate HSE | Approval:<br>Mike.Coyle@Jacobs.com | Previous Rev. Date:<br>23 Aug 01 | Current Revision Date:<br>1 Apr 03 |

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FIGURES

## 1.0 PURPOSE AND SCOPE

This Health, Safety, and Environment Procedure (HSEP) provides the minimum procedures to be followed in the event of a vehicle accident involving a Company owned or leased vehicle or a personal vehicle used for Company business and to any other motor vehicle, e.g. personal or borrowed and "third party motor vehicles", used by personnel engaged in Company business. This procedure addresses all motorized vehicles including cars, trucks, busses, all-terrain vehicles, golf carts, etc.

## 2.0 RESPONSIBILITIES

General responsibilities for HSE procedures implementation are stated in HSEP 1.5. Additional responsibilities specific to this HSEP include the following.

### 2.1 MANAGEMENT

Each Manager will ensure that Company Risk Management Department accident report forms are maintained in each Company vehicle under his/her control.

The appropriate manager must review all Vehicle Accident Reports with the employee and supervisor involved.

### 2.2 SUPERVISOR

Supervisors shall promptly report any vehicle incidents to operations management, HSE, and Corporate Risk Management.

Supervisors of employees involved in vehicle accidents must investigate the accident and complete the Vehicle Accident Report (Figure 1) with input from the person(s) involved in the incident and witnesses to the incident.

Copies of completed reports shall be promptly submitted to the Company Risk Management Department, to Corporate HSE, and to the office or operations program manager.

### 2.3 EMPLOYEE

Employees are responsible to promptly report all vehicle accidents to their supervisor or appropriate manager.

Employee drivers involved in vehicle accidents shall assist their supervisor or manager with completion of a Vehicle Accident Report.

### 2.4 CORPORATE RISK DEPARTMENT

The Corporate Risk Department distributes accident report forms, which are to be maintained in each vehicle covered by this HSEP.

### 2.5 HUMAN RESOURCES DEPARTMENT

The appropriate Human Resources Department will obtain a signed copy of the Motor Vehicle Operator Qualification form (HSEP 21.2) for each qualified operator.

## 3.0 DEFINITIONS

| | |
|---|---|
| Qualified Operator | Personnel who been designated and authorized by the Company to operate motor vehicles on Company business. |
| Vehicle | Motorized vehicles, including cars, trucks, busses, all-terrain vehicles, golf carts, etc. |

## 4.0 PROCEDURE REPORTING

Accident report forms shall be maintained in all vehicles owned, leased by the Company, or personal vehicles utilized for Company business. The forms are supplied by the Corporate Risk Management Department.

The form shall also be used in filing reports of accidents involving equipment vehicles (on-site or offsite) such as cherry pickers, backhoes, trucks, cars, etc.

Supervisors of employees involved in vehicle accidents must investigate the accident and complete the Vehicle Accident Report (Figure 1) with input from the person(s) involved in the incident and witnesses to the incident.

The report shall be distributed as follows:

- Corporate Health, Safety, and Environment
- Site or Manager's File
- Jacobs Vehicle Management Group
- Corporate Risk Management

Each incident will be investigated by a representative of the Corporate HSE Department in order to identify the cause and to determine measures to be taken to prevent a similar recurrence.

Disciplinary action and/or retraining may be required for any employee involved in a vehicle accident.

### 4.1 POST-INCIDENT ACTIONS

Vehicle operators shall be given instructions by their supervisor or an HSE representative on how to report an accident and what to do at the scene.

- Stop at once to investigate.
- If necessary, have someone call for emergency medical services.
- Call the police if the incident occurs on public property.
- Do not admit liability, even if you feel you are at fault.

- Do not discuss the incident with anyone at the scene other than the police, and only answer questions asked by them.
- Do not provide a written statement to anyone unless approved by Corporate Legal or Corporate Risk Management.
- Do not move vehicle until cleared by the police or unless local ordinances require moving vehicles after an accident.
- If possible, obtain names, addresses, license numbers, and phone numbers of any witnesses.
- Promptly notify your supervisor after an incident and assist with completion of the Vehicle Accident Report (Figure 1).
- Obtain from Risk Management an Automobile Loss Notice form and complete and submit to Risk Management.

## 5.0 REFERENCES

HSEP 21.2

# FIGURES

Vehicle Accident Report

## Figure 1 - Vehicle Accident Report

**Claim Reporting**
**Risk Management Dept.Toll Free: 877/832-1721 Phone: 832 351-7146 Fax: 832 351-7712**

**Company Name** ______________________________________________
Date of Accident ____________________Time of Accident __________________________
Location of Accident ________________________________________________________
Project No. ______________________________ Vehicle No. ________________________

**Company Vehicle**
Driver _______________________________________ Date of Birth ________________
Work Address: _______________________________________________________________
Home Address: _______________________________________________________________
Work Phone No. ____________________ Home Phone No. __________________________
Supervisor Name/Phone _______________________________________________________
Vehicle Owner _________________ Make and Model ______________________________
License No. __________ Vehicle Identification No. ______________________________
Name(s) of Passengers: _______________________________________________________

**Other Vehicle**
Driver _______________________________________________________________________
Home Address of Driver ______________________________________________________
Work Phone No. __________________________ Home Phone No. ____________________
Driver's License No. (Including State) ________________________________________
Vehicle Owner _________________ Make and Model______________________________
Relation of Driver to Owner ___________________________________________________
Insurance Company __________________________________________________________
Insurance Agent ____________________ Policy No. _______________________________

---

**Description of Accident**

_______________________________________________________________________________
_______________________________________________________________________________
_____________________________________________________________________

**Description of Damage To Vehicle**

**Company Vehicle:** ___________________________________________________________
Est. Repair Cost $_________ Where Vehicle Can Be Seen:__________________________

**Other Vehicle:** _____________________________________________________________
Est. Repair Cost $_________ Where Vehicle Can Be Seen___________________________

**Injuries/Witnesses**

**Company Vehicle:** Name and Age of Injured ☐ Witnesses ☐ ______________________

________________________________________________________________________

Relation to Driver of Company Vehicle ______________________________________________

________________________________________________________________________

Name of Investigating Officer:

________________________________________________________________________

Badge No. _____Police Report Number ____________Citations________________________

**Other Property Damage**

Owner's Name, Address, and Phone No.

__________________________________________________________________________

________________________________________________________________________

Describe Damage

__________________________________________________________________________

________________________________________________________________________Report submitted by ___________________________ Date ___________________________

**Diagram of Accident**

**Attachment B13: Rental Equipment Condition Report for Automobiles / Trucks**

**Attachment B14: Standard Equipment Inspection Form**

**JE REMEDIATION TECHNOLOGIES, INC.**
A MEMBER OF THE JACOBS ENGINEERING GROUP

**Attachment B13**

**RENTAL EQUIPMENT CONDITION REPORT**

**FOR AUTOMOBILES/TRUCKS**

**CLIENT** ____________________ **PROJECT NO.** ______________________

VEHICLE TYPE __________________________AGENCY RECEIVED FROM ______________________

MAKE/MODEL _____________ MILEAGE Out _____________ MILEAGE In _____________

"Yes or No" Where Appropriate "G" - New or in Good Condition "R" - Requires Repairs "N" - Items Not Applicable

## BODY & INTERIOR

☐ Inspection Sticker ______________ ☐ Upholstery ___________________

☐ License/Sticker_____________________ ☐ Heater/Defroster _______________

☐ Door Locks ____________________ ☐ Air Conditioner ________________

☐ Door Handles _______________________ ☐ Steering ______________________

☐ Lighting System _______________ ☐ Floor Boards/Mats ________________

☐ Body ________________________ ☐ Paint ________________________

## ENGINE & OPERATING SYSTEMS

☐ Oil Level and Condition ______________ ☐ Oil Leaks _____________________

☐ Operating Condition __________________ ☐ Cooling System/Hoses _______________

☐ Water Level/Anti-Freeze ______________ ☐ Transmission __________________

☐ Tire Condition/Lugs _________________ ☐ Transmission Level/Condition __________

☐ Battery Condition __ ______________________ ☐ Corrosion/terminal Connections___________________

☐ Tire Pressure _____ ☐ Lug Nuts________________ ☐ Fan/ Alternator__________ ☐ Belts ________

☐ Control Panel, Gauges ________________ ☐ Spare Tire _______________

☐ Jack, Tire Tool ________________________ ☐ Exhaust System __________________

☐ Windshield Wipers ________________ ☐ Brakes ______________________

☐ Windows, Windshield ___________ ☐ Parking Brake ______________________

**Attachment B13** (continued)

| **REMARKS:** |
| --- |
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| |
| Initial Inspection By ___________________________________________ Date ___________________________________________ |

JACOBS ENGINEERING GROUP INC.

## Attachment B14

## Standard Equipment Inspection Form

| Make | Type | Year of Manufacture | Date | Model | Serial No. | Hours | Employee ID | Inspector Name |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

| ***Fill in appropriate boxes*** | Company Name | | **Engine** | **Attachment** | **Attachment** |
|---|---|---|---|---|---|
| | | | | | |
| | Supervisor Name | | | | |

**A. SERVICE CHECKS PRE-FIELD MOBILIZATION:**

| ITEM | *OK* | *AMT NEEDED* | *ITEM* | *OK* | *AMT ADDED* |
|---|---|---|---|---|---|
| Radiator & Freeze Protection | | | Batteries | | |
| Transmission | | | Differential/Plan | | |
| Final Drives | | | Tandems | | |
| Engine | | | Fuel Level | | |
| Hydraulic System | | | Drain Fuel Sediment | | |
| Lubrication Points | | | Pivot Shaft | | |

**B. EQUIPMENT INSPECTION PRE-FIELD MOBILIZATION**

| | *CONDITION Bad/Good/ Excellent* | *Attn Needed* | **Explanation** | *Corrected? (Y/N)* |
|---|---|---|---|---|
| Engine Compartment | | | | |
| Radiator | | | | |
| Fan & Shrouds | | | | |
| Air Induction and Filter | | | | |
| Belts Pulleys | | | | |
| Exhaust & Rain Cap | | | | |
| Battery & Cables | | | | |
| Hydraulic Cylinders | | | | |
| Operators Comp. | | | | |
| Controls & Linkages | | | | |
| Hoses & Lines | | | | |
| Oil Leaks | | | | |
| Fuel Leaks | | | | |
| Coolant | | | | |
| Fasteners | | | | |
| Cracks | | | | |
| Guards & Covers | | | | |
| Cutting Edges | | | | |
| Sprockets | | | | |
| Rollers & Idlers | | | | |
| Tracks or Tires | | | | |

**B. EQUIPMENT INSPECTION PRE-FIELD MOBILIZATION** (continued)

| | ***CONDITION Bad/Good/ Excellent*** | ***Attn Needed*** | **Explanation** | ***Corrected? (Y/N)*** |
|---|---|---|---|---|
| Engine | | | | |
| Governor Control | | | | |
| Trans Operation | | | | |
| Trans Linkage | | | | |
| Steering System | | | | |
| Service Brakes | | | | |
| Parking Brake | | | | |
| Unusual Noise | | | | |
| Gauges Operational | | | | |
| Gauges Normal | | | | |
| Backup Alarm | | | | |
| Heater & Fan | | | | |
| Switches | | | | |
| Wipers & Washer | | | | |
| Lights | | | | |
| Horn | | | | |
| Seat & Seat Belts | | | | |
| Windows | | | | |
| Doors | | | | |
| **General Appearance:** | | | | |
| **Machine Damage:** | | | | |

**NOTES:**

**Attachment B14** (continued)

**NOTES** (continued)**:**

Deficiencies noted: ☐ Yes ☐ No Explain: ____________________

Deficiencies fixed: ☐ Yes ☐ No Date: ____________

Inspection 100% complete ☐ Yes ☐ No

Subcontractor Signature ____________________ Date all items passed inspection: __________

Jacobs Representative ____________________ Date: __________

## Attachment B15: Respiratory Protection Program and Report Forms

**Attachment B15**

## 7.0 TERC RESPIRATORY PROTECTION PROGRAM

The Respiratory Program Administrator for the Company is Terry Briggs, Ph.D., CIH, who is located in the Denver, CO office. He is responsible for the overall administration of this Program and conducting evaluations of the Program's effectiveness. Because the Company operates multiple project locations in various states, the Program Administrator has designated the Corporate HSE Managers as "Program Coordinators" to assist him in the execution of these responsibilities.

The Program Coordinator for Alaska-based projects is Brad Burns, who is located in the Anchorage, AK office. The Program Coordinator shall be responsible for Program implementation, conducting routine observations related to the effective selection, use, maintenance, storage, and other aspects of this Program. Observations shall be documented through the use of Safety Observation Reports, (SORs) and other similar documents. The Program Coordinator shall ensure that noted deficiencies are corrected as soon as possible.

### 7.1 MEDICAL EVALUATION

A medical evaluation and/or a medical examination will be completed to determine the employee's ability to use a respirator before the employee is fit tested or required to use a respirator in the workplace. A medical examination shall include any medical tests, consultations, or diagnostic procedures that the physician or other licensed health care professional (PLHCP) deems necessary to make final determination on the employee's ability to use a respirator. Form 1-1 provides a site program overview for respirator selection, training, testing, usage, and record-keeping.

## Form 1-1
## Site Program Overview

| | |
|---|---|
| **Medical Evaluations** | Medical evaluations will be performed by Alexander T. Baskous, MD, MPH<br><br>Medical evaluations will be scheduled by Aletha Colvett<br>Denver EH&S Phone: (303) 462-7212 |
| **Respirator Selection** | List specific types of respiratory equipment available on this project:<br>**Type** / **Model** / **Size**<br>**MSA** / **Ultra Twin (full face)** / **S, M, L** |
| | **Respirators will be selected using Form 3-1, by the following person:**<br>**SSHO on each project**<br><br>Respirators will be issued by the following person or organization:<br>Program Coordinator Phone: (907) 751-3387 |
| **Fit Testing** | **The following person/organization will perform fit testing:**<br>**Name: Brad Burns Phone: (907) 751-3387**<br>**Name: Phone:**<br>**Name: Phone:**<br>**Name: Phone:**<br>**Name: Phone:**<br>☐ **Qualitative fit testing:**<br>☐ **Bitrex™** ☐ **Saccharin solution**<br>☐ **Isoamylacetate (Banana Oil)** ☐ **Irritant smoke**<br>☐ **Quantitative fit testing:**<br>**Protocol: ____** |
| **Training** | **The following person/organization will perform respirator training:**<br>**Name: Brad Burns Phone: (907) 751-3387**<br>**Name: Phone:**<br>**Name: Phone:**<br>**Name: Phone:**<br>**Name: Phone:** |

## Form 1-1
## Site Program Overview
(continued)

| | |
|---|---|
| **Respirator Use** | Entry into the following areas routinely require respirator use:<br>Level C Exclusion Zones<br>MSA Full Face |
| | Store respirators in the following location(s):<br>Site Office<br>Local Temporary Storage (connex box) |
| | **Dispose of used respirator cartridges and canisters at the following location(s):** |
| | The following person/organization is authorized to perform respirator maintenance and repair:<br>**Name: Brad Burns** **Phone: (907) 751-3387**<br>**Name:** **Phone:**<br>**Name:** **Phone:**<br>**Name:** **Phone:**<br>**Name:** **Phone:**<br>Manufacturer specific instructions for respirators used at this site are included in Section 7. |
| **Record Keeping** | The Alaska region health and safety administrative assistant will maintain specified records as required:<br>**Medical Questionnaires**<br>**Medical Ability to Wear a Respirator**<br>**Respirator Selection**<br>**Fit Test Records**<br>**Training Records**<br>**Program Evaluation, and Contact Person** **Brad Burns** **Anchorage, AK** |

### 7.1.1 Medical Evaluation Procedures

1. A PLHCP performs all respirator user medical evaluations. Each employee shall complete the Medical Questionnaire for Respirator Users (Appendix A), which is forwarded to Dr. Zavon for written determination of the employee's ability to use the selected respirator, under the defined working conditions.
2. All respirator users will answer questions 1 through 15 on the questionnaire.
3. Every employee who will be using an SCBA and has a positive response to any item in questions 10 through 15 of Part A, section 2 will be provided a medical examination.
4. If a pre-employment or annual physical is required and conducted, it may be used to meet the requirements of this section if it includes the same information as the OSHA Respirator Medical Evaluation Questionnaire.
5. The medical questionnaire and examinations are administered confidentially during the employee's normal working hours or at a time and place convenient to the employee. The medical questionnaire is also administered in a manner that ensures that the employee understands its content.
6. The employee is also provided an opportunity to discuss the questionnaire and examination results with the PLHCP.
7. Any employee who refuses to be medically evaluated for respirator use will not be allowed to use a respirator.

### 7.1.2 Follow-up Medical Examination

1. A follow-up medical examination is provided for any employee who gives a positive response to any of Questions 1 through 8 in Section 2 Part A of the Questionnaire, or whose initial medical examination demonstrates the need for a follow-up medical examination.

### 7.1.3 Supplemental Information for the PLHCP

1. Supplemental information concerning the specific type(s) of respirator to be used and the anticipated working conditions is provided to the PLHCP, with each Respirator Medical Evaluation Questionnaire, before the PLHCP makes a recommendation concerning an employee's ability to use a respirator. (See Form 2-1)
2. A copy of the OSHA Respiratory Protection standard and a copy of this site-specific written Program has also been provided to the PLHCP.

### 7.1.4 Medical Determination

1. Following the evaluation and/or examination a written recommendation regarding the employee's ability to use the respirator must be provided by the PLHCP. The recommendation shall provide the following information:
   - Any limitations on respirator use related to the medical condition of the employee, or relating to the workplace conditions in which the respirator will be used, including whether or not the employee is medically able to use the respirator;
   - The need, if any, for follow-up medical evaluations; and

- A statement that the PLHCP has provided the employee with a copy of the PLHCP's written recommendation.

2. For negative pressure respirator work, if the PLHCP finds a medical condition that may place the employee's health at increased risk, a powered air-purifying respirator (PAPR), or equivalent, can be provided with the following restriction. A PAPR can be provided only if the PLHCP's medical evaluation finds that the employee can use such a respirator.

3. If an employee is wearing a PAPR because of medical restrictions and if a subsequent medical evaluation finds that the employee is medically able to use a negative pressure respirator, then there is no longer a requirement to provide a PAPR.

### 7.1.5 Additional Medical Evaluations / Examinations

1. An additional medical evaluation and/or examination shall be made if:

   - An employee reports medical signs or symptoms that are related to ability to use a respirator;
   - A PLHCP, supervisor, Program Coordinator, or the respirator Program Administrator determines that an employee needs to be reevaluated;
   - Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee reevaluation; or
   - A change occurs in workplace conditions (e.g., physical work effort, protective clothing, temperature) that may result in a substantial increase in the physiological burden placed on an employee.

## Form 2-1
## Supplemental Respiratory Information

**Dr. ____________________ , please provide a written recommendation regarding this employee's ability to use a respirator, as defined below.**

Employee Name:____________________ S. S. No. _________________

Company: ____________ Project Name: _________ Job No. __________
************************************************************************************************

**1) Type respirator:** ____________ (Circle one) Half Mask, Full Face (Circle all that apply) Particulate Filter, Gas/vapor Cartridge, Air Supplied

**2) Weight of respirator:** ______________________________________

**3) Duration and Frequency of Use:** (Circle "Yes" for best definition of employee's use)

| | |
|---|---|
| 1) Emergency rescue only | Yes |
| 2) Less than 5 hours per week | Yes |
| 3) Less than 2 hours per day | Yes |
| 4) 2 to 4 hours per day | Yes |
| 5) Over 4 hours per day | Yes |

**4) Expected physical work effort:**

**Light** (less than 200 kcal/hour)

**Examples of **Light** work include: sitting while typing, writing, drafting, or performing light assembly work, or standing while operating a drill press or controlling machines.*

**Moderate** (200 to 350 kcal/hour)

**Examples of **Moderate** work include: Sitting while nailing or filing, driving a truck or bus, standing while drilling, nailing, assembly work, manual lifting (about 35 lbs.) at waist level, pushing a wheelbarrow with a heavy load (about 100 lbs.) on a level surface.*

**Heavy** (above 350 kcal/hour)

**Examples of **Heavy** work include: lifting a heavy load (about 50 lbs.) from floor to waist or shoulder, shoveling, standing while bricklaying or chipping, walking up an 8 degree grade, climbing stairs carrying a heavy load (about 50 lbs.)*

**5) Additional PPE to be worn** ______________________________________

**6) Will you be working under hot conditions ( above 77 F)? Yes / No**

**7) Will you be working under humid conditions? Yes / No**

- *A copy of the site-specific Respirator Program and OSHA standard 1910.134 have also been provided to the physician, along with the information contained on this document.*

**************************************************************************************************
*

Reply to __________, ( ) _______ fax, ( ) _____ phone

## 7.2 RESPIRATOR SELECTION

This section presents the types of respirators available on-site, and the criteria and procedure to be used to determine respiratory protection needed for specific tasks.

### 7.2.1 Respirators Available

Respirator Selection documentation (Form 3-1) will be completed by the Respiratory Protection Program Coordinator and includes information relative to respirator selection. Completed Respirator Selection forms are maintained as part of this Program and are updated as necessary. The types of respirators available for (routine) selection on this site include:

| Respirator Type | Model/Sizes | Cartridge #s | Applications |
|---|---|---|---|
| MSA Full Face | S, M, L | As required by each site | |

### 7.2.2 Criteria for Respirator Selection

Respirator selection for routine tasks has been determined through application of existing (i.e., Client, Manufacturer) data.

Form 3-1 can be completed by the Respiratory Protection Program Coordinator for all routine tasks/areas and for all tasks in areas not previously worked in and/or with chemical compositions or concentration not previously encountered and shall document respirator selection guidelines for respiratory protection.

Also, note that the particulate filter cartridge Types N, R, and P refer to standard performance designations established by NIOSH. Individual manufactures may have different designations. To aid in decision-making on the appropriate type of respirator, individual manufacturer literature will also be used.

Cartridge service life limit – Currently only a few cartridge end-of-service-life indicators are NIOSH-certified. Professional judgment is required to establish service life limits based on contaminant chemical, physical, and toxicological properties, estimated contaminant concentrations and exposure patterns and contaminant warning properties. Cartridge manufacturer references can also be used as guidance in this evaluation. Note: for chemicals with odor thresholds above the exposure limits (PEL or TLV), chemical cartridges **shall not** be used. Also, certain compounds exhibit relatively poor adsorption capacity and service life must be restricted, e.g., one use only or partial shift, depending on site conditions. Examples of chemicals in this category are:

- Ethanol, propanol, and other light alcohols;
- Ethyl chloride, chloropropane, and other light monochloro hydrocarbons;
- Chloroform, methyl chloride, and other light trichloro hydrocarbons;
- Methyl acetate and other light acetate compounds;
- Acetone and other light ketones;
- Hexane and other light alkanes;
- Methylamine, dimethylamine, and other light amines;
- Methyl iodide; and
- Acrylonitrile.

## Form 3-1
## Respiratory Hazard And Respirator Selection

**Project:** ______________________ **Date:** __________ **Task:** __________

**Site Area/Process:** ______________________ **Estimated Task Duration:** __________

| Major Chemical Hazards | Estimated Concentration PPM (mg/m$^3$) | PEL or TLV PPM (mg/m$^3$) |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

**Confined Space Issues. Describe:** ______________________

**Cartridge Respirator Restriction. Describe:** ______________________

**IDLH Atmosphere Potential. Describe:** ______________________

Respirator Selected:

- ☐ Disposable Type/Single-Use (non-IDLH) (see section 5.2)
- ☐ Particulate Filter (see section 5.4)
  - ❍ Type N, non-oil
  - ❍ Type R, oil ok up to 8 hours
  - ❍ Type P, oil ok, no time restriction
- ☐ Chemical Cartridge
- ☐ Air-line
- ☐ SCBA

**Cartridge Type (if applicable):** ______________________

**Cartridge Service Life Limit:** ______________________

**Cartridge Change-out Schedule:** ______________________

**Comments:** ______________________

**Prepared by:** ______________________

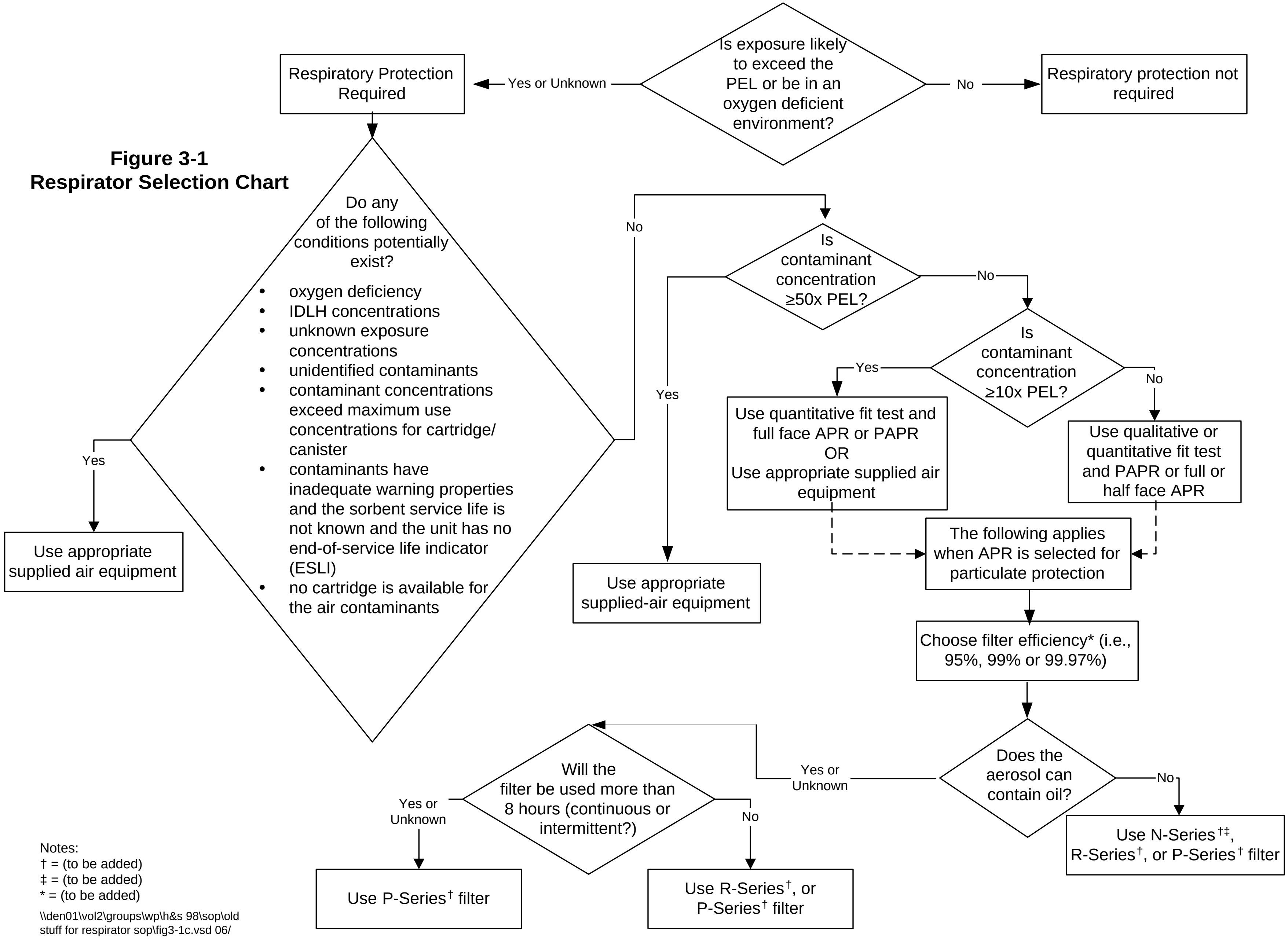


**Figure 3-1**
**Respirator Selection Chart**

Notes:
† = (to be added)
‡ = (to be added)
* = (to be added)

\\den01\vol2\groups\wp\h&s 98\sop\old stuff for respirator sop\fig3-1c.vsd 06/02/98

### 7.2.3 Immediately Dangerous to Life or Health Atmospheres (IDLH)

1. Employees are not permitted to work in oxygen deficient (<19.5%) atmospheres or in areas with chemical concentrations potentially above IDLH levels unless prior approval is obtained from the Respirator Program Coordinator, the TSHM, and the Project Manager. Examples of jobs that are or could become IDLH include activities such as:
   - Breaking into flare lines;
   - Initial opening of $H_2S$ or CO equipment vessels or lines;
   - Working near reactors or vessels having used catalyst;
   - Confined space entry work where inert gas may be present; and/or
   - Working in certain process or sanitary sewers.
2. When work tasks are to be performed in IDLH atmospheres a full-facepiece pressure-demand SCBA, rated for a minimum service life of 30 minutes or a supplied air-line respirator with egress bottle is required.
3. Trained rescue standby person(s) located outside the IDLH area are posted and equipped with an SCBA or air-line on separate supply. This includes work in confined spaces that require air-line respiratory protection for other than nuisance odor or nuisance dust.
4. Stand-by persons will be equipped with the following:
   - Pressure demand or other positive pressure SCBA or a pressure demand or other positive pressure supplied-air respirator with an auxiliary egress bottle; and
   - Appropriate retrieval equipment (harnesses, wristlets, anklets) for removing an employee who enters the hazardous atmosphere.
5. Retrieval equipment must be used unless it would increase the overall risk of rescue. Situations may exist in which retrieval line would pose an entanglement problem, especially if air-lines and electrical cords are present. It shall also be ensured that visual or signal line communication is maintained between the employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere.
6. The designated Rescue Team is notified before the employee(s) located outside the IDLH atmosphere enter the IDLH atmosphere to provide emergency rescue.
7. Standby personnel will notify ___________ at _________ in case of emergency and/or rescue is necessary.

## 7.3 FIT TESTING REQUIREMENTS

Respirator fit testing is performed in accordance with OSHA accepted fit test protocols and procedures.

1. Persons performing Qualitative Fit Tests and/or Quantitative Fit Tests must be qualified to perform the tests correctly and to verify accuracy and designated by the Company to do so.
2. The following fit testing requirements shall be met.

- Each respirator wearer shall be fit-tested on each specific (model, size) respirator worn prior to initial use, and **annually thereafter**.
- Spectacles (glasses), goggles, faceshields, or welding helmets shall be worn in a manner that does not interfere with the facepiece seal of the respirator.
- Contact lenses (soft and gas permeable only) may be worn with full-face respirators, according to the OSHA standard. Some clients have policies that prohibit their use on their sites.
- Employees shall be clean shaven; facial hair shall not come between the sealing surface of the facepiece and the face or interfere with valve function.
- User seal checks are performed each time the respirator is donned and prior to entering a hazardous atmosphere.

**[Program Coordinator's Note:** Fit testing shall be conducted using the procedures found in 29 CFR 1910.134. Documentation of all employee fit tests shall be made and retained until the next fit test is administered. Forms 4-1 and 4-2 (see the end of this section), for Qualitative and Quantitative fit tests, respectively, may be used for this purpose.]

3. The employee shall be allowed to select the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.
4. Prior to the selection process, the employee shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension, and how to determine an acceptable fit. A mirror shall be available to assist the employee in evaluating the fit and positioning of the respirator. This instruction may not constitute the employees formal training on respirator use, because it is only a review.
5. The employee shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape, and if fitted and used properly, will provide adequate protection.
6. The employee shall be instructed to hold each chosen facepiece up to the face and eliminate those that obviously do not give an acceptable fit.
7. The more acceptable facepieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to assess comfort. If the employee is not familiar with using a particular respirator, then he/she shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.
8. Assessment of comfort shall include a review of the following points with the employee and allowing adequate time to determine the comfort of the respirator:
    - Position of the mask on the nose;
    - Room for eye protection;
    - Room to talk; and
    - Position of mask on face and cheeks.

9. The following criteria shall be used to help determine the respirator fit:
   - Chin properly placed;
   - Adequate strap tension, not overly tightened;
   - Fit across nose bridge;
   - Respirator of proper size to span distance from nose to chin;
   - Tendency of respirator to slip; and
   - Self-observation in mirror to evaluate fit and respirator position.
10. The employee shall conduct a user seal check, either the negative and positive pressure seal checks described or those recommended by the respirator manufacturer, which provide equivalent protection. Before conducting the negative and positive pressure checks, the subject shall be told to seat the mask on the face by moving the head from side-to-side and up and down slowly while taking in a few slow deep breaths. Another facepiece shall be selected and retested if the test subject fails the user seal check.
11. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface, such as stubble beard growth, beard, mustache or sideburns which cross the respirator sealing surface. Any type of apparel which interferes with a satisfactory fit shall be altered or removed.
12. If the employee exhibits difficulty in breathing during the tests, he or she shall be referred to a PLHCP, as appropriate, for a medical re-evaluation to determine whether they can wear a respirator while performing their duties.
13. If the employee finds the fit of the respirator unacceptable, the test subject shall be given the opportunity to select a different respirator and to be retested.
14. A tight fitting PAPR can be fit tested simply by not turning the fan motor on.

*Exercise Regimen*

Prior to commencement of the fit test, the employee shall be given a description of the fit test and the employee's responsibilities during the test procedure. The description of the process shall include a description of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least five minutes before the start of the fit test.

The fit test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use, which could interfere with respirator fit.

*Test Exercises*

The following test exercises are performed for all fit testing methods prescribed in this procedure, except for the Control Negative Pressure (CNP) method. A separate fit testing exercise regimen is contained in the CNP protocol. The employee shall perform exercises, in the test environment, in the following manner:

1. Normal breathing. In a normal standing position, without talking, the employee shall breathe normally.
2. Deep breathing. In a normal standing position, the employee shall breathe slowly and deeply, taking caution so as not to hyperventilate.
3. Turning head side to side. Standing in place, employee shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale at each side.
4. Moving head up and down. Standing in place, the employee shall slowly move his/her head up and down. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).
5. Talking. The employee shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song.

   *Rainbow Passage*

   When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.
6. Grimace. The employee shall grimace by smiling or frowning. (This applies only to QNFT testing; it is not performed for QLFT).
7. Bending over. The employee shall bend at the waist as if he/she were to touch his/her toes. Jogging in place shall be substituted for this exercise in those test environments such as shroud-type QNFT or QLFT units that do not permit bending over at the waist.

Normal breathing. Same as exercise (1).

Each test exercise shall be performed for one minute except for the grimace exercise, which shall be performed for 15 seconds. The employee shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

### 7.3.1 Qualitative Fit Test Requirements (QLFT)

1. Negative-pressure air purifying respirators that will be worn in concentrations that are equal to or less than 10 times the PEL may be fit tested using QLFT.

2. The individual and/or persons administering QLFT are able to prepare test solutions, calibrate equipment and perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order.
3. The QLFT equipment is to be kept clean and well maintained so as to operate within the parameters for which it was designed.

[**Program Coordinator's Note**: See 29 CFR 1910.134, Appendix A, to select appropriate site-specific methods.]

### 7.3.2 Quantitative Fit Test Requirements (QNFT) (if applicable)

The following quantitative fit testing procedures have been demonstrated to be acceptable: Quantitative fit testing using a non-hazardous test aerosol (such as corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS], or sodium chloride) generated in a test chamber, and employing instrumentation to quantify the fit of the respirator; quantitative fit testing using ambient aerosol as the test agent and appropriate instrumentation (condensation nuclei counter) to quantify the respirator fit; quantitative fit testing using controlled negative pressure and appropriate instrumentation to measure the volumetric leak rate of a facepiece to quantify the respirator fit.

1. The person and/or persons administering QNFT must be able to calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly, and ensure that test equipment is in proper working order.
2. The QNFT equipment must be kept clean, maintained, and calibrated according to the manufacturer's instructions so as to operate at the parameters for which it was designed.
3. Once a mask has been identified to install a fit test probe, it will not be used for any other purpose.

[**Program Coordinator's Note**: See 29 CFR 1910.134, Appendix A, to select appropriate site specific methods.]

Form 4-1 will be used to document qualitative respirator fit-tests. Form 4-2 will be used to document quantitative respirator fit-tests.

## Form 4-1
## Qualitative Respirator Fit-Test Record

Name: ______________________________ Social Security No.: ______________________

Date: __________ Project Location: ____________________________________________

Personal Use Conditions/Limitations: **The following personal use conditions may affect the prospective respirator wearer's ability to obtain a proper face-seal, properly wear the respirator in the work environment, or may be prohibited by CHSP 13.9: Respiratory Protection.**

**Check all that apply:**

________ None ________ Beard / Facial Hair ________ Dentures

________ Prescription Eyeglasses ________ Contact Lenses

SCARS/OTHER; EXPLAIN:________________________________

***Fit-Test Record***

RESPIRATOR (MAKE, MODEL AND SIZE): ____________________________________

QUALITATIVE FIT-TESTING AGENT:

_____ Bitrex™

_____ Isoamyl Acetate (Banana Oil)

_____ Irritant Smoke

_____ Saccharin solution

***Fit-Test Results***

_____ PASS: **Fit-Test Agent Not Detected by Fit-Test Subject (employee signature required)**

I have been fit-tested to assure proper respirator size, as well as face piece to face seal. I have been instructed in the proper use, care and limitations of the respirator listed above. I have demonstrated the proper donning of this equipment according to training received.

______ **FAIL:** FIT-TEST AGENT DETECTED BY FIT-TEST SUBJECT.

Subject must not wear the respirator until a successful (passing) fit-test is obtained. This test is ended, **do not** have this form signed.

**Competent Person Performing Fit-Test:** __________________________

***Employee Signature:***__________________________

## Form 4-2
## Quantitative Respirator Fit Testing Record

**ISSUANCE** ☐ **RETRAINING** ☐ **REFITTING** ☐

**Date:** ______________________________

**Employee Name:** ______________________________

**Social Security Number:** ______________________________

**RESPIRATOR IDENTIFICATION**

**Make/Model:** ______________________________ **Size:** ______________

**TESTS PASSED**

Portacount: ☐ Yes ☐ No Irritant Smoke: ☐ Yes ☐ No

Spectacles ☐ Contact Lenses ☐ No Corrective Lenses

I certify that I have been instructed in the proper use and limitations of Air Purifying respirators and that I have been successfully fit tested and am authorized to wear the above listed respirator(s).

I understand that I am responsible for maintaining this respirator in proper working condition. I also understand that any problem with respirator fit or with respirator malfunction will be reported immediately to my supervisor. In order to ensure proper fit, I acknowledge that this respirator will be worn in the same manner as it was worn during testing and I will conduct a “user seal check” immediately before each use.

Signature of Employee: ______________________________

Signature of Instructor: ______________________________

## 7.4 PROPER RESPIRATOR USE

### 7.4.1 General Requirements

1. All respirators, filters, cartridges, and components used at this site are certified by NIOSH. Respirators shall be worn where work is necessary in hazardous atmospheres and in accordance with all manufacturer's instructions.
2. Respirators shall be used only for the purpose intended and shall not be modified in any way.
3. Tight-fitting facepieces respirators are not to be worn by employees who have any condition that interferes with the face-to-facepiece seal or valve function (such as facial hair).
4. If an employee wears corrective glasses or goggles or other personal protective equipment, the Program Coordinator shall ensure that such equipment is worn in a manner that does not interfere with the seal of the facepiece to the face of the user.
5. For all tight-fitting respirators, a user seal check is conducted each time the respirator is donned. Respirators that cannot be seal checked are not acceptable for use.
6. Site management shall ensure that appropriate surveillance of work area conditions and degree of employee exposure or stress is maintained. When there is a change in work area conditions or degree of employee exposure or stress that may affect respirator effectiveness, the Respirator Program Coordinator shall reevaluate the continued effectiveness of the respirator.
7. The Respirator Program Coordinator, SSHO, TSHM, and/or the employee's Supervisor will ensure that employees can leave the work area:
   - To wash their faces and respirator facepieces as necessary to prevent eye or skin irritation associated with respirator use; or
   - If they detect vapor or gas breakthrough, changes in breathing resistance or leakage of the facepiece; or
   - To replace the respirator or the filter, cartridge, or canister elements when vapor or gases breakthrough changes in breathing resistance, or leakage of the facepiece. **The respirator must replaced or repaired before allowing the employee to return to the work area.**

The following shall be inspected prior to use for all respirators:

- Tightness of connection;
- Condition of face piece;
- Head straps;
- Valves and connecting tube;
- Cartridge/Canisters;
- Elastic parts (for pliability); and
- Respirator function.

### 7.4.2 Disposable Type/Single-Use Respirators (Non-IDLH)

1. Limitations: This mask provides protection against low levels of certain dusts/fumes but does not supply oxygen, and is not for use in an oxygen deficient atmosphere. Do not use in any atmosphere that is immediately hazardous to life or health**. This respirator will not be used where airborne concentrations of dust/fumes may equal or exceed five times the permissible exposure limit (PEL)**.
2. Procedures for using the mask:
   - Inspect the mask before use to assure that all parts are present and in good working order.
   - Some disposable single use respirators utilize elastic straps and adjustable buckles. The manufacture's instructions are followed when donning and adjusting the respirator straps.

**Note:** If detection of vapors inside the mask (by smell or otherwise) is experienced or difficult breathing is experienced, employees are trained to leave the area immediately, report the condition to their Supervisor and the Respirator Program Coordinator or his designee and discard the respirator.

### 7.4.3 Chemical Cartridge Respirator/Air-Purifying Respirator (Non-IDLH)

1. These respirators provide protection against low levels of certain gases and vapors. Respirator canisters or cartridges shall be specifically selected for concentrations of gases/vapors that may be encountered.
2. Limitations: This mask does not supply oxygen and is not for use in an oxygen deficient atmosphere. These respirators cannot be used in any atmosphere that is immediately hazardous to life or health. Employees are trained to leave the area immediately if an odor is detected inside the mask.
3. Air purifying respirators (APRs) shall not be used for rescue or emergency work.
4. Procedures for using the mask:
   - Masks are inspected before each use to assure all parts are present and in good working order.
   - Employees then don respirator and adjust to obtain a snug but comfortable fit.
   - Employees then perform a user seal check.
5. If employees can smell, taste, or otherwise detect vapors inside the mask, or if difficulty breathing is experienced, the cartridges will be changed. If the employee becomes hot or feels for any reason that the cartridge is not functioning properly, the cartridge will be changed.

### 7.4.4 Particulate Filter Respirator (Non-IDLH)

1. Limitations: Particulate Filter Respirators provide protection against low levels of certain dusts/fumes. This mask does not supply oxygen and is **not** for use in an oxygen deficient atmosphere. This type respirator **shall not** be used in any atmosphere that is immediately hazardous to life or health.

2. Procedures for using the mask:

   - The mask is inspected by the employee before each use to assure that all parts are present and in good working order.
   - Employees will then don the respirator mask and adjust it to obtain a snug but comfortable fit.
   - Employees will then perform a user seal check.

**7.4.5 <u>Air-line Respirator</u>**

1. Limitations: An air-line respirator shall **not** be used in any atmosphere that is immediately hazardous to life or health, including an oxygen-deficient atmosphere, unless equipped with a self-contained escape air bottle.
2. Procedures for using the equipment:

   - Employees shall inspect all equipment before each use to assure all parts are present and in good working order.
   - If using an escape bottle, user will ensure that air supply is sufficient to permit safe escape from work area.
   - The employee will then follow the manufacturer's instruction to select correct length of air-line hose. Connect hose to regulator and air supply (maximum air pressure at the point of attachment of hose to air supply depends upon manufacturer's instructions). If using a compressor, the employee, his/her supervisor and/or the Program Coordinator will make sure the inlet is in an uncontaminated area. Air-purifying filters and sorbents shall be used as needed. If the compressor is oil-lubricated, it shall be equipped with high temperature and carbon monoxide alarms.
   - The employee will then don the respirator mask and adjust to obtain a snug but comfortable fit and perform a user fit test.
   - Next the worker shall connect the mask to the regulator and adjust the airflow in the mask.

**Note:** In case of malfunction, employees are trained to leave the area immediately, report the condition to their supervisor and the Program Coordinator.

3. An adequate supply of breathing air shall be ensured by the installation of an air pressure gauge in the air supply system.

**7.4.6 <u>Self-Contained Breathing Apparatus (SCBA)</u>**

1. SCBAs are provided primarily for use in emergency response when spills, leaks, or other circumstances present breathing hazards. Air and oxygen cylinders shall be maintained in a fully charged state and shall be recharged when the pressure falls to 90 percent of the manufacturer's recommended pressure level.
2. Limitations: Air supply is generally rated for 30 minutes. Note: heavy exertion and excitement will increase the breathing rate and deplete the air supply sooner. Employees are trained to leave the area when the alarm indicates low air supply.
3. Procedures for using the equipment:

- Employees shall inspect the unit before each use and ensure a sufficient air supply and that the regulator and low pressure (at or above 90 percent) warning devices function properly.
- The user will then open the cylinder air supply valve.
- Next, don unit so cylinder is on user's back with the valve pointing down and engage harnesses and tighten.
- Then the employee will don the respirator mask and adjust to obtain a snug but comfortable fit and perform a user seal check.
- The employee will then connect mask hose to regulator.

**Note:** Employees are trained to use the bypass only in the event of regulator failure and to leave area immediately, whenever the low-pressure alarm sounds.

4. A designated Competent Person performs care and maintenance of SCBAs.
5. Bottles are refilled only with breathing air that meets the specifications for Grade D Breathing Air in Compressed Gas Association Commodity Specification G-7.1-1989.
6. SCBA emergency use respirators are kept accessible to the work area and stored in compartments or in covers that are clearly marked as containing emergency respirators.
7. All respirators maintained for use in emergency situations shall be inspected at least monthly and in accordance with the manufacturer's recommendations, and shall be checked for proper function before and after each use.
8. Emergency escape-only respirators shall be inspected before being carried into the workplace for use.
9. For respirators maintained for emergency use, the Program Coordinator or Supervisor will certify the respirator by documenting the date the inspection was performed, the name (or signature) of the person who made the inspection, the findings, required remedial action, and a serial number or other means of identifying the inspected respirator.
10. This information is provided on a tag or label that is attached to the storage compartment for the respirator, is kept with the respirator, or is included in inspection reports stored as paper or electronic files. This information shall be maintained until replaced following a subsequent certification.

### 7.4.7 Breathing Air Quality

1. Air supply shall be free of harmful quantities of contaminants, and shall meet specification for Grade D Breathing Air as described in the Compressed Gas Association publication G-7 1988: Compressed Air for Human Respiration.
2. Compressed oxygen **shall not** be used in supplied-air respirators or in open circuit self-contained breathing apparatus. Oxygen must **never** be used with air-line respirators.
3. Breathing air may be supplied to respirators from cylinders or air compressors. Cylinders must have a dated label/sticker affixed to them indicating "Certified Breathing Air" or equivalent.

4. If used, a breathing air type compressor shall be situated so as to avoid entry of contaminated air into the system. An alarm shall also be installed to indicate imminent compressor failure and/or overheating. If an oil-lubricated compressor is used, it shall have a high-temperature or carbon monoxide alarm or automatic shutdown control feature.
5. Oil lubricated air compressors should have a continuous carbon monoxide (CO) monitor with both audible and visual alarms. However, if this is not possible, then manual CO testing must be performed and documented at least twice daily; once at beginning of job, and also after lunch break.
6. In-line air purifying sorbent filters with water traps shall be installed between the compressor and user(s).
7. Employees are instructed to stop work immediately if they experience difficulty in breathing, smell any unusual odors, or experience an ill feeling such as a headache or upset stomach, etc. and report the situation to their Supervisor.

### 7.4.8 User Seal Checks

Employees shall test the seal of their respirator to their face prior to using by performing both negative and positive-pressure user seal checks according to the following guidelines.

1. Negative-Pressure Seal Check Procedure:
   - Close off inlet openings of the respirator; canister(s), cartridge(s), or filter(s) by covering with palm of hands; by replacing the inlet seal on the canister(s); or by squeezing a breathing tube or blocking its inlet so as not to allow the passage of air.
   - Inhale gently and holds breathe for ten seconds.
   - A satisfactory fit is achieved if the facepiece collapses slightly and no inward leakage of air into facepiece is detected.

If inward leakage is detected the respirator wearer will reposition the face seal and/or straps and repeat this sequence until a satisfactory fit check is obtained.

2. Positive-Pressure Seal Check Procedure
   - Close exhalation valve or breathing tube, or both, then exhale gently.
   - A satisfactory fit is achieved if a slight buildup of positive pressure is generated on the inside of the facepiece, without detection of outward leakage between the sealing surface and the face.
   - If outward leakage is detected, the respirator wearer will reposition the face seal and/or straps and repeat this sequence until a satisfactory seal check is obtained.

### 7.4.9 Manufacturer Specific Procedures

[**Program Coordinator's Note**: Procedures relative to respirator use and care, as directed by the equipment manufacturer, are available as references and shall be attached by the SSHO to this document.]

## 7.5 TRAINING

Training is provided to all employees who are required to use respirators before requiring the employee to use the respirator in the workplace. The training will be comprehensive, understandable, and done on an annual basis or more often, if necessary. (Refer to Jacobs Respiratory Protection work instructions.) The training will include the following topics, as a minimum:

- The nature of the hazard(s), including physical properties, odor characteristics, physiological effects on the body, and known concentration levels of toxic material or airborne radioactive level;
- How improper fit, usage, or maintenance can compromise the protective effect of the respirator;
- The physical characteristics, functional capabilities, and limitations of various types of respirators;
- How to use the respirator in emergency situations;
- Procedures for maintenance and storage of the respirator; and
- How to recognize the medical signs and symptoms of that may limit or prevent the effective use of respirators.

### 7.5.1 Training Documentation

Training documentation is maintained for all employees who are assigned to work that requires the use of a respirator. (Forms A-1, A-2, A-3, and A-4, at the end of this section, may be used to document training and training exercise completion for air-purifying respirators and supplied-air respirators.)

If documentation, which demonstrates that an employee has received training within the last 12 months is available and addresses the elements of this Program, and if the employee can demonstrate knowledge of those elements, repeat training is not required. Previous training not repeated upon initial task assignment must be provided no later than 12 months from the date of the previous training.

Retraining is administered annually, **and** when the following occur:

- Changes in the workplace or the type of respirator render previous training obsolete;
- Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skill; or

- Situations arise in which retraining appears necessary to ensure safe respirator use.

## 7.6 RESPIRATOR MAINTENANCE

### 7.6.1 Cleaning and Sanitation

The following provides guidelines for cleaning and sanitation of respirators. Recommendations provided by the equipment manufacturer may be used provided such procedures are as effective as those listed here.

1. Respirators will be cleaned and sanitized after each use. Commercially available mild detergents or cleaner/sanitizer recommended by the manufacturer are used.
2. Storage shall be in a convenient, clean, and sanitary location. At a minimum respirators shall be stored in a protective bag.
3. Chemical cartridges/mechanical filters chemical cartridges shall be discarded and replaced as defined in Section 7.4.3.
4. Cleaning, disinfecting, and storage of respirators shall be performed as follows:
   - Remove filters, cartridges, or canisters. Disassemble facepiece by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.
   - Wash components in warm (43º C [110º F] maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.
   - Rinse components thoroughly in clean, warm (43º C [110º F] maximum), preferably running water. Drain.
   - When the cleaner used does not contain a disinfecting agent, respirator components will be immersed for two minutes in one of the following:
     - Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 43º C (110º F); or
     - Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 43º C (110º F); or
     - Other commercially available cleansers of equivalent disinfectant quality when used as directed, as recommended or approved by the respirator manufacturer.
   - Rinse components thoroughly in clean, warm (43º C [110º F] maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.
   - Components are hand-dried with a clean lint-free cloth or air-dried.
   - Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.
   - Test the respirator to ensure that all components work properly.

### 7.6.2 <u>Inspecting and Storing</u>

Respirators are stored to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals, and they shall be packed or stored to prevent deformation of the facepiece and exhalation valve. Inspection and replacement of respirator parts shall be performed according to the following:

1. All respirators must be inspected by the wearer prior to each use.
2. Self contained breathing apparatus (SCBAs) shall be inspected monthly and after each use by Competent Person(s). Employees shall self-inspect SCBAs prior to each use. SCBA inspections shall include checking cylinder pressure and units shall be brought to the rated pressure. Units shall be recharged after each use.
3. Air-line respirators: Complete systems are inspected before and after each use.
4. Replacement of parts shall be made only with those specifically designed for the respiratory device used. All maintenance and repair shall be performed only by appropriately trained persons and shall be documented. It should be noted that some respiratory equipment maintenance requires the manufacturer's certification of training (i.e. SCBAs).

### 7.6.3 <u>Repairing, Discarding, and Maintaining Respirators</u>

Defective equipment shall be immediately removed from service and repaired prior to use. Repairs shall be made only by an appropriately trained, designated Competent Person, and only utilizing the manufacturer's NIOSH approved replacement parts. Defective equipment not repaired immediately shall be red tagged as noted: "Danger - Do Not Use – Defective", and the specific defect(s) noted on the tag.

Users may self-perform repairs only if they have been appropriately trained and approved parts are available. Reducing and admission valves, regulators, and alarms for air supplied respirators shall only be repaired by the manufacturer or a technician trained by the manufacturer.

## 7.7 VOLUNTARY RESPIRATOR USE REQUIREMENTS

Employees shall not wear air purifying respirators with cartridges or canisters, or air supplied respirators unless a health hazard is present. Employees may voluntarily use a respirator, with the approval of both their Supervisor and the Program Coordinator. The Program Coordinator will evaluate requests for voluntary respirator use to determine if the employee can perform the activities safely and respirator use will not in itself create a hazard.

- If it is determined that voluntary use will be permitted, the following will apply:

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, of if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

You should do the following:

1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.
2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.
3. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.
4. Keep track of your respirator so that you do not mistakenly use someone else's respirator. [63 FR 1152, Jan. 8, 1998]

- A medical evaluation and PLHCP's written determination will also be provided for all employees who are permitted to use respirators voluntarily, prior to their use of a respirator. (See section 2.0 of this Program).
- Additionally, all requirements for cleaning, maintaining and storage of respirators contained in this Program shall also apply to employees permitted to use respirators voluntarily. (See section 8.0 of this Program).
- Respirators worn on a voluntary basis do not require fit testing.

Exception: Employees whose only use of respirators involves the voluntary use of filtering facepieces (dust masks) are not covered by the requirements of this Program.

## 7.8 RESPIRATOR PROGRAM EVALUATION

The effectiveness of this site-specific Respiratory Protection Program will be evaluated with routine observations and formal Program evaluations.

### 7.8.1 Routine Observations

The Program Coordinator shall be responsible for conducting routine observations related to the effective selection, use, maintenance, storage and other aspects of this Program. Observations shall be noted through the use of SORs or equivalent documented routine safety inspections. Noted deficiencies shall be corrected as soon as possible.

### 7.8.2 Program Evaluations

Formal Program evaluations shall also be conducted on a periodic basis. A written evaluation shall be conducted to address the overall effectiveness of the Program. This evaluation may be incorporated into the Company's standard Safety Evaluation Report (SER) format, Environmental Project Audit format, or be conducted as an independent review.

### 7.8.3 Content of Program Evaluations

Program evaluations shall conform to the content requirements of the American National Standards Institute (ANSI Z88.2-1992) recommendations and those listed in 29 CFR 1910.134/1926.103. The areas of evaluation include:

- Program administration and evaluation;
- Training of workers in the proper use of respirators and the associated hazards;
- Initial and periodic fit testing;
- Medical evaluation;
- Hazard classification and sampling;
- Respirator selection;
- Respirator use procedures including seal protection, evaluation of effectiveness, and IDLH procedures;
- Cleaning, maintenance, storage, and inspection;
- Breathing air supplies;
- Emergency preparedness and procedures;
- Special problems;
- Voluntary use procedures; and
- Other applicable observations.

Forms A-1 through A-4 will be used to document training on air supplied, supplied air, and air purifying respirators.

## Attachment B15 (continued)

### Form A-1
### Air Supplied Respirator Training

Employee Name:

Instructor(s): Date:

| I have been trained in and understand the following: | SCBA | Air-line |
|---|---|---|
| Importance and need for respiratory protection | | |
| Where/when to use the respirator, including emergencies | | |
| Proper inspection, donning, doffing, and use of respirator | | |
| Proper maintenance and storage of the respirator | | |
| How to recognize medical signs and symptoms that may limit or prevent effective use of respirators | | |
| Limitation and restriction of the respirator | | |
| Requirements for a proper respirator fit | | |
| Respirator check - normal atmosphere | | |
| Respirator check - test atmosphere | | |

I wear corrective lenses: Yes No

I have been trained in, & worn (normal atmosphere), the following supplied air respirators:

Make: Model: Size:

Make: Model: Size:

I have been retrained in (normal atmosphere) the following respirators:

Air Supplied - Air-line: Make: Model: Size:

Air Supplied - SCBA: Make: Model: Size:

Air Supplied - Egress: Make: Model: Size:

Instructor's Signature Employee's Signature

## Form A-2
## Supplied Air Respirator Exercise Training Exercise

Name of Employee: ______________________________

Instructor(s): ______________________ Date: ______________________

RESPIRATORY PROTECTION

| DID THE EMPLOYEE: | SCBA |
|---|---|
| Properly don respirator | |
| Check respirator fit (positive and negative pressure checks) | |
| Describe minimum respirator entry requirement to unknown hazardous atmospheres | |
| Describe correct response to sound of low pressure warning device | |
| Conduct a high pressure check | |
| Conduct a low pressure check | |
| Properly inspect a manifold system and set up and air-line | |
| Properly inspect cascade system and recharge an SCBA bottle | |
| Describe correct responses to respirator emergencies | |

______________________________

Instructor Signature

______________________________

Employee Signature

Name:______________________________

## Form A-3
## Health Hazards & Personal Protection Training
## Air Purifying Respirators

Print Name:

Instructor(s) Name: Date:

| **I have been trained in and understand the following:** | **Full Face** | **Half Face** |
|---|---|---|
| Importance and need for respiratory protection | | |
| Where/when to use respirator, including emergencies | | |
| Proper inspection, donning, and use of respirator | | |
| Proper maintenance and storage of the respirator | | |
| Limitation and restriction of the respirator | | |
| Requirements for a proper respirator fit | | |
| Respirator check - normal atmosphere | | |
| Respirator check - test atmosphere | | |

I wear corrective lenses: ☐ Yes ☐ No

I have been trained in, and worn in a normal atmosphere, and been fit tested (with _________________________________) for the following air purifying respirators:

Make: ________________ Model: ________________ Size: ________________

I have been trained in, and worn in a normal atmosphere, and been fit tested with ______________________________________, the following air purifying respirators:

**Make:** Model: Size:

Name: Model: Size:

Instructor's Signature Employee's Signature

## Form A-4
## Air Purifying Respirator Training Exercise

Name of Employee: ______________________________

Instructor(s): ______________________________ Date: ______________

Respirator Make: ______________________________ Respirator Model: ______________

Respirator Make: ______________________________ Respirator Model: ______________

| DID THE EMPLOYEE: | HALF FACE | FULL FACE |
|---|---|---|
| Inspect the respirator (condition, cleanliness, straps, valves, etc.)? | | |
| Check respirator fit (positive and negative pressure checks) | | |
| Correctly describe the respirator limitations (i.e., not for IDLH or ODA conditions, or concentrations greater than APF or MUC)? | | |
| Correctly describe indications that cartridges require changing (i.e., breakthrough, increased resistance, length of service)? | | |
| Correctly describe when to discontinue using a respirator, and what to do in cases of emergency? | | |

**The student inspected and donned the respirator(s) in accordance with the manufacturer's instructions, and correctly stated limitations for wearing APRs.**

______________________________ ______________

Instructor's Signature Date

## Attachment B16

## HAZARDOUS MATERIAL EXPOSURE AND FIELD ACTIVITY REPORT

EMPLOYEE'S
OFFICE LOCATION: ANCHORAGE

For: ______Month _____Year

NAME OF EMPLOYEE:

CHECK HERE FOR: ____"NO SITE VISITS"

PART I - SITE VISITS TO NON-EXCLUSION ZONES

| SITE NAME/ LOCATION | ACTIVITY | DURATION OF SITE VISIT (HOURS) |
|---|---|---|

PART II - SITE VISITS TO EXCLUSION ZONES (For additional room, use back of form)

| SITE NAME/ LOCATION | ACTIVITY | CHEMICAL OR OTHER MATERIALS PRESENT | EXPOSSURE POTENTIAL (I.M.S.) | DURINGTION OF SITE VISIT HOURS | LEVEL OF PROTECTION USED |
|---|---|---|---|---|---|

***I** = **Incidental** Potential for exposure is 1/10 or under the exposure limit level.
**M** = **Moderate** Potential for exposure is >1/10 up to, but not including, the exposure limit level.
**S** = **Significant** Potential for exposure at or above exposure limit level.

EMPLOYEE SIGNATURE DATE

**Return to: Terry Watkins, Jacobs Engineering, 4300 B Street, Suite 600, Anchorage, AK 99503 (907) 751-3449**

**Attachment B17**

**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: ______________________

Physical Hazard: ______________________

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

911 Emergency Response

Hospital/Clinic: Metlakatla Clinic

Address: ______________________

Special Equipment: ______________________

Evacuation Route: ______________________

General Discussion Information:

## ATTENDEES

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

**ATTACHMENT C**

**Project-Specific Supplemental Information**

Table C1: Site ST32 Elmendorf AFB Air Monitoring Requirements and Action Levels

Table C2: Cooling Power of Wind on Exposed Flesh Expressed

Table C3: Threshold Limit Values Work / Warm-up Schedule

Attachment C1: Site ST32 Elmendorf AFB Safe Plan of Action Procedure

Attachment C2: Project-Specific Chemical Hazards

Attachment C3: Site ST32 Hazard Communication Program

Attachment C4: Site Control HSEP 7.3.2

Attachment C5: Confined Space HSEP 7.2.2

Attachment C6: Safety Evaluation Reports HSEP 2.2

Attachment C7: Medical Monitoring Program for Environmental Project Work HSEP 44

Attachment C8: Working Safely Around Wild Animals HSEP 7.4

**Table C1**
**Site ST32 Elmendorf AFB Air Monitoring Requirements and Action Levels**

| Instrument | Tasks | Action Levels | | Frequency [1] | Calibration [2] |
|---|---|---|---|---|---|
| PID: Minimum 10.6 eV, calibrated wit IsoButylene | All Tasks | 0-10 ppm BZ<br>>10-25 ppm BZ<br>>25 to 50 ppm BZ<br>>50 ppm BZ<br>Note: Detections above background levels. | Level D<br>Level C,<br>Level B<br>Stop work; reevaluate | Monitor the breathing zone at the beginning of operations and whenever site conditions change. Levels C and B require continuous monitoring. | Daily - pre- and post-use |
| Direct reading instrument: Colorimetric Tubes: Benzene | All Tasks | <0.5 ppm BZ<br>0.5 – 2.5 ppm BZ<br>>2.5 to 25 ppm BZ<br>>25 ppm BZ | Level D<br>Level C,<br>Level B<br>Stop work; reevaluate | Monitor initially at all POL sites to eliminate or establish the presence of Benzene, unless site characterization has eliminated the concern. Also passive dosimeters will be used if benzene is detected. | Conduct a leak check on pump prior to use |
| Combustible Gas Meter [3] | Confined space | ≥10% LEL | Stop work; reevaluate (explosion hazard) | Continuous monitoring of a confined space. Screening during excavations or before performing hot work. | Daily - pre- and post-use |
| Oxygen Meter | Confined Space Entry | <19.5%<br><br>>23.5% | Provide alternate air source (Level B)<br>Explosion hazard, stop work, reevaluate | Screening before entering confined space. | Daily - pre- and post-use |

Notes:

[1]Air monitoring shall be documented using field logs or monitoring forms.

[2]Calibrations shall be documented in the field logs or calibration logs.

[3]Oxygen must be > 15 percent for LEL reading to be accurate.

BZ = Breathing Zone
eV = electron volts
LEL = lower explosive limit
$mg/m^3$ = milligram per cubic meter
PID = photoionization detector
ppm = parts per million
< = less than
> = greater than

**Table C2**
**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. | | | | | | | | | | | | |

Notes: For definitions, see Acronyms and Abbreviations section.

Source: American Conference of Governmental Industrial Hygienists. Threshold Limit Values and Biological Exposure Indices for 1999.

## Table C3
## 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 (approx.) | Maximum Work Period | No. of Breaks | Maximum Work Period | No. of Breaks | Maximum Work Period | No. of Breaks | Maximum Work period | No. of Breaks | Maximum 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 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 four 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.

For definitions, see Acronyms and Abbreviations section.

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Source: American Conference of Governmental Industrial Hygienists, Threshold Limit Values and Biological Exposure Indices for 1990-1991, Cincinnati, Ohio, 1990.

**Attachment C1: Site ST32 Elmendorf AFB Activity Hazardous Analysis Procedure**

**Attachment C1**

# SAFE PLAN OF ACTION PROCEDURE

## PURPOSE

To describe the use and benefits of developing and using Safe Plan of Action (SPA). Statistics demonstrate that faithful use of the SPA is a best practice and that they can minimize workplace injuries and illnesses.

## SPA/AHA BENEFITS

- Provide a written HSE plan for each task
- Require participation by each member of the crew in identifying hazards and control measures
- Serve as a documented hazard assessment plan
- Serve as a reference document for similar future work.

## APPLICATION

SPA/AHA should be used for any task that could reasonably present a risk of injury, illness or environmental damage. Specifically, they should be used before proceeding any field task.

## SPA/AHA METHOD

SPA/AHA is a task planning procedure conducted for each task to help the workgroup and its supervisor to collaboratively ensure proper HSE planning before beginning work and to identify:

- Potential chemical and physical hazards associated with a task
- Controls for the hazards
- Appropriate personal protective equipment (PPE)
- Necessary resources to efficiently complete the task without incident.

Team members sign the completed SPA Attendance Record form to indicate their participation, understanding and agreement to follow the plan. When signed by the supervisor, the SPA becomes a documented hazard assessment plan. Completion of the SPA form is performed in the following manner:

- The SPA analysis is completed first. Determine the specific, individual steps involved with the task. And record them in the job steps column. Next analyze each step for any potential physical or chemical hazards and record them in the Hazard column.

- Identify appropriate controls for each potential hazard and record in the Action To Eliminate or Minimize Hazard column.
- Record resources or positions assigned to the job.
- Record equipment to be used, inspection requirements and training requirements in the appropriate columns.
- Finally, after thorough analysis of the foregoing information, complete the checklist on the reverse side of the form.
- Subcontractors are required to follow this same procedure.

**COMMUNICATION AND REVIEW OF ACTIVITY HAZARD ANALYSIS**

The Safety Tailgate Meeting Awareness (TSM) is a collaborative review of the SPA by the entire crew and supervisor before performing the task. These are conducted:

- At the beginning of the work shift
- After any change in personnel
- When there is a change of hazards or work conditions.
- The SPA shall be modified in the field to reflect any tasks or hazards not identified.
- SPA Form Attachment

## Safe Plan Of Action

**(HSEP 21.2 f1)**

**Project No. All**_________________________

**Job/Task** ____________________________ **Work Area** ________________________________________ **Date** _____________

| Steps of Task | Hazard/Reaction to Change | Safe Plan | Resources |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**Attachment C1** (continued)

**Team Members' Signatures**

____________________ ____________________ ____________________ ____________________ ____________________ ____________________

____________________ ____________________ ____________________ ____________________ ____________________ ____________________

____________________ ____________________ ____________________ ____________________ ____________________ ____________________

The signature of the supervisor confirms the completion of the hazard assessment and SPA by the crew.

Supervisor's Signature: ________________________________ Date________

**INSTRUCTIONS: 1. WRITE NAME OF JOB OR TASK IN SPACE PROVIDED. 2. CONDUCT 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 CHANGE. 5. IN THE SAFE PLAN COLUMN, STATE ACTIONS THAT WILL BE TAKEN TO PREVENT THE HAZARDS OR INJURY FROM REACTION TO CHANGE. 6. IN RESOURCES COLUMN, LIST EQUIPMENT, TOOLS, ETC. NEEDED TO DO THE JOB. 8. ASK EACH TEAM MEMBER, WHO HELPED DEVELOP AND WILL USE THIS SPA, TO SIGN IN SPACES PROVIDED. 9. REVIEW THE SPA AT THE END OF THE TASK FOR IMPROVEMENTS.**

**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**
**CONTINUATION AND OR ADDITIONS TO SPA DISCUSSED DURING PREPARATORY INSPECTION AND CREW BRIEFING**

**Attachment C1** (continued)

| EQUIPMENT TO BE USED | INSPECTIONS REQUIREMENTS | TRAINING REQUIREMENTS |
|---|---|---|
| | | |

| SPA ATTENDANCE RECORD | | |
|---|---|---|
| Personnel Present (print): | Representing | Signature |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

## **Attachment C1** (continued)

**Safe Plan of Action Analysis Checklist (check all that apply)** 

(Review checklist while completing second page of Activity Hazard Analysis)

A new SPA/AHA is required if the job scope, employee staffing 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:** ☐ N/A | |
| ☐ | Dust Mask |
| ☐ | Air Purifying Respirator |
| ☐ | Supplied Air Respirator |
| ☐ | SCBA |
| ☐ | Emergency Escape Respirator |
| **Special Clothing:** ☐ N/A | |
| ☐ | Tyvek ® |
| ☐ | Poly Coated Tyvek ® |
| ☐ | Fire Resistant Coveralls |
| ☐ | Rain Suit |
| ☐ | Safety Vest |
| **Fall Protection:** ☐ N/A | |
| ☐ | 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<br>☐ Required clearance distance = _20___Ft. ☐ Safe work zone marked |
| ☐ Crane or other Lifting Equipment | ☐ Signalman assigned ☐ Tag lines in use ☐ Area around crane barricaded<br>☐ Lifting equipment inspected ☐ Personnel protected from overhead load |
| ☐ Underground Utilities☐ | ☐ Reviewed as-builts ☐ Subsurface surveys ☐ Received dig permit<br>Required clearance distance = _______ Ft. ☐ Safe work zone Marked |
| ☐ Electrical | ☐ Lock Out/Tag Out/Try Out ☐ Permit required? ☐ Confirm that equipment is de-energized<br>☐ Reviewed electrical safety procedures |
| ☐ Excavations | ☐ Permits ☐ Inspected prior to entering ☐ Proper sloping/shoring<br>☐ Barricades provided ☐ Access/egress provided ☐ Protection from accumulated water |
| ☐ Fire Hazard | ☐ Hot Work Permit ☐ Fire Extinguishers ☐ Fire watch<br>☐ Adjacent area protected ☐ Unnecessary flammable material removed |
| ☐ Vehicular Traffic or Heavy Equipment | ☐ Traffic Barricades ☐ Cones ☐ Signs ☐ Flagmen ☐ Lane closure<br>☐ 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<br>☐ Reviewed safety requirements in operators manual(s) ☐ Guarding OK |
| ☐ Hand Hazards | List sharp tools, material, equipment: ____________________________________________<br>☐ PPE gloves, etc. ☐ Protected sharp edges as necessary |
| ☐ Manual Lifting | ☐ Reviewed proper lifting tech. ☐ Identified material requiring lifting equipment<br>☐ Hand protection required ☐ Back support belts |
| ☐ Ladders | ☐ Inspect general cond. before use ☐ Ladder inspected with in last quarter<br>☐ Ladder tied off or held ☐ Proper angle and placement ☐ Reviewed ladder safety |
| ☐ Scaffolds | ☐ Inspect general condition before use ☐ Tags in place ☐ Properly secured<br>☐ Toe boards used ☐ Footings adequate ☐ Materials properly stored on scaffold |
| ☐ Slips, Trips Falls | ☐ Inspect for trip hazards ☐ Hazards marked ☐ Tools & material properly stored<br>☐ Extension cords properly secured ☐ Work zone free of debris |
| ☐ Pinch Points | List potential pinch points: ______________________________________________________<br>☐ Working near operating equipment ☐ Hand/Body positioning |
| ☐ Working w/ Chemicals | ☐ The task creates potential for direct contact with hazardous chemicals.<br>☐ Reviewed MSDS hazards and precautions ☐ Have proper containers and labels.<br>☐ Have identified proper PPE (respirators, clothing, gloves, etc.) |
| ☐ Heat Stress Potential | ☐ Heat stress monitoring (>85°) ☐ Liquids available ☐ Cool down periods<br>☐ Sun Screen ☐ Reviewed Heat Stress symptoms |
| ☐ Cold Stress Potential | ☐ Proper clothing (i.e.. gloves, coat, coveralls) ☐ Wind chill <32°<br>☐ Reviewed Cold Stress symptoms ☐ Warm up periods |
| ☐ Environmental | ☐ Air emissions ☐ Water discharge ☐ Hazardous wastes ☐ Other wastes<br>☐ Pollution prevention ☐ Waste minimization |
| ☐ Natural or Site Hazards | ☐ Weather ☐ Terrain ☐ Adjacent operations or processes ☐ Biological hazards<br>☐ Animals/reptiles/insects hazards |
| ☐ Adjacent Work/Processes and/or co occupancy | ☐ Notified them of our presents ☐ Other workers adjacent, above, or below.<br>☐ Coordinated with adjacent work supervisor/customer operator ☐ Can work safely |
| ☐ Barricades/covers | ☐ Caution barricade tape required ☐ Danger barricade tape required ☐ Rigid railing required<br>☐ Covers over opening ☐ Warning signs required |

**Additional Information:**

**Attachment C2: Project-Specific Chemical Hazards**

| Potential Site Contaminant | Health Hazard Rating at this Site | Route of Entry | Symptoms/Effects of Exposure | PEL/TLV ppm or $mg/m^3$ | IDLH ppm or $mg/m^3$ |
|---|---|---|---|---|---|
| Benzene | Low | Inh, Ing, Con, Abs | Irritation of eyes and skin, headache, vertigo, fatigue, giddiness, tremors, nausea, vomiting, liver injury | 1 ppm | 5 ppm, ST |
| Diesel-Range Organics (DRO) | Low | Inh, Ing, Con, Abs | Irritation of eyes, skin, or mucous membranes, headache, fatigue, dizziness, nausea, possible liver and kidney damage | N/A | N/A |
| Gasoline-Range Organics (GRO) | Low | Inh, Ing, Abs | Irritation of eyes, skin, or mucous membranes, headache, fatigue, dizziness, nausea, possible liver and kidney damage | 300 ppm | 500 ppm, STEL |

NOTE: Previous soil sampling has indicated that the above chemicals were detected in laboratory analysis.

# Attachment C3: Site ST32 Hazard Communication Program

**Attachment C3**
**ST32 HAZARD COMMUNICATION PROGRAM**

## 1.0 PURPOSE AND SCOPE

The purpose of this Health, Safety, and Environment Program (HSEP) is to provide the minimum requirements to employees for maintaining and implementing this site-specific Hazard Communication Program.

This program applies to all Elmendorf projects.

## 2.0 RESPONSIBILITIES

Responsibilities specific to this HSEP include the following:

### 2.1 Site Management

Site Management is responsible for ensuring that this site-specific Hazard Communication Program has been effectively communicated and implemented to all employees assigned to the site.

Site Management must ensure that Material Safety Data Sheet (MSDS) are maintained in the Jacobs Anchorage office and employee know and understand to request and/or access them.

Ensure employees are trained in the recognition of hazardous materials and the method and means to protect themselves from these hazards.

Continuously monitor the work to assure compliance with this program.

Confirm each job is properly prepared and that employees are aware of any hazardous substances that may be encountered as part of their work or as a result of someone else's work in the area.

Maintain a list of all workplace chemicals,

Label workplace chemical containers,

Maintain Material Safety Data Sheets for the workplace chemicals,

### 2.2 Site Safety and Health Officer

The Site Safety and Health Officer shall assist Site Project Management in compliance with this Hazard Communication Program.

### 2.3 Subcontractors

Will comply with the provisions of this program and communicate hazards associated with their work during daily pre-job meetings.

Providing copies to the SSHO of MSDS for hazardous chemicals brought on-site

Attending site-specific orientation

### 2.4 Employees

Employees must know and be able to recognize hazards associated with their work and to ensure that these hazards are properly addressed according to this program and the training received.

Employees must know where the MSDSs are located for chemicals used in the workplace.

Employees must be able to understand all forms of labeling and warning for hazards in the workplace.

## 3.0 DEFINITIONS

| | |
|---|---|
| Acute | Severe, often dangerous conditions in which relatively rapid changes occur. |
| Acute Exposure | An intense exposure over a relatively short period of time. |
| Asphyxiant | A chemical (gas or vapor) that can cause death or unconsciousness by suffocation. Simple asphyxiants, such as nitrogen, either use up or displace oxygen in the air. They become especially dangerous in confined or enclosed spaces. Chemical asphyxiants, such as carbon monoxide and hydrogen sulfide, interfere with the body's ability to absorb or transport oxygen to the tissues. |
| Boiling Point | The temperature at which the vapor pressure of a liquid equals atmospheric pressure or at which the liquid changes to a vapor. The boiling point is usually expressed in degrees Fahrenheit. If a flammable material has a low boiling point, it indicates a special fire hazard. |

**Attachment C3** (continued)

| | |
|---|---|
| "C" or Ceiling | A description usually seen in connection with a published exposure limit. It refers to the concentration that should not be exceeded, even for an instant. It may be written as TLV-C or Threshold Limit Value - Ceiling. (See also Threshold Limit Value.) |
| Carcinogen | A substance or physical agent that may cause cancer in animals or humans. |
| C.A.S. Number | Identifies a particular chemical by the Chemical Abstracts Service, a service of the American Chemical Society that indexes and compiles summaries of worldwide chemical literature called "Chemical Abstracts." |
| CC – Cubic Centimeter | A volumetric measurement, which, in the case of water, is also equal to one milliliter (ml). |
| Chemical | As broadly applied to the chemical industry, a naturally occurring substance or a compound produced by chemical reactions for either direct industrial and consumer use or for reaction with other chemicals. |
| Chemical Reaction | A change in the arrangement of atoms or molecules to yield substances of different composition and properties. (See Reactivity) |
| Chronic | Persistent, prolonged, or repeated conditions |
| Chronic Exposure | A prolonged exposure occurring over a period of days, weeks, or years. |
| Combustible Liquid | According to the DOT and NFPA, combustible liquids are those having a flash point at or above 100 ºF (37.8 ºC). Combustible liquids do not ignite as easily as flammable liquids. However, combustible liquids can be ignited under certain circumstances and must be handled with caution. Substances, such as wood, paper, etc., are termed "ordinary combustibles." |
| Concentration | The amount of one substance mixed with, and in the presence of, another substance. For example, 5 parts (of acetone) per million (parts of air). |
| Corrosive | A substance that, according to the DOT, causes visible destruction or permanent changes in human skin tissue at the site of contact. |
| Dermatitis | An inflammation or irritation of the skin. |
| Dyspnea | Shortness of breath; difficult or labored breathing. |
| EPA | The Environmental Protection Agency is the governmental agency responsible for administration of laws to control and/or reduce pollution of air, water, and land systems. |
| EPA Number | The number assigned to chemicals regulated by the EPA. |
| Flammable Liquid | By DOT and NFPA, a flammable liquid is one that has a flash point below 100 ºF. (See Flash Point) |
| Flash Point | The lowest temperature at which a liquid gives off enough vapor to form an ignitable mixture and burn when a source of ignition (sparks, open flames, cigarettes, etc.) is present. Two tests are used to determine the flash point: open and closed cup. The test method is indicated on the MSDS after the flash point. |
| Hazardous Material | Any substance or compound that may produce adverse effects on the health and safety of humans. |
| Ingestion | Taking a substance into the body through the mouth as food, drink, medicine, or unknowingly as on contaminated hands or cigarettes, etc. |
| Inhalation | The breathing in of an airborne substance that may be in the form of gases, fumes, mists, vapors, dusts, or aerosols. |
| Irritant | A substance that produces an irritating effect when it contacts the skin, eyes, nose, or respiratory system. |

| | |
|---|---|
| Lower Explosive Limit (LEL) | (Also known as Lower Flammable Limit.) The lowest concentration of a substance that will produce a fire or flash when an ignition source (flame, spark, etc.) is present. It is expressed in percent of vapor or gas in the air by volume. Below the LEL or LFL, the air/contaminant mixture is theoretically too "lean" to burn. (See also UEL) |
| Odor Threshold | The minimum concentration of a substance at which a majority of test subjects can detect and identify the substance's characteristic odor. |
| OSHA | The Occupational Safety and Health Administration is a Federal Agency under the Department of Labor that publishes and enforces safety and health regulations for most business and industries in the United States. |
| Oxygen Deficiency | An atmosphere having less than the normal percentage of oxygen found in normal air. Normal air contains 20.8% oxygen at sea level. |
| Reactivity | A substance's propensity to under a chemical reaction or change that may result in effects, which can be dangerous, such as explosion, burning, or generation of corrosive or toxic emissions. Reaction initiators, such as heat, other chemicals, dropping, etc., will usually be specified as "Conditions to Avoid" when a chemical's reactivity is described in an MSDS. |
| Time Weighted Average (TWA) | The average concentration, over a given work period, e.g., 8-hour workday, of a person's exposure to a chemical or a potentially harmful agent. The average is determined by sampling for the contaminant during the period of exposure. |
| Upper Explosive Limit (UEL) | (Also known as Upper Flammable Limit.) The UEL is the highest concentration of a mixture that will burn or explode when an ignition source is present. Theoretically, above this limit, the mixture is said to be too "rich" to support combustion. The airborne concentration range between the LEL and the UEL constitutes the flammable range or explosive range. |

## 4.0 PROGRAM

### 4.1 General

The purpose of Hazard Communication program is to communicate the hazards of workplace chemicals and communicate protective measures to control the hazards. Hazard Communication is accomplished by:

- Maintaining a list of all workplace chemicals,
- Labeling workplace chemical containers,
- Maintaining Material Safety Data Sheets for the workplace chemicals, and
- Implementing a training program to communicate the hazards of chemicals and appropriate protective measures.

Upon completion of Hazard Communication training, Jacobs employees and subcontractors will understand the components of Hazard Communication, will understand the hazards of the chemicals in their workplace and the protective measures to control the hazards

### 4.2 Hazard Evaluation

Chemical manufacturers are responsible for assessing a chemical's:

- Physical hazards, such as flammability, combustibility, explosion, reaction, radioactivity; and
- Health hazards, such as irritation, corrosion, sensitization, or toxicity.

The Company relies on our clients for chemical, product, and process unit intermediate stream hazard information.

Material Safety Data Sheets (MSDSs) shall be requested for chemicals and products purchased or brought onto the site. The site relies on the evaluation performed by the chemical manufacturers or importers, who originated the MSDS, for the accuracy of this information.

MSDSs will be maintained at the Amaknak Island office.

### 4.3 Written Hazard Communication

A list of the chemicals used at DP98 at Elmendorf AFB will be maintained and updated at least annually or when there are new chemicals. The Site Project Manager/designee is expected to maintain the list of chemicals.

### 4.4 Labels

Labels and other forms of warnings are to be conspicuously placed on containers so the message is readily visible.

The chemical manufacturer, importer or distributor will label, tag or mark the chemical container identifying the hazardous chemicals, appropriate hazard warnings, and name and address of the chemical manufacturer, importer or responsible party.

#### 4.1.1 Labeling Systems

There are multiple labeling systems currently in use including the National Fire Protection Association (NFPA) 704M labeling system, the Hazardous Materials Information System (HMIS), the U.S. Department of Transportation labeling system, the United Nations Hazard Class Number system and others.

NPCA/HMIS

The National Paint & Coatings Association (NPCA) Hazardous Materials Information System (HMIS) uses standard labels to communicate hazards through the use of colors, numbers, letters of the alphabet, and symbols.

The HMIS is a five-part rectangle that provides identification of the chemical, acute health hazard, flammability, reactivity, personal protective equipment designations, and chronic health hazard information.

The chemical identity is conveyed by the chemical name and should be the same as the name on the MSDS. The acute health (blue), flammability (red), reactivity (yellow) hazards are communicated by numerical ratings similar to the NFPA system.

An alphabetical designation is used to denote recommended personal protective equipment.

Chronic health hazards may be any abbreviated technique such as an asterisk communicated by placed on the label denoting reference to the specific Material Safety Data Sheet, or the actual chronic information may be written on the label if space allows.

### 4.1.2 Labels for Transfer Containers

When hazardous materials are transferred from one container to another, the new container will be marked appropriately with the hazard warning.

### 4.5 Material Safety Data Sheets (MSDS)

A Material Safety Data Sheet will maintained be at the Jacobs Anchorage office for each hazardous chemical used by an employee. The MSDS will include:

- The chemical name and common name of all ingredients, which are health hazards,
- The chemical name and common name of all ingredients which are physical hazards,
- The physical and chemical characteristics of the hazardous chemical such as vapor pressure, flash point,
- The physical hazards of the hazardous chemical including fire, explosion, reactivity,
- The primary routes of entry,

- The Permissible Exposure Limit, Threshold Limit Value, and other exposure limit used by the manufacturer,
- Whether the hazardous chemical is listed in the National Toxicology Program Annual report on Carcinogens, International Agency for the Research on Cancer Monographs or by OSHA,
- Applicable precautions for safe handling and use,
- Applicable engineering controls, work practices, or personal protective equipment control measures known to the manufacturer,
- Emergency and first aid procedures,
- Date the MSDS was prepared and name, address and telephone number of the manufacturer.

### 4.6 Work Place Inventory

An up-to-date hazardous chemical inventory must be maintained.

### 4.7 Employee Information and Training

Employees shall be informed of operations in their work area where hazardous chemicals are present, the location of the written Hazard Communication program, list of hazardous chemicals, and MSDSs.

Training will include methods and observations to detect a hazardous chemical in the workplace, the physical and health hazards of the hazardous chemicals in the workplace, the measures employees can take to protect themselves, an explanation of the labeling system and MSDSs.

Training will be documented using the Hazard Communication and Right-To-Know Training Form, of this document.

### 4.8 Trade Secrets

The chemical manufacturer may withhold specific chemical identity from the MSDS. For emergency or first aid treatment or non-emergency conditions, the chemical manufacturer will disclose the specific chemical identity to a health professional.

## 5.0 REFERENCES AND RELATED DOCUMENTS

29 CFR 1910.1200, Hazard Communication

29 CFR 1926.59, Hazard Communication

Jacobs HSEP 1.3, Hazard Communication

JACOBS ENGINEERING GROUP INC.

**HAZARD COMMUNICATION**
**and**
**RIGHT TO KNOW STANDARDS TRAINING FORM**

---

Name: ______________________________ S.S. No.: ___________________________

Company: ______________________________

1. I have been informed about the Hazard Communication Program, Material Safety Data Sheets (MSDS), and Physical Agent Data Sheets (PADS) their use, location, and procedures for obtaining copies.

2. I have been informed that some of my work may involve exposure to toxic substances.

3. I have been informed about the right of employees to have access to relevant exposure and medical records, and the procedures for requesting access.

4. I understand that the employer must act upon a request in a reasonable amount of time to avoid the interruption of normal work operations but within 15 days.

Signature: ______________________________________________________________________

Date: ______________________________________________________________________

# Attachment C4: Site Control HSEP 7.3.2

JACOBS

| HSE Procedure | | Document No: HSEP 7.3.2 | Page: 1 of 8 |
|---|---|---|---|
| Site Control | | Supersedes: CHSP 7.3.2 | Rev. 2 |
| Issuing Department: Corporate HSE | Approval: Mike.Coyle@Jacobs.com | Previous Rev. Date: 1 Jun 97 | Current Revision Date: 13 Aug 01 |

## Table of Contents



## 1.0 PURPOSE AND SCOPE

This Corporate Health, Safety, and Environment Procedure (CHSEP) presents requirements for worksite entry and safe site work practices and the criteria for the establishment of contamination-control work zones for hazardous waste site work.

This CHSEP applies to all hazardous waste work sites and indicated sections dealing with safe work practices apply additionally to all work sites. Subcontractors may follow their company Health, Safety, and Environment (HSE) procedures but they must be consistent with these requirements and meet or exceed the requirements set forth in this CHSEP.

## 2.0 RESPONSIBILITIES

### 2.1. Project Health, Safety, and Environment Manager

The Project Health, Safety, and Environment Manager (HSEM) is responsible for assuring that the requirements of this section are incorporated in the site Health, Safety, and Environment Plan (HSEP) requirements.

### 2.2. Site Manager

The Site Manager (SM) shall also sign off on the HSEP & is responsible for implementation of this HSEP.

### 2.3. Program Health, Safety, and Environment Manager

The Program HHSE Manager (PHSEM) is responsible for evaluation of requests for any variances from requirements presented in this HSEP.

### 2.4. Site Health, Safety, and Environment Officer

The Site Health, Safety, and Environment Officer (HSEO) shall assure full compliance with the HSEP & report any deficiencies to the SM.

## 3.0 DEFINITIONS

None

## 4.0 PROCEDURE

Attachment 1 contains the Basic Code of Safe Practices, which are applicable to all site work.

The following procedures will also be followed for work on hazardous waste sites.

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material are prohibited in any area designated as contaminated.
- Hands and face must be thoroughly washed upon leaving the work area and before eating, drinking, and any other activities.
- Contact with contaminated or suspected contaminated surfaces should be avoided. Whenever possible, do not walk through puddles, mud, or other discolored surfaces. Avoid kneeling on the ground and leaning, sitting, or placing equipment on drums, containers, vehicles, or on the ground.
- Entrance and exit must be planned and emergency escape routes delineated. Warning signals for site evacuation must be established.
- Personnel on site must use the “buddy” system when wearing respiratory protective equipment. As a minimum, a third person, suitably equipped as a safety backup, is required during initial entries.
- Personnel should practice unfamiliar operations prior to actual procedure.
- During continual operations, on site workers act as safety backup to each other. Off-site personnel provide emergency assistance. Communications using radios or other means must be maintained between initial entry members at all times. Emergency communications should be prearranged in case of radio failure, necessity for evacuation of site, or other reasons.
- Whenever decontamination procedures for outer garments are in effect, the entire body should be thoroughly washed as soon as possible after the protective garment is removed.
- Visual contact must be maintained between “pairs” on-site and safety personnel. Entry team members should remain close together to assist each other during emergencies.
- Wind indicators visible to all personnel should be strategically located throughout the site. Personnel and equipment in the contaminated area should be minimized, consistent with effective site operations.
- Work area for various operational activities must be established (see Section 7.4 below).
- Procedures for leaving a contaminated area must be planned and implemented prior to going on site. Work areas and decontamination procedures must be established based on prevailing site conditions.
- Continual practice and training must be provided in using personal protection equipment, especially the self-contained breathing apparatus and chemical-resistant protective clothing.
- Wearing personal protective equipment (PPE) puts a hazardous material worker at considerable risk of developing heat stress. During warm weather conditions, a heat stress control program must be implemented (see HSEP for heat stress ).
- Cold injury (frostbite and hypothermia) and impaired ability to work are dangers at low temperatures and when the wind-chill factor is high. Procedures for cold stress monitoring and control are presented in the HSEP for cold stress.

The site-specific HSEP must specify testing for site hazards and a task hazard analysis that presents a task breakdown of the scope of work and the H&S control procedures to be implemented for each task, which must be adhered to during site initiation.

The site HSEP presents air-monitoring requirements for known contaminants. This data, together with site logistics information and information related to prevailing weather conditions, helps dictate the initial entry airborne monitoring program.

Work zones for hazardous waste sites are to be established since activities required during hazardous waste site operations may contribute to the movement of contaminants from the site to otherwise unaffected areas. Personnel and equipment may carry contaminated material into clean areas. Materials may become airborne due to their volatility, or the disturbance of contaminated soil may cause them to become wind blown.

To minimize the transfer of hazardous substances from the site, contamination control procedures are needed. Two general methods are used: establishing site work zones (discussed here) and removing contaminants from people and equipment (see HSEPs for personnel and equipment decontamination). This information is to be detailed in the HSEP. Whenever possible, a site map depicting the work zones will be developed and included in the HSEP.

### 4.1. Control at the Site

Personnel or equipment from the site must control a site to reduce the possibility of exposure to contaminants and their transport. Exposure or movement of substances can be reduced or eliminated in a number of ways, including:

- Setting up security and physical barriers to exclude unnecessary personnel from the general area.
- Minimizing the number of personnel and equipment on site consistent with effective operations.
- Establishing work zones within the site.
- Establishing control points to regulate access to work zones.
- Conducting operations in a manner to reduce the exposure of personnel and equipment and to eliminate the potential for airborne dispersion.
- Implementing appropriate decontamination procedures.

### 4.2. Establishing Work Zones

One method of preventing or reducing the migration of contamination is to delineate zones on the site where prescribed operations occur. Access control points should limit movement of personnel and equipment between zones and onto the site. By these means, contamination would be expected to be contained within certain relatively small areas on the site and its potential for spread minimized. Three contiguous zones are recommended.

Zone 1: Exclusion

Zone 2: Contamination Reduction Zone

Zone 3: Support Zone

### 4.3. Zone 1—Exclusion Zone

The Exclusion Zone, the innermost of the three concentric areas, is the zone where contamination does or could occur. All people entering the Exclusion Zone must wear prescribed levels of protection. An entry and exit check point must be established at the periphery of the Exclusion Zone to regulate the flow of personnel and equipment into and out of the zone and to verify that the procedures established to enter and exit are followed.

The outer boundary of Zone 1, the Hotline, is initially established by visually surveying the immediate environs of the incident and determine where the hazardous substances involved are located; where any drainage, leached, or spilled material is; and whether any discolorations are visible. Guidance in determining the boundaries is also provided by data from the initial site survey indicating the presence of organic or inorganic vapor/gases or particulates in air, combustible gases, and radiation, or the results of water and soil sampling.

Additional factors that should be considered include the distances needed to prevent fire of an explosion from affecting personnel outside the zone, the physical area necessary to conduct site operations, and the potential for contaminants to be blown from the area. Once the Hotline has been determined, it should be well marked. During subsequent site operations, the boundary may be modified and adjusted as more information becomes available.

Sub Areas Within The Exclusion Zone

All personnel within the Exclusion Zone must wear the required level of protection. Personal protective equipment is designated based on site-specific conditions, including the type of work to be done and the hazards that might be encountered. Frequently with the Exclusion Zone, different levels of protection are justified. Sub areas are specified and conspicuously marked as to whether Level A, B, C, or D protection is required. The level of protection is determined by the measured concentration of substances in air, potential for contamination, and the known or suspected presence of highly toxic substances.

Different levels of protection in the Exclusion Zone might also be designated by job assignment. For example, collection samples from open containers might require Level B protection, while for walk-through ambient air monitoring; Level C protections might be sufficient. The assignment, when appropriate, of different levels of protection within the Exclusion Zone generally makes for a more flexible, effective, and less costly operation, while still maintaining a high degree of safety.

**4.4. Zone 3—Support Zone**

The Support Zone, the outermost part of the site, is considered a non-contaminated or clean area. Support equipment is located on the zone and traffic is restricted to authorized response personnel. Since normal work clothes are appropriate within this zone, potentially contaminated personnel clothing, equipment, and samples are not permitted, but are left in the Contamination Reduction Zone until they are decontaminated.

- Accessibility: topography; open space available; locations of highways, railroad tracks; or other limitations.
- Wind direction: preferably the support facilities should be located upwind of the Exclusion Zone. However, shifts in wind direction and other conditions may be such that an ideal location based on wind direction alone does not exist.
- Resources: adequate roads, power lines, water, and shelter

**4.5. Zone 2—Contamination Reduction Zone**

Between the Exclusion Zone and the Support Zone is the Contamination Reduction Zone, which provides a transition between contamination and clean zones. Zone 2 serves as a buffer to further reduce the probability of the clean zone becoming contaminated or being affected by other existing hazards. It provides additional assurance that the physical transfer of contaminating substances on people, equipment, or in the air is limited through a combination of decontamination, distance between Exclusion and Support Zones, air dilution, zone restrictions, and work functions.

Initially, the Contamination Reduction Zone is considered to be a non-contaminated area. At the boundary between the Exclusion and Contamination Reduction Zones, decontamination stations are established, one for personnel and one for heavy equipment. Depending on the size of the operation, more than two stations may be necessary. Exit from the Exclusion Zone is through a decontamination station.

As operations proceed, the area around the decontamination may become contaminated, but to a much lesser degree than the Exclusion Zone. On a relative basis, the amount of contaminants should decrease from the Hotline to the Support Zone due to the distance involved and the decontamination procedures used.

The boundary between the Support Zone and the Contamination Control Line, separates the possibly low contamination area from the clean Support Zone. Access to the Contamination Reduction Zone from the Support Zone is through a control point. Personnel entering there would wear the prescribed personnel protective equipment, as required, for working in the Contamination Reduction Zone.

### 4.6. Other Considerations in Work Zone Definition

- **Modifications:** The use of a three-zone system, access control points, and exacting decontamination procedures provides a reasonable assurance against the translocation of contaminating substances. This site control system is based on a “worst case” situation. Less stringent site control and decontamination procedures may be utilized if more definitive information is available on the types of substances involved and hazards they present. This information can be obtained through air monitoring, instrument survey and sampling, and technical data concerning the characteristics and behavior of material present.
- **Area Dimension**: The distance between the Hotline, Contamination Control Line, and command post and the size and shape of each zone have to be based on conditions specific to each site. Considerable judgment is needed to assure that the distances between zone boundaries are large enough to allow room for the necessary operations, provide adequate distances to prevent the spread of contaminants, and eliminate the possibility of injury due to explosion or fire. Long-term operations would involve developing reasonable methods to determine if material is being transferred between zones and to assist in modifying site boundaries. The following criteria should be considered in establishing area dimensions and boundary distances:
  - Physical and topographical features of the site.
  - Weather conditions.
  - Field/laboratory measurements of air contaminants and environmental samples.
  - Air dispersion calculations.
  - Potential for explosion and flying debris.
  - Physical, chemical, toxicological, and other characteristics of the substances present.
  - Cleanup activities required.
  - Potential for fire.
  - Area needed to conduct operations.
  - Dimensions of contaminated area.
  - Potential for exposure.
- **Monitoring and Sampling:** To verify that the site control procedures are preventing the spread of contamination, a monitoring and sampling program should be established. The Support Zone should be periodically monitored for air contaminants using direct reading instruments and/or collecting air samples for particulate, gas, or vapor analysis. Analysis of soil samples collected in the most heavily traveled area would indicate contaminants being carried from the Exclusion Zone by personnel, equipment, or wind. Occasional swipe tests should be taken in trailers and other areas used by personnel.
- These same types of samples should be collected along with air monitored in the Contamination Reduction Zone. Increased concentrations in air or other environmental media may indicate a breakdown in control over the Contamination Reduction Corridor, ineffective decontamination procedures, or failure to restrict site access.

## 5.0 REFERENCES

U.S. Army Corps of Engineers, Safety & Health Requirements Manual EM 385-1-1, Section 28. October 1992.

U.S. EPA, Standard Operating Safety Guides, November 1984.

NIOSH/OSHA/USCG/EPA. Occupational Safety & Health Guidance Manual for Hazardous Waste Site Activities, October 1985.

## 6.0 FIGURES

Basic Code of Safe Practices

# Figure 1

## Basic Code of Safe Practices

Following is the Basic Code of Safe Practices that applies at all times to site. These safety rules are not inclusive, and all Federal and State safety regulations shall also be applicable. Where a conflict exists between a Federal, State, and/or other applicable safety rule, the more restrictive shall be in force on the job site.

This is a recommended format. It is general in nature and intended also as a basic for the preparation of a code of safe practices by subcontractors that fit his/her operation more exactly. As a minimum performance standard, they shall be adopted and enforced by any subcontractor performing work on Company projects.

- Hard hats shall be worn at all times in construction areas.
- Sleeved shirts shall be worn at all times.
- Long pants shall be worn at all times.
- Leather shoes be worn at all times in construction areas; no tennis or running shoes will be allowed.
- Adequate eye protection shall be worn when cutting, grinding, sawing or conducting any other activity that poses a potential eye hazard.
- Safety harness with lanyard shall be used at unprotected heights of more than 6'-0"; this includes working on a ladder when more than 6'-0" above the ground or floor. 100% tie off is required when unprotected more than 6' above work surface.
- Hearing protection shall be worn when employees are exposed to noise levels requiring hearing protection as defined by Federal or State HSE standards.
- Illegal drugs, alcohol, firearms, or other dangerous substances shall not be allowed on the job site.
- Good housekeeping practices shall be maintained continually.
- When work is performed overhead, the subcontractor conducting such work shall erect a barricade. The barricade shall consist of caution or danger barricade tape and appropriate warning signs.
- All barricades shall be removed when not in use.
- Subcontractor employees shall be required to honor the barricades erected by other contractors on the job site.
- All persons shall follow these safe practices and rules, render every possible aid to safe operations and report all unsafe conditions or practices to the supervisor.
- Foremen shall assure that employees observe and obey every applicable Company, State, or Federal regulation and order as is necessary to the safe conduct of the work, and shall take such action as is necessary to obtain.
- All employees shall be given frequent accident prevention instruction. Instructions shall be given at least every five work days.
- Anyone known to be under the influence of drugs or intoxicating substance, which impair the employees ability to safely perform the assigned duties, shall not be allowed on the job while in that condition.
- Horseplay, scuffling, and other acts which tend to have an adverse influence on the safety or well being of the employees shall be prohibited.

- Work shall be well planned and supervised to prevent injuries in the handling of materials and in working together with equipment.
- No one shall knowingly be permitted or required to work while the employee's ability or alertness is so impaired by fatigue, illness, or other causes that they might unnecessarily expose the employee or others to injury.
- Employees shall not enter manholes, underground vaults, chambers, tanks, silos or other similar spaces without a confined space entry permit being issued.
- Employees shall be instructed to ensure that all guards and other protective devices are proper and adjusted and shall report deficiencies promptly to the supervisor.
- Electric cords shall not be exposed to potential damage from vehicles.
- In locations where the use of a portable power tool is difficult, the tool shall be supported by means of a rope or similar support of adequate strength.
- Only trained and authorized persons shall operate machinery or equipment.
- Loose or frayed clothing, loose or hanging long hair, dangling ties, finger rings, etc., shall not be worn around moving machinery or other areas where they may become entangled.
- Machinery shall not be serviced, repaired, or adjusted while in operation, nor shall oiling of moving parts be attempted, except on equipment that is designed or fitted with safeguards to protect the person performing the work.
- Where appropriate, lockout procedures shall be used.
- Employees shall not work under vehicles supported by jacks or chain hoists without protective blocking that will prevent injury if jacks or hoists should fail.
- Air hoses shall not be disconnected at compressors until the hose line has been bled.
- Excavating, trenching, and shoring operations shall be supervised by a "competent person" (refer to OSHA and/or Company regulations during all stages of field activity).
- All excavations shall be visually inspected before entry or backfilling to ensure that it is safe.
- Excavating equipment shall not be operated near tops of cuts, banks, or cliffs if employees are working below.
- Tractors, bulldozers scrapers, and carryalls shall not operate where there is a possibility of overturning in dangerous areas like edges of deep fills, cut banks, and steep slopes.
- When loading where there is a probability of dangerous slides or movement of material, the wheels or treads of loading equipment, other than that riding on rails, should be turned in the direction which will facilitate escape in case of danger, except in a situation where this position of the wheels or treads would cause a greater operational hazard.
- Workers shall not handle or tamper with any electric equipment in a manner not within the scope of their duties, unless they have received instructions from a qualified, licensed electrician.
- All injuries shall be reported promptly to the foreman and the Prime Contractor so that arrangements can be made for medical or first aid treatment.
- No burning, welding, or other source of ignition shall be applied to any enclosed tank or vessel, even if there are some openings, until it has first been determined that no possibility of explosion exists and authority for the work is obtained from the foreman or superintendent.

## Attachment C5: Confined Space HSEP 7.2.2

JACOBS

| HSE Procedure | | Document No: HSEP 7.2.2 | Page: 1 of 15 |
|---|---|---|---|
| Confined Space Entry<br>General Industrial Services | | Supersedes: CHSP 7.2.2 | Rev. |
| Issuing Department: Corporate HSE | Approval: Mike.Coyle@Jacobs.com | Previous Rev. Date: 1 Jun 97 | Current Revision Date: 30 July 01 |

## Table of Contents



## 1.0 PURPOSE AND SCOPE

This Corporate Health, Safety and Environment Procedure (HSEP) provides the minimum procedures to ensure the safety and health of employees who enter confined spaces or perform activities to support confined space operations, such as Stand-by Attendants and Supervisors.

This HSEP applies to all employees and subcontractors engaged in operations covered by the Company Health and Safety Program, <u>except for</u> the following types of projects:

- New industrial construction projects, which are located outside of an operating unit.
- Commercial construction projects.

These projects shall follow the procedures set forth in: Corporate Health, Safety and Environment Procedure Number 7.2.1; Confined Space Entry; New & Commercial Construction Projects.

## 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.

### 2.1. Site Management

Site Management must assume ownership and responsibility for implementation of the policy and procedures found in this HSEP.

Site Management must be familiar with this HSEP and utilize expertise at their disposal to ensure employees are protected from confined space hazards.

Site Management must evaluate confined space rescue services assigned for site entries.

### 2.2. Entry Supervisor

The Entry Supervisor shall obtain and sign the confined space permit prior to entry.

The Entry Supervisor must know the hazards involved with confined space entry.

The Entry Supervisor must verify that all required tests have been performed and that all procedures and equipment are in place before the permit is issued.

The Entry Supervisor must also terminate entry and cancel permits if necessary.

The Entry Supervisor must verify that rescue services are available and the means for summoning them are in operating condition. Entry Supervisors are responsible for the removal of unauthorized person(s) who enter the confined space.

Entry Supervisors must assure that the medical facility treating any exposed Entrants are provided any MSDSs or other information that may aid in treatment.

Entry Supervisors must assure that entry operations remain consistent with the terms of the entry permit and that acceptable entry conditions are maintained.

### 2.3. Stand-by Attendants

The Stand-by Attendant (Attendant) must know the hazards of the confined spaces and be able to recognize behavioral effects of potential exposures.

The Attendant must maintain a continuous count and identification of authorized Entrants within the confined space. This count should be maintained as a sign in/sign out log and must remain with the permit at all times.

The Attendant must remain outside the space until relieved by another Attendant and should communicate with Entrants as necessary.

The Attendant must monitor activities both inside and outside the confined space and order an exit if conditions become hazardous.

The Attendant must summon the rescue team if needed.

The Attendant must be able to prevent unauthorized entry into the confined space. If an unauthorized person enters the confined space, the Attendant must advise them to exit immediately and inform the Entrants and the Entry Supervisor of the unauthorized Entrant.

The Attendant cannot perform other duties that interfere with their primary duty to monitor and protect the safety of authorized Entrants.

The Attendant may perform non-entry rescues as specified in the rescue plan.

Prior to being designated as a Confined Space Entry Attendant, they must successfully complete the Attendant Training Program.

The Attendant should be required to wear a vest or some other identification to signify he/she is an Attendant.

Each Attendant must be equipped with an air horn, radio or some other means of communication to summon help in the event of an emergency. The communication device shall be used only in an emergency.

### 2.4. Employees/Entrants

All Entrants must know and be able to recognize the hazards involved with confined space entries.

All Entrants must be able to recognize signs, symptoms and consequences of possible exposure to chemicals that may be present within the confined space.

Entrants must know how to use all personal protective equipment involved with the entry.

Entrants must be able to communicate with Stand-by Attendants. They must alert Stand-by Attendants to the warning signs or existence of a hazardous condition and exit as quickly as possible if the need arises.

Employees/Entrants shall have access to initial/periodic atmospheric test results.

Employees/Entrants shall have the ability to observe pre-entry or subsequent testing of the confined space.

### 2.5. Site HSE Representative

The Site HSE Representative shall assist Site Management and Entry Supervisors in compliance with this HSEP.

The Site HSE Representative shall be responsible for maintaining site documentation required by this HSEP.

### 2.6. Corporate Health, Safety and Environment

Corporate Health, Safety and Environment will assist Site Management Entry Supervision, and the Site Safety Representative in the safe execution of confined space entry operations, and compliance with this HSEP.

Corporate Health, Safety and Environment will function to assist in the training and monitoring of confined space entry operations and ensure any concerns are communicated to Site Management and Supervision and properly resolved.

## 3.0 DEFINITIONS

| | |
|---|---|
| Confined Space | Is large enough and so configured that an employee can bodily enter and perform assigned work.<br>Has limited or restricted means for entry or exit (for example; tanks, vessels, silos, storage bins, hoppers, vaults and pits or spaces that may have limited means of entry).<br>Is not designed for continuous employee occupancy. |
| Confined Space Entry Permit | The form provided by the Company (Attachment 1) to allow and control entry into a confined space with required information completely filled out. |
| Emergency | Any occurrence (including any failure of hazard control or monitoring equipment) or event internal or external to the confined space that could endanger Entrants. |
| Entrant (Authorized Entrant) | An employee who is authorized to enter a confined space. |
| Entry | The action by which a person passes through an opening into a confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the Entrant's body breaks the plane of an opening into the space. |
| Entry Supervisor | The person responsible for determining if acceptable entry conditions are present in a confined space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this procedure. |

| | |
|---|---|
| Published Exposure Limits | Sources for employee exposure limit data:<br>OSHA 29 CFR 1910.1000 (Subpart Z) Toxic and Hazardous Substances/Permissible Exposure Limits (PELs) Table Z-1.<br>Material Safety Data Sheets (MSDS); follow recommendations for employee exposure published in the most recent publication of this Manufacturer's data.<br>National Institute of Occupational Safety and Health (NIOSH) Recommended Exposure Limits (RELs) as published in the most recent publication of the NIOSH Pocket Guide to Chemical Hazards.<br>American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) as published by same.<br>Federal (NRC) or State radiation exposure regulations. |
| Stand-by Attendant | An employee stationed outside the confined space, which monitors the Entrants, and performs all Stand-by Attendant responsibilities assigned by this procedure (Section 6.3). |

## 4.0 PROCEDURE

### 4.1. General Requirements

This written program shall be available for inspection by employees and their authorized representatives.

Each jobsite shall be evaluated and all exposed employees shall be informed of the existence, location and danger posed by the confined spaces.

Prior to performing confined space work, information regarding confined space hazards and entry operations shall be obtained from the owner.

If personnel from more than one employer will be working in or near the confined space, procedures must be implemented to coordinate entry operations so that employees of one employer do not endanger the employees of any other employer.

The owner must be informed of any hazards confronted or created during the confined space entry either through a debriefing or during the entry operation.

Any conditions making it unsafe to remove an entrance cover shall be eliminated before the cover is removed.

When entry covers are removed, the opening shall be promptly guarded by a railing or temporary cover that will prevent an accidental fall through the opening and foreign objects from falling into the space.

If lighting and power requirements cannot be met by the use of battery lights and pneumatic equipment, reduced voltage at a maximum of 12 volts must be used.

Higher voltages may be used only with a ground fault circuit interrupter (GFCI). The ground fault circuit interrupter, transformer and disconnects must be located outside of the confined space.

If the confined space is equipped with a grounding cable, a firm mechanical joint should be verified.

If plant air is used for pneumatic equipment, it must be verified that inert gases, such as nitrogen, cannot enter the plant air system.

Prior to entry into a confined space, all entrants must complete the Respiratory Protection Program.

Personnel with respiratory problems as determined by a physician shall not be permitted in confined spaces.

All permit specified personal protective apparel and respiratory equipment shall be worn when entering any hazardous enclosure as required.

### 4.2. Permit System

Prior to personnel entering any confined space, a Confined Space Entry Permit (permit) (Attachment 1) must be obtained.

Before entry begins, the Entry Supervisor identified on the permit shall sign the permit to authorize entry.

The duration of the Confined Space Entry Permit may not exceed the time required to complete the job identified on the permit.

The Confined Space Entry Permit shall be posted at the time of entry for review.

All incidents or problems encountered during an entry operation shall be noted on the permit so that appropriate revisions can be made.

All permits must be retained for one year to facilitate review of the Confined Space Entry Program.

All Confined Space Entry Permits (permits) must include the following specific information:

- Identification of the space.
- Purpose of entry.
- Date and duration of the permit.
- A list of Authorized Entrants.
- NOTE: The permit may contain a reference to the means used, such as a roster, to keep track of authorized Entrants.
- Names of current Attendants and the Entry Supervisor.
- A list of hazards in the permit space.
- A list of measures used to isolate the permit space and eliminate or control the hazards.
- The acceptable entry conditions.
- The results of monitoring tests, initialed by the person(s) performing the test.
- The rescue and emergency services available and the means to summon them.
- Communication procedures for Stand-by Attendants and Entrants.
- Any equipment to be used to comply with entry procedures (i.e., respirators, radios, horns, alarms, etc.).
- Any other necessary information.
- Any additional permits required (i.e., hot work, excavation).

The Confined Space Entry Permit will be automatically canceled in the event that an emergency alarm, area fire alarm, or plant emergency is sounded, with the exception of a test alarm. Personnel inside the confined space must exit and follow emergency procedures. When the all-clear signal is sounded, the Confined Space Entry Permit can be reinstated or reissued after atmospheric tests are retaken and noted on the permit.

### 4.3. Control of Environmental Conditions

A review of the confined space and its previous contents must be made by the Client Representative, Site Safety Representative, and the Entry Supervisor to ascertain that the necessary ventilation, protective clothing, respiratory equipment, emergency standby equipment, fire prevention precautions, etc., have been specified and provided.

Cleaning and decontamination shall be performed as required prior to personnel entering the confined space.

Mechanical ventilation systems may be required to eliminate hazardous atmospheric conditions. Air supplied for ventilation must be from a clean source and must not increase the hazards in the confined space.

The forced air ventilation shall be directed as to ventilate the immediate areas where an Entrant is or will be present within the space.

Before an employee enters the space, the internal atmosphere shall be tested with a calibrated direct reading instrument(s), in the order listed below, to assure the following hazardous atmospheres do not exist:

- Oxygen (O2): Atmospheric oxygen content below 19.5% and above 23.5%.
- Flammables: Flammable gases or vapors at 0% Lower Explosive Limit (LEL), or no needle movement off of 0% on analog type meters.
- Toxic and Hazardous Substances: Any potential toxic air contaminants equal or above *Published Exposure Limits* (See 5.0 Definitions). Note: Potential radiation exposure is also covered as part of this requirement, and shall not exceed established Federal and/or State regulatory exposure limits.

An employee who has successfully completed gas detector training for the monitor being used must conduct these tests.

If the atmosphere within the confined space cannot be maintained within the allowable ranges for oxygen content, toxicity levels and flammable limits (as defined above), employees must not enter.

If forced ventilation does not maintain an atmosphere below the established exposure limits for any toxic/hazardous substances or such conditions can reasonably be expected to develop, appropriate respirators shall be provided and properly used.

When respirators are used, frequent monitoring of the atmosphere within the confined space must be maintained, which will alert affected employees if conditions change.

If a hazardous atmosphere is detected during entry, all Entrants must evacuate the confined space and the space shall be evaluated to determine how the hazardous atmosphere developed. In addition, measures shall be implemented to protect the Entrants from the hazardous atmospheres before a subsequent entry takes place.

### 4.4. Burning and Welding

Burning and welding in confined spaces entails unusual hazards and a detailed analysis shall be made of each specific case to insure safe performance of the work.

When burning, welding or heating operations are required in a confined space, either a mechanical method of ventilation, such as a blower, or local exhaust ventilation method, such as exhaust hood must be provided to ensure adequate ventilation. When sufficient ventilation cannot be obtained without blocking the means of access to the confined space, employees in the confined space shall be protected by air supplied respiratory equipment.

When burning or welding is required in any confined space, the gas cylinders and welding machines shall be located outside of the space. Hose connections shall be checked for leakage prior to entry into confined space. Hoses shall be removed from the confined space at the end of work, during lunch periods, breaks, or whenever all personnel leave the confined space.

All surfaces coated with toxic preservatives or any residual materials from previous use must be removed for a distance of two feet from the point of burning or welding to prevent evolution of vapors/fumes.

Vessels and/or tanks of laminated shell construction should be given special consideration for the possibility of trapped residuals from the previous contents.

### 4.5. Isolation Requirements

A detailed review of the means for isolating the confined space must be communicated to each employee involved in the confined space task. Isolation of the space consists of blanking and blinding; utilizing double block and bleed methods; and misaligning or disconnecting all mechanical linkages. In addition, lockout or tagout of all sources of energy must be accomplished to ensure isolation is achieved throughout the duration of confined space entry. (Safety Lock and Tag Procedures, Section 8.9 of the Company Safety Manual or its equivalent must be followed.)

Methods of communicating the isolation process for the confined space may be accomplished by using Piping and Instrumentation Drawings (P&IDs) which can be marked up to show isolation points, means of isolation, and location of locks and tags.

### 4.6. Emergency Rescue

A site-specific rescue plan must be developed and explained to all confined space entry participants. This plan will address as a minimum all the requirements in this section.

The rescue team must be established prior to the entry and the Entry Supervisor must verify that rescue services are available and that the means for summoning them are operable.

If an onsite Rescue Team is used, the Entry Supervisor must assure that each member of the Rescue Team is provided with and trained to use the personal protective equipment and rescue equipment necessary for making rescues from permit spaces. In addition, each member of the Rescue Team must practice making confined space rescues at least once every twelve (12) months. Members of the Rescue Team must also be trained in basic first-aid and CPR and will assist during any medical emergencies during confined space entries.

Site management on a periodic basis must evaluate rescue services that will be assigned for the site entry. The evaluation shall include: training of rescuers, response times, and equipment availabilities.

Any confined space entries conducted that contain or likely will develop into IDLH atmospheres require rescue services present during the confined space entry.

To facilitate non-entry rescue, retrieval systems or methods shall be used whenever an authorized entrant enters a permit space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. Retrieval systems shall meet the following requirements:

Each authorized entrant shall use a chest or full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level, or above the entrant's head. Wristlets may be used in lieu of the chest or full body harness if the employer can demonstrate that the use of a chest or full body harness is unfeasible or creates a greater hazard and that the use of wristlets is the safest and most effective alternative.

The other end of the retrieval line shall be attached to a mechanical retrieval device or fixed point outside the permit space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary. A mechanical retrieval device shall be available to retrieve personnel from vertical type permit spaces more than 5 feet deep.

Whenever conditions exist within a confined space that expose an entrant to environmental conditions that are Immediately Dangerous to Life and Health (IDLH) or have a possibility of becoming IDLH, a 30-minute Self Contained Breathing Apparatus or a combination airline respirator with a 5-minute escape pack must be immediately available for rescue.

## 5.0 REFERENCES

29 CFR 1910.146: Permit-Required Confined Spaces

29-CFR 1926.350(b)(4), 352(g), 353(b): Welding

Training Program No. 022: Confined Space Entry

All confined space Entrants, Stand-by Attendants and Entry Supervisors must be trained in the hazards of confined space work, the permit system being used and their specific duties and responsibilities as part of the entry team.

Training must be completed before any confined space duties are assigned, when there is a change in assigned duties, or when there is a change that presents a hazard about which, an employee has not been trained.

Re-training shall be provided whenever there are deviations from the confined space entry procedures or there are inadequacies in the employee's knowledge or use of these procedures.

Certification of training must be maintained. The certification must contain each employees name, signature of trainer, and the date of the training.

## 6.0 FIGURES

Confined Space Entry Permit For General Industrial Services

Confined Space Authorized Entrants Sign-in/Sign-out Log

Confined Space Entry Safety Checklist

Minimum Training Topics for Confined Space Entry Stand-By Attendants

# Figure 1

## Confined Space Entry Permit For General Industrial Services

1. Client/Space/Purpose

| | | |
|---|---|---|
| Client: | | |
| Location: | | |
| Space to Be Entered: | | |
| Purpose of Entry | | |
| Date: | Issue Time: | Expiration Time: |

2. Personnel

| Entry Supervisor: | Authorized Entrants: | Stand-by Attendants: |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

3. Hazards

| Hazards of the Space: |
|---|
| |
| |
| |
| Means used to isolate energy sources: |
| |
| |
| |
| Means used to isolate chemical/process hazards: |
| |
| |
| |
| Means used to isolate other hazards: (specify) |
| |
| |
| |
| Other Permits required: |
| |
| |
| |

4. Atmospheric Conditions

| | | Testing Conducted | | |
|---|---|---|---|---|
| Type | Acceptable Limit | Test Result | Time Test Done | Person Conducting Test |
| Oxygen | 19.5% | | | |
| Comb. Gas | 0% | | | |
| Toxic Atoms. | | | | |
| | | | | |

5. Equipment Required

| Personal Protective Equipment Required For Entry: |
|---|
| |
| |
| |
| Rescue Equipment Required: |
| |
| |
| Rescue Summoned By: |
| |

All potential hazards of the confined space entry must be identified on permit.

All hazards identified must be effectively isolated and means listed on permit.

All atmospheric tests required must be conducted and levels meet acceptable limits.

All equipment specified must be available and worn when applicable.

Any additional permits required for the work must be obtained.

Issuance/Acceptance

Permit Issued By:

(Print Name) (Signature)

Permit Accepted By:

(Print Name) (Signature)

Job Completed

| Entry Complete: | Date: | Time: |
|---|---|---|
| Description of Incidents: | | |
| | | |
| | | |
| | | |
| Entry Supervisor Signature: | | |



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# Figure2

## Confined Space Authorized Entrants Sign-in/Sign-out Log

Stand-By Attendant Name:______________ Job: ___________________ Date _____________

| Name | Authorized Entrant? Yes | Authorized Entrant? No | In | Out | In | Out | In | Out | In | Out | In | Out | In | Out |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | |
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# Figure 3

## Confined Space Entry Safety Checklist

This checklist covers the practices and procedures to protect employees from those hazards while entering, exiting and working in confined spaces.

__________ 1. Has a survey been conducted to identify permit required confined spaces and an inventory established?

__________ 2. Are confined spaces re-evaluated when necessary?

__________ 3. Has each hazard of the confined space been identified and procedures developed to eliminate or control them?

__________ 4. Have confined spaces been posted notifying employees that a permit is required for entry?

__________ 5. Have written procedures and practices been implemented for entering a non-permit confined space safely?

__________ 6. Is the Company standardized permit being utilized?

__________ 7. If hot work is to be performed in the permit space, has this been noted on the permit and a hot work permit generated?

__________ 8. Are the permits canceled at the completion of the entry after all entrants have exited?

__________ 9. Are atmospheric testing and verification of permit precautions conducted prior to entry?

__________ 10. Are permits immediately revoked when conditions or work activity are different than those specified on the permit and a new hazard could be introduced?

__________ 11. Is a new permit issued or the original permit re-issued when changes in work conditions or activity introduce new hazards to the space?

__________ 12. Is testing for hazardous atmospheres conducted prior to each entry by a qualified person and with approved equipment?

__________ 13. Is the atmosphere of the confined space maintained to within acceptable limits?

__________ 14. Is entry prohibited until appropriate controls are implemented if the atmospheric testing so indicates?

__________ 15. If the source of the contaminant creating the unacceptable atmosphere cannot be determined, are precautions taken to deal with the worst possible condition?

__________ 16. If the confined space atmosphere becomes unacceptable while the work is in progress, are there procedures and equipment provided to allow the employee to safely exit the space?

__________ 17. Are all hazardous materials, high pressure, high temperature, and other piping that may introduce a hazard properly isolated to prevent re-entry of hazardous materials to the confined space?

__________ 18. Are pipelines or similar conveyances between the confined space and points of isolation drained, cleaned or flushed of hazardous materials.

__________ 19. Are precautions taken to ensure that if drains, vents or piping are left open that reversal of flows or air contamination cannot enter the space?

__________ 20. Are special precautions taken when entering double walled, jacketed, or internally insulated confined spaces that may discharge hazardous material through leaks or cracks in the internal wall?

__________ 21. Is the equipment in the confined space locked out or tagged out (or both), per CFR 1910.147 and HSEP 15.1, Lock-Out/Tag-Out?

__________ 22. When ventilation is used to remove atmospheric contaminants from the confined space, is the space ventilated until the atmosphere is within acceptable limits?

__________ 23. Is ventilation maintained during the entire entry process if there is a potential for atmospheric conditions to exceed the acceptable limits?

__________ 24. Have alternate methods been established to remove air contaminants when ventilation is not feasible?

__________ 25. Are confined spaces cleaned and decontaminated of hazardous materials prior to entry?

__________ 26. If the purpose of the entry is for cleaning/decontamination, can this be done (if possible) before entry?

__________ 27. When cleaning/decontamination is not practical, is adequate personal protective equipment being utilized?

__________ 28. Is the equipment selected determined by a qualified individual based upon the requirements of the job to be performed, and in accordance with applicable standards?

__________ 29. Are entry/exit points evaluated to determine the most effective methods/equipment for safe entry and exit?

__________ 30 Have retrieval methods or equipment been determined for use in rescue?

__________ 31. Are mechanical lifting devices available for all entries to vertical type confined spaces?

__________ 32. Are warning systems/barricades available to prevent employees/objects from falling into the space?

__________ 33. Is fall protection equipment worn by employees entering permit required confined spaces?

__________ 34. Is the equipment to be used approved for use in the environment the space was classified?

__________ 35. Has a written emergency response plan been established for emergencies that may arise?

__________ 36. If respiratory protection is utilized, does it meet the requirements of OSHA 29 CFR 1910.134, and Company HSEP 13.14: Respiratory Protection.

__________ 37. Are entrants, attendants, and those in charge of entries properly trained and periodically retrained?

__________ 38. If contractors are used to enter confined spaces, are they informed of the known potential hazards and is it established who will serve as the rescue responder?

__________ 39. Are the assigned rescuers properly trained and equipped to perform efficient and timely rescues?

__________ 40. Has the confined space testing documentation and/or atmospheric checks been made available to employees/entrants?

# Figure 4

## Minimum Training Topics for Confined Space Entry Stand-By Attendants

Confined spaces Stand-by Attendants provide a vital communications link between those inside of a confined space and conditions outside of the space.  Stand-by Attendant responsibilities include:

Confined spaces Stand-by Attendants provide a vital communications link between those inside of a confined space and conditions outside of the space.  Stand-by Attendant responsibilities include:

_______ The Stand-by Attendant (Attendant) must know the hazards of the confined spaces and be able to recognize behavioral effects of potential exposures.

_______ The Attendant must maintain a continuous count and identification of authorized

Entrants remain with the permit at all times.

_______ The Attendant must remain outside the space until relieved by another trained Attendant and should communicate with Entrants as necessary.

_______ The Attendant must monitor activities both inside and outside the confined space and order an exit if conditions become hazardous.

_______ The Attendant must summon the rescue team if needed.

_______ The Attendant must be able to prevent unauthorized entry into the confined space. If an unauthorized person enters the confined space, the Attendant must advise them to exit immediately and inform the Entrants and the Entry Supervisor of the unauthorized Entrant.

_______ The Attendant cannot perform other duties that interfere with their primary duty to monitor and protect the safety of authorized Entrants.

_______ The Attendant may perform non-entry rescues as specified in the rescue plan.

_______ The Attendant should be required to wear a vest or some other identification to signify he/she is an Attendant.

Each Attendant must be equipped with an air horn radio or some other means of communication to summon help in the event of an emergency.  The communication device shall be used only in an emergency.

Additional site or job specific requirements discussed.  List: _______________

____________________________________________________________

*The above Confined Space Entry Training Topics have been discussed with me, and I understand my responsibilities as a Confined Space Stand-By Attendant.*

| | | |
|---|---|---|
| ________________________ | ________________ | ________________ |
| **Signature** | **Social Security No.** | **Date** |

________________________

Instructor's Name

# Attachment C6: Safety Evaluation Reports HSEP 2.2

JACOBS

| HSE Procedure | | Document No: HSEP 2.2 | Page: 1 of 12 |
|---|---|---|---|
| Safety Evaluation Report | | Supersedes: HSEP 2.2 Rev 2 and JVEP 29 | Revision: 3<br>Issue Date: 22 Mar 04 |
| Issuing Department: Corporate HSE | Approval: Mike.Coyle@Jacobs.com | Previous Rev. Date: 27 Sep 02 | Effective Date: 22 Mar 04 |

## Table of Contents



## 1.0 PURPOSE AND SCOPE

The Safety Evaluation Report (SER) is a management tool that evaluates the Health, Safety, and Environment process at a work location. Findings identify effective process implementation, specific hazards, and issues of concern, and provide a basis to continuously improve HSE performance.

Evaluations are comprehensive in scope and include the HSE plans, policies, procedures, and requirements of the Company, the client, subcontractors, and applicable regulatory agencies. Both current and future work areas and activities shall be included in the scope of the evaluation. All work activities and all HSE-related documentation are subject to evaluation and review.

This process is designed for use where we have responsibility for HSE. Activities of employees, subcontractors, and any other HSE-related exposures that could create hazards to them or a liability for our client or for the Company are included in the SER.

Concerns identified during the evaluation that are not within the contractual responsibility of the Company and do not present an exposure to employees or subcontractors should be forwarded to the appropriate responsible party but are not included in the SER.

## 2.0 RESPONSIBILITIES

General responsibilities for HSE Program implementation are stated in HSEP 1.5. Additional management, staff, employee, and subcontractor responsibilities that address duties specific to this topic are stated in this procedure.

### 2.1. Senior Operations Management

The senior operations manager is responsible for:

- Identifying operations management representatives as potential members of the evaluation team,
- Reviewing the findings of the SERs conducted at their office and/or project locations, and
- Confirming implementation of corrective actions with the assigned project or office manager.

### 2.2. Project or Office Manager

The project or office manager is responsible for:

- Providing escorts to the evaluation team, as necessary,
- Ensuring access to all HSE records and all work areas,
- Prompt correction of all hazards identified during the evaluation and/or developing and implementing corrective action procedures for items that can not be promptly resolved, and
- Providing a Corrective Action Plan or written response to the SER within the designated time frame.

### 2.3. HSE Department

The HSE department is responsible for:

- Providing SER evaluator training and designating appropriate evaluation team participants,
- Defining the schedule for conducting SERs in each HSASP document,
- Reporting SER summary totals to management, and
- Evaluating the findings of all SERs conducted within their area of responsibility to identify trends or common deficiencies that may require attention across all similar operations.

### 2.4. Evaluation Team Members

Members of the evaluation team are responsible for:

- Coordinating and scheduling the SER with the responsible project or office manager,
- Conducting the evaluation in a professional manner and documenting findings objectively,
- Discussing possible corrective actions for deficiencies identified during the evaluation with the appropriate personnel,
- Conducting a closing conference with the responsible project or office manager before leaving the location, and
- Completing and issuing the SER in a timely manner.

### 2.5. Lead Evaluator

One HSE Manager shall be designated as the Lead Evaluator and is responsible for overall coordination of the SER process, including

- Selecting evaluation team members based on requisite expertise,
- Determining the appropriate size of the team,

- Providing a copy of the location's previous SER to all team members,
- Providing technical and procedural guidance,
- Ensuring that team members have received SER evaluator training, and
- Distribution of the final report.

## 3.0 DEFINITIONS

| | |
|---|---|
| Contractors | Contractors and/or their employees, who are *not* Jacobs subcontractors or employees |
| HSE Department | Refers to the Jacobs Health, Safety, and Environment Department, typically referred to as "HSE," and includes the Vice President, HSE, and the staff of Senior HSE Managers, Managers of HSE, and Industrial Hygiene Managers. |
| HSE Manager | A full-time Jacobs staff employee, who provides HSE management to multiple projects/offices and provides supervision to multiple HSE supervisors. |
| Imminent Danger | Situations or conditions which could, in the opinion of the evaluation team, reasonably be expected to cause death or immediate serious physical harm to personnel or significant damage to property or the environment. |
| Lead Evaluator | An HSE Manager, who has thorough knowledge of the Company HSE program and is trained in the use of this procedure and associated evaluation protocols and who serves as the leader of the evaluation team. |
| Project/Office Manager | The Jacobs employee responsible for overall project execution including implementation of the project's or office's HSE program. The Project Manager's office may or may not be located at the project site. In some cases, the Project Manager and the Site/Construction Manager may be the same person. |
| Senior HSE Manager | A senior-level, full-time Jacobs staff employee, who provides management to multiple HSE Managers and reports to the senior HSE representative in the Company. |
| Site Manager | The on-site Jacobs employee responsible for project execution and HSE program implementation. In some cases, the Project Manger and the Site/Construction Manager may be the same person. At office locations, this position is typically the Office Manager. |
| Senior Operations Management | The senior levels of management within each operating unit, including the Group Vice President and those Operations management personnel above the site/office management level. |
| Subcontractor | Any person, partnership, or corporation, which has a contract with the Company and/or their subcontractor(s), to furnish labor, material, or equipment as part of the work. |

## 4.0 EVALUATION PROCEDURE

Guidelines for the evaluation team are provided in Figure 1, Guidelines for Evaluator and are further defined in the SER Evaluator's training.

Use of a checklist to aid the evaluators with their review of relevant forms, manuals, procedures, and documentation requirements is recommended. A sample checklist for field/project operations has been provided as Figure 2, Project HSE Checklist. Evaluators completing SERs outside the US are encouraged to use the items in Figure 2 to create their own country-specific checklist.

### 4.1. Frequency

Newly established office locations and new field projects will have an initial SER conducted during the early stages, typically within 30 days of occupancy or mobilization, to confirm that the HSE program elements are in place.

Office locations shall have an SER conducted at least annually.

SERs should be conducted on field operations or field projects at least every six-months.

More frequent evaluations may be requested by the responsible HSE or Operations Management and are always encouraged.

The project/office HASAP shall specify the planned SER schedule.

### 4.2. Evaluation Team

The SER team should be comprised of at least one operations management representative and one corporate HSE manager. Typically, this would be those home office Operations and HSE management representatives responsible for oversight of the location being reviewed.

Project Managers, Site Managers from other projects, or Operations Managers from other areas may serve as an operations team member, but Site Managers should not be members of the evaluation team for their own location. An evaluation team including at least one “cold eyes” member is encouraged.

Members of the evaluation team should have completed the SER evaluator’s training.

The Lead Evaluator will assess factors such as workforce size, relative hazards, site geography, project complexity, etc. when determining whether more than two evaluators will be required.

### 4.3. Schedule and Duration

The evaluation team should coordinate scheduling of the SER with the project/office management team. The evaluation team must note that advance security arrangements are required by some clients to access certain areas of their facilities.

The size and complexity of the project or office location and the size of the evaluation team will determine the time required to complete a thorough evaluation. Some SERs can be completed in one day, while larger or more complex locations more time. The team should strive to observe a majority of the workforce actively engaged in their work tasks.

### 4.4. Format

Standard SER formats are essential to ensure consistency throughout the Company and to provide for results trending and comparisons of multiple evaluations. Formats for “Field” SERs (HSEP 2.2 f1) and for “Office” SERs (HSEP 2.2 f2) can be found in the HSEP Manual’s Table of Contents as documents related to this procedure.

It is recognized that unique conditions exist at various locations and that factors such as project delivery methods, e.g., agency agreements, joint venture agreements, etc., may require special considerations. Findings for unusually large or segregated locations may be broken into two or more separate SERs.

Category 24, Other, has been provided to allow evaluators to address unusual or unique HSE hazards or issues not found in the standard categories.

A Senior HSE Manager must approve insertion of additional categories or other modifications of the standard SER forms.

### 4.5. Opening Conference

A formal opening conference will be conducted by the evaluation team with the responsible project or office operations and HSE management team representatives. The evaluation team will explain the scope, purpose, schedule, closing conference process, and other details of the evaluation process. The project/office team should explain any client concerns, special hazards, security issues or local requirements to the evaluation team.

Client and subcontractor personnel are typically not involved in the opening/closing conference stages of the SER process. Open and direct questions and discussions about potential shortcomings of the location's HSE program are critical to the ultimate effectiveness of the evaluation. Therefore, any involvement that could distract from conducting totally candid conversations must be avoided.

### 4.6. Photography

Photography may be allowed during the evaluation; however, many owners/clients do not allow photography on their sites. If the evaluation team is considering using photos to document their findings, approval must be secured from the location owner and the project/office manager.

As with all evaluation findings, hazards identified in photographs must be appropriately addressed and corrective actions must also be confirmed and documented.

### 4.7. Imminent Danger

Any imminent danger situations identified during the evaluation will cause immediate suspension of the SER process and must be addressed immediately. All personnel will promptly be removed from the hazard and the situation must be secured to prevent further exposures until the situation is remedied.

The Site Manager must promptly be informed of such findings and is responsible to inform the client and/or other employers' management representatives, if those parties are involved.

### 4.8. Worker Interviews

As part of the field portion of the evaluation, the evaluation team members will randomly select workers for informal one-on-one or small group interviews. A mandatory percentage of the workforce that is to be interviewed is not prescribed, however, the evaluation team will determine what a representative number is for the particular location.

Personnel from various categories (helpers, craftsmen, foremen, supervisors) should be interviewed, including personnel from various units, departments, disciplines, crafts, etc.

Interview findings will be treated in a confidential manner. The names of personnel interviewed will not be included in the evaluators' field notes or on the SER.

### 4.9. Closing Conference

At the conclusion of the evaluation, a closing conference shall be conducted between the evaluation team and the project/office team. All items of concern identified during the evaluation must be reviewed with the project/office manager, or their designee, prior to the departure of the evaluation team. This is required to ensure a clear understanding of the evaluators' concerns, and is not intended to serve as an opportunity to debate the validity of these concerns. Recommended corrective actions may also be discussed during this conference.

An informal list of items identified during the evaluation will be left with the project/office team to further confirm the items identified and to assist the site team in expediting corrective actions.

## 5.0 SER DISTRIBUTION

A formal Safety Evaluation Report will be issued by the Lead Evaluator within seven calendar days of the closing conference.

Distribution will include the site management team and the next two levels of operations and HSE management personnel. SERs with an unusually high or low number of findings may be distributed to even higher levels of management.

The HSE Department will also include SER results in monthly reports to management.

## 6.0 CORRECTIVE ACTIONS

The project or office manager is responsible for ensuring that all items identified by the evaluation team are corrected. Most of the deficiencies identified during the SER will have been corrected immediately and those prompt corrective actions will be noted on the SER. However, some items may also need programmatic changes to correct the underlying cause(s) or may require involvement by third parties, such as clients, vendors, etc. The emphasis should be placed on corrective actions intended to eliminate the *causes* of the unsafe acts and unsafe conditions identified and not only on correcting the item identified.

The project/office manager must prepare a written response to the evaluation report. The Corrective Action Plan, forms HSEP 2.2 f1b and 2.2f2b, is the second worksheet in the SER workbook and is provided as a sample format. The written Corrective Action Plan will include the responsible party and targeted completion date for each item listed on the SER and must be submitted to the project/office manager's supervisor and to the Lead Evaluator within seven calendar days of the receipt of the SER.

## 7.0 FOLLOW-UP SER

Any location, for which the evaluation result total is 75% or below, shall participate in a follow-up SER within 45 days.

Based on the findings of their evaluation, the SER team may determine that other situations may also require a follow-up SER be conducted. Generally, locations with an unusually large number of deficiencies will be scheduled for a follow-up evaluation within the next 60 to 90 days. However, locations with only one or a few deficiencies of a more serious nature may also be considered for a follow-up SER, at the discretion of the evaluation team.

The evaluation team will discuss the potential of a follow-up SER with the site management team during the closing conference, if a second evaluation is anticipated. If a follow-up SER is ultimately determined to be required by the evaluation team, it will be noted in the written report.

The proposed schedule for the follow-up SER will be determined by the evaluation team, after discussion with the project team, and will be indicated in the cover letter of the written report.

## 8.0 RECORDKEEPING

Each project or office shall keep copies of their SER history, including evaluation reports and the associated corrective action reports for each. The HSE Department will also maintain copies of all SERs generated. Records of SERs should be kept for a minimum of three years.

## 9.0 REFERENCES AND RELATED DOCUMENTS

HSEP 2.2 f1, Field SER Form (including the report's cover letter, the Corrective Action Form, and the photo log)

HSEP 2.2 f2, Office SER Form (including the report's cover letter, the Corrective Action Form, and the photo log)

## 10.0 FIGURES

Guidelines for Evaluator

Project HSE Checklist

# Figure 1

## Guidelines for Evaluator

**General**

Before beginning the evaluation process, review the Safety Evaluation Report HSEP and in particular the Purpose and Scope paragraphs.

Concerns identified during the evaluation that are not within the contractual responsibility of the Company and do not present an exposure to employees or subcontractors should be forwarded to the appropriate responsible party and are not to be included in the SER.

The names of personnel interviewed will not be included in the evaluators' reports or on the SER. If appropriate, the numbers of workers interviewed and their general classifications, e.g., two electricians, one foreman, etc., may be included. One-on-one interviews are preferred, however, small group interview sessions are acceptable. Workers shall be informed at the outset of the interview that their honest responses are critical to the quality of the evaluation and that information provided will be treated as strictly confidential. The objectives of this activity are to determine whether the workers are knowledgeable of the HSE program elements and are active participants and to gage the overall HSE attitude and culture at the location.

All comments in the report must be factual and objective. Do not include any subjective comments or opinions stated either by the evaluator(s) or by the workers. Do not mention previous incidents or potential incident scenarios. If circumstances dictate, verbally review the situation with line management.

The evaluation should not be all negative. The objective is to report a factual and comprehensive picture of the current state of the overall HSE program at the location. Use positive statements and observations, where appropriate.

If an imminent danger finding is made the deduction is noted in the appropriate category and the deficiency is also listed in the "Discrepancies That Require Immediate Response" section near the end of the SER form, the immediate corrective action taken must be stated under "Action Taken". Also, a summary of any disciplinary action taken should be appended to the SER, if appropriate.

References to state, Federal, or other regulatory standards should not be listed on the SER form. Deficiencies and corrective actions should be conveyed in non-technical terms.

**Completion of SER Form**

Both positive and negative items should be listed for each category, as identified during the evaluation. Generally, the more information and comments placed in the SER document, the better the report will convey the actual conditions observed during the evaluation.

In the body of the SER, describe any deficiency identified for an SER category that is being evaluated. If none of the example items listed for a category apply to the location being evaluated, state "Not Applicable" (NA) in the deficiency section or comment section for that category. Also, in the SER Scoresheet at the end of the SER form, the check-box for that category should be ***unchecked***. This will automatically remove that category from the scoring calculation.

For each deficiency identified, an appropriate deduction will be defined by the evaluation team. Deduct 2 points for items determined to be minor, 5 points for moderate, and 10 points for serious. The following probability and severity risk assessment index can be used as an aid to determine minor, moderate, or serious deduction points.

# Risk Assessment Index

**Severity**

| | |
|---|---|
| **1** | Low |
| **2** | Medium |
| **3** | High |

**Probability**

| | |
|---|---|
| **1** | Low |
| **2** | Medium |
| **3** | High |

**Deduction Matrix**

| | | Severity | | |
|---|---|---|---|---|
| | | **1** | **2** | **3** |
| **Probability** | **1** | *2* | *2* | *5* |
| | **2** | *2* | *5* | *10* |
| | **3** | *5* | *10* | *10* |

Deductions for uncorrected findings or repeat deficiencies reported in previous SERs should be raised to the next higher level of deduction, e.g. 2 to 5, 5 to 10, 10 to 20. Such findings will be identified as recurring items in the "Describe Deficiency" section.

Each category contains example evaluation questions to guide the evaluator. Each of the items listed as examples should be reviewed, as applicable to the location. Since some items may fit into either of two categories, Lead Evaluators shall use their judgment to determine which category is most suitable for each item.

The evaluator should provide either an entry or a "Not Applicable" comment in all shaded areas of the form. No sections shall be left blank.

If a subcontractor is associated with an identified deficiency, it is helpful if the subcontractor's name is provided along with the description of the deficiency.

For scoring purposes, the evaluator may either cite multiple findings of the same type (e.g., eye protection, respirators not in use, fire extinguishers, eye wash stations, emergency showers, emergency lighting), as individual deficiencies or as a single program deficiency. Typically, multiple individual deficiencies are scored as minor or moderate, whereas a single program deficiency reflecting multiple findings is often scored as moderate or serious.

No matter how many infractions a category may have, no negative points should result in the SER calculation page for that category. The lowest score any individual category should receive is zero.

Excel comment boxes with helpful guidelines for the evaluator have been provided for some of the cells in the worksheet.

Figure 2, Project HSE Checklist, should be used as a source of examples when completing Documentation, Postings, and Signs, Category 22, in the SER worksheet. Evaluators completing SERs outside the US are encouraged to use the items in Figure 2 to create their own country-specific checklist.

Category 24, Other, in the Field SER form has been provided to allow evaluators to address unusual or unique HSE hazards or issues. A Senior HSE Manager must approve insertion of additional categories or other modifications of the standard SER forms.

To increase the number of rows in order to increase spaces for listing discrepancies, be sure to insert Excel rows ***within*** the range of the total points formula (within the existing rows) for that category to assure that the sum formula includes the newly added rows.

## Score Calculation

The form is "automated." For instance, entering the size of the workforce will compute an Exposure Modification Factor, which is then used automatically in the scoring. For the purposes of determining workforce size as it relates to the EMF, count the number of workers included in the scope of the evaluation (SER). For example, staff, office, or subcontractor employees may or may not be part of a field project being evaluated. The lead evaluator shall make this determination.

To provide an example for the calculation process, sample values have been left in some categories on the form, which the evaluator will have to remove/replace.

Calculations in the scoresheet will be automatic. Since computations are based on whether or not a category was evaluated and scored, it is important that this step is followed:

> *If the category was evaluated and scored, place a check in the box in the first column of the scoresheet, whether or not points were deducted. If the category was not evaluated, remove the check from the category box and the category will automatically become not applicable. Removing the check from the box automatically generates zero points possible and zero score for that category.*

Possible points that can be earned in each category is the product of 10 (base factor) times the Exposure Modification Factor (EMF). Score *weighting* is determined by size of workforce (EMF) and the severity (minor, moderate, serious) of deficiencies assigned by the evaluator. Both weighting factors are automatically calculated in the scoring process.

**Final Score**

On the rows above the final score, check the box in the left column if the Total Recordable Incident (TRI), Lost-time Incident (LTI), and the Motor Vehicle Accident (MVA) rates are ***each/all*** equal to or less than half of the current corresponding Company fiscal year-to-date rate. If **each/all** of these rates are less than half of the Company YTD average, two percentage points will automatically be added to the final score.

If **any one** of the specified rates is greater than the Company average, one percentage point will be deducted from the final score for each rate that is greater, for a maximum deduction of three percentage points. The previous fiscal year's metrics will be used as the current "Company average" for SERs conducted during the first 90 days of a new fiscal year.

Do not check the second, third, or fourth boxes if the first box has been checked indicating that the TRI, LTI, ***and*** MVA rates are ***all*** equal to or less than ***half*** of Company average.

**Photographs**

If the evaluation team will be using photos to document their findings, a third tab in the SER workbook has been left available for pasting photographs.

Each photo must be accompanied by a caption. The caption should address who, what, where, when, why, and how and must include a description of the corrective action taken.

**Report Preparation**

It is suggested that the evaluator, who drafts the final report, ask another manager to review the final version of the SER before distribution.

As a final step, the evaluator is encouraged to delete unused rows to shorten the report and improve its appearance. After unnecessary rows have been deleted, the report can be saved and printed. A page break has been intentionally placed above the SER Scoresheet page. The print range is not set to include column K.

# Figure 2

## Project HSE Checklist

This checklist (US version) has been provided as an aid to be used for evaluation of site documentation and postings, which can be found as Category 22 on the Field SER form.

**Project Name:** **Client:**
**Project Location:** **Project Number:**

| All jobsites must have | (Yes) | (No) | (N/A) |
|---|---|---|---|
| OSHA Regulations 29 CFR 1910 and 1926 | | | |
| Access via JNet to the electronic collection of corporate HSE Procedures (HSEPs) | | | |
| A completed Jacobs Hazcom site-specific manual | | | |
| A complete collection of MSDS | | | |
| A copy of the client's HSE manual | | | |
| A blood borne pathogens exposure control plan | | | |
| A site-specific respiratory protection program | | | |

Assure that all jobsites have the following notices posted in an area frequently visited by all employees

| | | | |
|---|---|---|---|
| Government-required posters. These may not apply in all States | | | |

- Employee Polygraph Protection Act
- Americans With Disabilities Act
- Job Safety & Health Protection
- Equal Employment Opportunity
- Notice of Payday (California only)
- State Unemployment Insurance Benefits
- State Notice Of Compensation To Employees

| | | | |
|---|---|---|---|
| Global Field Services' "Project Absolutes" poster | | | |
| Site evacuation procedures and routes | | | |
| Recent relevant incident reports/Safety Alerts/Lessons Learned/Safety Shorts | | | |
| Right to access medical records (1910.20) | | | |
| Emergency telephone numbers (1926.50) | | | |
| Hearing conservation standard (1910.95) | | | |
| Crane hand signals (1926.550) | | | |

| Documentation | (Yes) | (No) | (N/A) |
|---|---|---|---|
| OSHA 300 Log (1904) | | | |
| First aid log (1904) | | | |
| Weekly HSE meetings | | | |
| Weekly supervisor HSE meetings | | | |
| HSE committee meetings | | | |
| Accident/incident investigation reports | | | |
| Personal exposure monitoring for regulated chemicals | | | |
| Employee orientation training (1926.21) | | | |
| Hazard communication training (initial and refresher, 1910.1200) | | | |
| Access to exposure and medical records training (initial and refresher,1910.20) | | | |
| Blood borne pathogen exposure control training (initial and refresher, 1910.1030) | | | |
| Hearing protection training (1910.95) | | | |
| Audiometric testing (1910.95) | | | |
| Noise monitoring (1910.95) | | | |
| Respirator use training (1910.134) | | | |
| Respirator fit testing (1910.134) | | | |
| Respirator program designated competent person (1910.134) | | | |

| | | | |
|---|---|---|---|
| Aerial lift inspection (quarterly, 1910.67, 1026.453) | | | |
| Aerial lift inspection designated competent person | | | |
| Aerial lift operator qualification (1910.67) | | | |
| Asbestos training certification (1910.1001) | | | |
| Assured grounding/GFCI program. (1910.304) | | | |
| Come-along/chainfall inspection (1926.552) | | | |
| Come-along/chainfall inspection designated competent person | | | |
| Confined space entrant, attendant, & supervisor training (1910.146) | | | |
| Crane inspections (annual, 1910.180) | | | |
| Crane inspections (monthly, 1910.180) | | | |
| Crane inspection designated competent person | | | |
| Crane operator qualification (1910.180) | | | |
| Drum hoist inspection (monthly, 1926.553) | | | |
| Drum hoist inspection designated competent person | | | |
| Electrical equipment inspection (1926.431) | | | |
| Electrical equipment inspection designated competent person | | | |
| Electrical Qualified Person training (1910.303) | | | |
| Electrical training conducted by a designated competent person | | | |
| Excavation daily inspections (1926.651) | | | |
| Excavation inspection competent person (1926.650) | | | |
| Fall protection equipment inspections (quarterly minimum) | | | |
| Fall protection designated competent person (1926.500 – 503; 1910.66) | | | |
| Fall protection training (1926.500 – 503; 1910.66) | | | |
| Fire extinguisher training (1910.157) | | | |
| Fire protection equipment inspection (1910.157) | | | |
| Forklift inspections (daily and monthly, 1910.178) | | | |
| Forklift operator qualification (1910.178) | | | |
| Ladder inspections (monthly, 1910.27) | | | |
| Ladder designated competent person | | | |
| Ladder/Stairway use training (1926.1060) | | | |
| Lock-out/Tag-out training (1910.147) | | | |
| Powder-actuated tool operator certification (1926.302) | | | |
| Scaffold builder training (1926.451) | | | |
| Scaffold user training (1926.451) | | | |
| Scaffold inspection designated competent person | | | |
| Sling and wire rope inspection (monthly, 1910.184; 1926.251) | | | |
| Sling and wire rope inspection designated competent person (1910.184; 1926.251) | | | |
| Storage/handling of anhydrous ammonia (1910.111) | | | |
| Storage/handling of LP gas (1910.110) | | | |

| | | | |
|---|---|---|---|
| Hazardous Waste Operations (1910.120 and Compliance Directive CPL 02-02-071) | | | |
| Medical surveillance program | | | |
| Written site-specific health & safety program (HSP) | | | |
| Training records for all hazardous waste site workers | | | |
| Emergency response procedure | | | |

Evaluation Performed By ______________________ Date ______________________

**Attachment C7: Medical Monitoring Program for Environmental Project Work HSEP 4.1**

JACOBS

| HSE Procedure | | Document No: HSEP 4.1 | Page: 1 of 4 |
|---|---|---|---|
| **Medical Monitoring Program for Environmental Project Work** | | Supersedes: CHSP 4.1 | Rev. 2 |
| Issuing Department: Corporate HSE | Approval: Mike.Coyle@Jacobs.com | Previous Rev. Date: 1 Jun 97 | Current Revision Date: 28 Aug 01 |

## Table of Contents



## 1.0 PURPOSE AND SCOPE

This HSEP presents requirements for the medical surveillance program, physical examinations, and notification of results. Detailed descriptions of medical protocols and administrative procedures, and copies of all Company forms are given in Appendix A, Medical Monitoring Program Protocols and Administrative Procedures. A copy of 29 CFR 1910.120 and the medical surveillance portions of 29 CFR 1910.1001-1045, 1910.1001 and 1910.1027 are contained in Appendix B.

This HSEP applies to all employees assigned to hazardous waste site operations who are exposed to or are potentially exposed to hazardous substances or health hazards at or above the established exposure levels for those substances.

Employees exposed to specific hazardous materials will be evaluated on a case-by-case basis for inclusion in a medical surveillance program under the direction of the CHSEM with guidance by the CMC. All work activities covered by OSHA regulation will be conducted in accordance with the specific hazard's medical monitoring requirements as outlined in the respective OSHA standards. Hazardous materials not covered by OSHA shall be subject to requirements outlined by the CHSEM and CMC.

Procedures for employees exposed to or potentially exposed to lead and/or asbestos are contained within the scope of this HSEP and will not be evaluated on a case-by-case basis.

## 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.

### 2.1. Corporate Health, Safety, and Environment Manager (CHSEM)

The Corporate Health, Safety, and Environment Manager (CHSEM) is responsible for overall management of the medical surveillance program. The CHSEM shall select the Corporate Medical Consultant (CMC) to provide guidance in establishing and maintaining the medical surveillance program, and shall be responsible for monitoring the overall implementation and effectiveness of the program.

### 2.2. Corporate Health, Safety, and Environment Administrator CHSEA)

The Corporate Health, Safety, and Environment Administrator (CHSEA), appointed by the CHSEM, is responsible for overall administration of the medical surveillance program. This includes selecting and establishing medical clinics, establishing medical protocol and administrative procedures in coordination with the Corporate Medical Consultant, managing the scheduling of physical examinations, maintaining a current database and confidential medical records system, notifying the employee's supervisor of any work restrictions as noted by the examining physician, and monitoring hazardous materials exposure information.

### 2.3. Corporate Medical Consultant (CMC)

The Corporate Medical Consultant (CMC), appointed by the CHSEM, is responsible for medical quality control review and medical auditing of the performance of the medical clinics and laboratories. The CMC may also be asked by the Corporate Health, Safety, and Environment Department to advise on additional testing, medical restrictions and abnormalities, emergency event consultation, new clinic selection, and new program medical protocol.

Program participants must agree to take a Baseline (Initial) examination, annual and post-exposure examinations, and a Baseline (Exit) examination upon termination of their enrollment in the program.

## 3.0 DEFINITIONS

| | |
|---|---|
| Environmental Project Work | Projects that are primarily regulated by requirements set forth in 29 CFR 1910.120. |

## 4.0 PROCEDURE

### 4.1. New Hires and New Participants

New participants to the medical monitoring program will be entered into the database by completion of the New Hire/Termination/Transfer (Appendix A). This form should be initiated by the local Health, Safety, and Environment Manager or Coordinator, and in some instances by the human resources representative.

Upon initial enrollment into the medical monitoring program each employee will receive a baseline (initial) examination, an interim or periodic examination each year thereafter, and a baseline (exit) examination upon terminating enrollment in the program.

The interim and periodic examinations are to be used for comparison with the baseline exam in order to detect any early indication of change in health status, whether work related or of a non-occupational origin. The interim exam will be given the year following the baseline exam and every other year thereafter. The periodic exam will be given the second year after the baseline exam and every other year thereafter.

Employees assigned to operations where they are exposed to or are potentially exposed to asbestos or lead at or above the established limits require *additional* testing. These additional requirements can be found in sections: lead, 7.3.1, 7.4.1.1, 7.4.2.1, 7.5.1; asbestos, 7.3.2, 7.4.1.2, 7.4.2.2. If the employee is currently enrolled in the medical monitoring program, the CMC will review the employee's last physical examination to ensure it is adequate and to order supplementary tests for any inadequacies.

### 4.2. Baseline (Initial) Examination

An initial or baseline exam is given to each participant prior to any work assignment involving potential exposure to hazardous materials. The exam is intended to determine that the employee will be able to perform their job without undue risk to themselves, fellow employees, or to the public and to provide a baseline against which future examinations can be measured.

The exam consists of a complete medical examination designed to establish baseline measurements and to screen for evidence of adverse effects of occupational exposure to toxic substances or health hazards. It includes a medical and occupational history review, a complete physical examination (including PA chest x-ray), basic blood and urine laboratory tests, and a physician's evaluation to determine the individual's fitness to perform field work. In addition, the exam shall assess the individual's ability to wear and use personal protective equipment. The results of the exam shall be reviewed by a physician qualified in the practice of occupational and industrial medicine to determine the individual's fitness to perform field work. The Corporate Health & Safety Department may request to include additional tests as necessary for specific anticipated exposures.

The Baseline (Initial) Examination will also include blood lead/zinc protoporphyrin determination if the employee has been exposed to lead at or above the permissible level for more than 30 days in any consecutive twelve months. If an employee has been exposed to lead at or above the level, blood lead/zinc protoporphyrin levels will be taken every two months for the first six months and every six months thereafter. At minimum, if precise exposure levels and timeframes are not known, blood lead zinc/protoporphyrin will be taken annually.

If the employee has been exposed to asbestos at or above the permissible exposure limit for a combined 30 days or more per year, the Baseline (Initial) Examination will also include Part 1, Initial Medical Questionnaire of the medical questionnaire contained within 29 CFR 1910.1001, appendix D.

### 4.3. Annual Examinations

Each individual shall receive an Interim Medical Review or a Periodic Medical Examination annually, alternating every other year.

#### 4.3.1. Interim Medical Review

The Interim Medical Review includes an interim questionnaire, updated Hazardous Materials Exposure Summary (Appendix A), and laboratory analysis to compare to the Baseline (Initial) Examination. The physician may request approval from the Corporate Health, Safety, and Environment Department for special examination procedures or additional testing if he/she finds it necessary. The Interim Medical Review will be given the first year after the baseline exam and every other year thereafter.

The Interim Medical Review will also include a blood lead/zinc protoporphyrin test if the employee has been exposed to lead for at least 30 days in any consecutive twelve months.

Interim Medical Reviews will not be given to employees exposed to asbestos at or above the permissible limit for a combined 30 days or more per year. A Periodic Medical Review will be administered annually.

#### 4.3.2. Periodic Medical Examination

The Periodic Medical Examination includes a thorough examination similar to the Baseline (Initial) Examination (section 7.2) but not including an EKG. Chest x-rays will be taken every five years (except in the case of asbestos exposure, see section 7.4.2 below). The Periodic Medical Examination will be given the second year after the Baseline (Initial) Examination and every other year thereafter. The examination will be performed as closely as possible to the anniversary of the baseline or Interim Medical Review and, if possible, at the same clinic or facility. If the examination is to be performed at a different facility, arrangements should be made to have the previous records transferred to the new examining location. The Periodic Medical Examination will also include:

- A blood lead zinc/protoporphyrin test if the employee has been exposed to lead for at least 30 days within any consecutive twelve months.

- An annual PA chest x-ray for employees exposed to asbestos at or above the permissible limit for a combined 30 days or more per year. Additionally, the Periodic Medical Examination will also include Part 2, Periodic of the Medical Questionnaire contained within 29 CFR 1910.1001, appendix D.

### 4.4. Baseline (Exit) Examination

Upon termination of enrollment in the program, the employee must complete an Exit Examination whether or not the employee has completed any field work since his/her last exam.

The exam is identical to the Baseline (Initial) Examination except that it does not include the ability to wear a respirator test, or an EKG.

Exam requirement may be waived by the Corporate Health & Safety Department if the employee has completed a Baseline (Initial) or Periodic Examination within the preceding six months. If the employee refuses the Baseline (Exit) Examination, he must put the refusal in writing.

The Baseline (Exit) Examination will also include blood lead zinc/protoporphyrin tests if the employee has been exposed to lead for at least 30 days within any consecutive twelve months.

Upon completion of a Baseline (Initial), Interim, Periodic, or Exit Examination, a Physician's Examination Summary (Appendix A), completed by the examining physician, will be mailed to the Corporate Health & Safety Administrator within one week of the examination. The Physician's Examination Summary serves as formal documentation of the employee's fit for work status and medical field clearance.

A letter from the examining physician outlining the results of the examination will be sent to the patient's home address within two weeks. A copy of the laboratory results will be included.

### 4.5. Post Exposure Examinations

Following exposure to hazardous materials, a post exposure examination may be required. The examination may be requested by the exposed individual, the project/site manager or the manager of health, safety, and environment. The tests included in the post exposure examination will be determined by the nature of the exposure and may include all tests performed in the Baseline (Initial) Examination and additional tests as necessary. In most cases, additional testing to monitor tissue damage after an exposure will be established on a case-by-case basis and reviewed by the corporate medical consultant.

### 4.6. Access to Employee's Exposure and Medical Records

All employees enrolled in the medical surveillance program shall have access to their exposure and medical records as described in Occupational Safety and Health Standard 29 CFR 1910.20. Requests for exposure and medical records are to be made in writing and sent to the HSA.

## 5.0 REFERENCES

29 CFR 1910.120, Hazardous Waste Operations And Emergency Response; 29 CFR 1910.134, respiratory protection; 29 CFR 1910.1001-1045, toxic and hazardous substances,

NIOSH, OSHA, USCG, USEPA. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities. U.S. Department of Health and Human Services, Public Health Services Centers, National Institute for Occupational Safety and Health, Washington, D.C.

ANSI. American National Standard for Respiratory Protection. ANSI Z88.6-1984. American National Standards Institute, New York, N.Y., 1984.

## 6.0 ATTACHMENTS

Contact the Corporate Health, Safety, and Environment Department for the Medical Monitoring Program Protocols and Administrative Procedures and OSHA Standards. Due to its size, this document has not been appended to this HSEP.

# Attachment C8: Work Safely Around Wild Animals HSEP 7.4

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: | Approval: | Previous Rev. Date: | Current Revision Date: |
| --- | --- | --- | --- |
| Corporate HSE | Mike.Coyle@Jacobs.com | 1 Feb 01 | 28 Aug 01 |

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## 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

# 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.

<u>Black Bear</u>

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.

<u>Brown Bear</u>

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 D**

**Project-Specific Safe Plans of Action (SPA)**

Attachment D1**:** Project-Specific Safe Plans of Action

Attachment D2: Lockout and Tagout HSEP 15.1
Utility Clearance HSEP 7.3.3
Equipment Operator Qualification HSEP 8.3
Cold Stress Control HSEP 11.4
Heat Stress HSEP 11.5
Housekeeping and Material Handling HSEP 16.4
Unexploded Ordnances HSEP 9.5

# Attachment D1: Project-Specific Safe Plans of Action

# Attachment D1
# Project-Specific Hazard Analysis

| JOB/STEP | HAZARDS | SAFE PLAN |
|---|---|---|
| All Tasks | Heat Stroke<br>(Symptoms: red, hot, dry skin; no perspiration; dizziness; confusion; rapid breathing and pulse; high body temperature) | This is a **MEDICAL EMERGENCY!** Cool victim rapidly by soaking in cool (not cold) water. Loosen restrictive clothing. **Get medical attention immediately!**<br>For further guidance see HSEP 11.5.<br>See HSEP 11.5 attached at the end of this section for more information. |
| | Heat Exhaustion<br>(Symptoms: pale, clammy, moist skin; shallow breathing; profuse sweating; weakness; normal temperature; headache; dizziness; vomiting) | Move victim to a cool, air-conditioned area. Loosen clothing, place head in low position. Have victim drink cool (not cold) water. |
| | Frostbite<br>(Symptoms: blanched, white, waxy skin, but resilient tissue; tissue cold and pale) | Move victim to a warm area. Warm frostbitten area quickly in warm (not hot) water. Have victim drink warm fluids--not coffee or alcohol. Do not break any blisters. Elevate the injured area and **get medical attention**. |
| | Hypothermia<br>(Symptoms: shivering; apathy; sleepiness; rapid drop in body temperature; glassy stare; slow pulse; slow respiration) | Move victim to a warm area. Have victim drink warm fluids–not coffee or alcohol. **Get medical attention.**<br>See HSEP 11.4, attached at the end of this section for more information |
| | Working around Wild Animals | Injury can occur from encounters with wild animals. Comply with HSEP 7.4, Working Safely Around Wild Animals. Do not bother them. |
| | Ladder Use | Fall protection will be required at heights greater than 6 feet. |
| | | Ladders will be inspected to ensure they are in safe condition. |
| | | Extension ladders will be tied off or held for the duration of the job. |
| | Slips, Trips, Falls | Remain aware and vigilant. Watch foot placement and follow well-worn paths when available. Utilize caution when carrying equipment over uneven terrain. Park as close to the site as is practicable. |
| | Use of Hand Tools, Hammers, Sledges, Pry bars, etc. | The right tool for the job will be used. |
| | | Before every use, each tool will be inspected for defects. |
| | | Proper PPE such as leather gloves and safety glasses will be used when using tools. Face shields with safety glasses will be worn when grinding. |
| | Use of Power Tools | Each tool will be inspected before every use for defects. |
| | | When making adjustments, power tools will be unplugged. |
| | | The power source will be GFCI protected. |
| Using Absorbent Materials for Contaminated Materials | | |
| | Dermal contact with contaminated media | Wear nitrile gloves and tyvek suits and rubber booties. |
| | Inhalation of vapors | Perform monitoring as prescribed in Attachment C1 |

## Attachment D1
## Project-Specific Hazard Analysis

| JOB/STEP | HAZARDS | SAFE PLAN |
|---|---|---|
| | Manual lifting hazards - muscle strain, crushed toes, pinched fingers or hands | Use proper lifting techniques, get assistance and use lifting aids. |
| Mobilization | | |
| Heavy lifting of bags etc. at airport & on legs of trips | Bodily Injury | When unloading equipment get help if the object is too heavy. Generally 50 pounds is the maximum anyone should handle. Use proper lifting technique; watch out for one another; ask for & offer assistance Use dollies, hand trucks to assist movement of the material. |
| Local traffic patterns. | Getting lost and violating local traffic laws | Review potential hazards with travelers unaccompanied by experienced travelers to Elmendorf regarding one-way streets, cross-walks etc. |
| Transporting materials | Damage of equipment and violation of federal, state or local law | Secure all loads prior to movement. Pack all containers boxes and vehicles to prevent damage to equipment and items being transported. Follow all state, federal, and local safe driving rules. 360° walk around and inspect vehicle prior to use. Pull over and stop prior to placing or receiving cell phone or radio communications. |
| Establishing communications | Not having adequate communication with emergency response, medical facilities, personnel | Communications with emergency medical personnel shall be established immediately upon mobilization of the site. Communication with all site personnel discussing emergency requirements contained in the SSHP and identifying any areas of concern shall be conducted. |
| Site preparation | | |
| set-up site | Electrical shock/fire | All circuits will be protected against overload.<br>All flexible cords shall be hard usage or extra hard usage based. Cords passing through work areas shall be protected.<br>Grounds shall be installed as per EM-385-1-1 Section 11 and the National Electric Code. Only qualified electricians are permitted to install electrical equipment. Electrical equipment shall be suitability for installation and use. Suitability of equipment for an identified purpose may be evidenced by listing, labeling, or certification for that identified purpose. |
| Overhead power lines | Electrical shock/death | Any overhead wire shall be considered energized unless the person owning such line or operating officials of the electrical utility supplying the line assures that it is not energized and it has been visibly grounded.<br>Operations adjacent to overhead lines are prohibited unless at least one of the following conditions is satisfied:<br>Power has been shut off and positive means taken to prevent the lines from being energized.<br>Equipment, or any part, does not have the capability of coming within the minimum clearance from energized overhead lines as specified in c. or the equipment has been positioned and blocked to assure no part, including cables, can come within the minimum clearances as specified in c. A notice of the minimum required clearance has been posted at the operator's position (electric line derrick trucks and aerial lifts are not required to comply with this requirement), or |

**Attachment D1**
**Project-Specific Hazard Analysis**

| JOB/STEP | HAZARDS | SAFE PLAN |
|---|---|---|
| Overhead power lines (continued) | Electrical shock/death (continued) | The equipment clearance is at least 10 feet for voltages of 50 kV or less and 15 feet for voltages 51Kv to 200 Kv. Additional clearances are provided in EM 385-1-1.<br>Work activities that could affect or be affected by overhead lines shall not be initiated until coordinated with the appropriate utility officials. |
| Use of hand and power tools | Misuse of hand and power tools | Use the right tool for the job. Hand and power tools shall be inspected, tested, and determined to be in safe operating condition before use. Continued periodic inspections shall be made to assure safe operating condition and proper maintenance.<br>Hand and power tools shall be in good repair and with all required safety devices installed and properly adjusted. Tools having defects that will impair their strength or render them unsafe shall be removed from service.<br>Power tools designed to accommodate guards shall be equipped with such guards.<br>Reciprocating, rotating, and moving parts of equipment shall be guarded if exposed to contact by employees or otherwise create a hazard. |
| | Electrical shock | Power tools shall be double insulted or provided with ground prong. Power tools used with extension cords (flexible cords) shall be provided with a GFCI. |
| Designated smoking area | Fire and inhalation of contaminates found at the site | The designated smoking area will be cleared of flammable and/or combustible materials that may be ignited and be located outside of contaminated areas. The area shall be provided with a cigarette butt container. Portable fire extinguisher shall be located not more than 25 feet away. |
| | Smoking in office facilities | Smoking is only allowed in designated area, outside of facilities and away from entrances to buildings. |
| Setting up and demarcating areas and site control | Not separating clean (support) areas from POL-contaminated areas | Each POL-contaminated area on this project shall be marked and clearly identified. Control shall be established and maintained to prevent persons not needing to perform work to walk into POL-contaminated areas. |
| First aid | Not having required first aid equipment available | A minimum of a 16-unit first aid kit shall be provided at the work site. Communication and emergency number shall be posted onsite. Each site is required to have at least two persons qualified in FA/CPR. |
| | Not identifying physical hazards located on the site | The site shall be inspected for physical hazards such as pits, holes, protruding objects from the ground. Areas of concern shall be identified by barricading with construction fence or yellow or red barricade tape RED DANGER, YELLOW CAUTION, and/or posted if needed. Hazards will be communicated to personnel during daily pre-job briefings. |
| Soil Boring Installation and Sampling | | |
| Lifting equipment | Back strain or injury | Use lifting aids and/or get help. Use proper lifting techniques to avoid injury. |

## Attachment D1
## Project-Specific Hazard Analysis

| JOB/STEP | HAZARDS | SAFE PLAN |
|---|---|---|
| Travel to boring locations | Not securing materials in vehicle, poor roads, not having two persons to respond to emergencies. | Secure loads and pack coolers for transportation of acids. Eye wash bottles should be provided.<br>Have communication (radios, phones), first aid kits, water, and spill cleanup material.<br>Let personnel on the site know when you left and when you are expected to arrive back.<br>Drive with alert to road conditions and wild animals. Provide two persons when monitoring. |
| Assemble jars needed for sampling event | Broken glass | Inspect jars for cracks and wear gloves |
| Setting the unit up | Pinch points | Minimum PPE is hard hat, safety glasses w/side shields, steel-toed shoes, and leather gloves. |
| | Crushing injuries | Establish an area to set the unit and use guide person to set the units in place. Watch for overhead clearances and striking overhead utilities. |
| | Overhead utilities | Ensure that during set up persons the drill rig is stable and on firm ground. Provide adequate cribbing or jacks to support the unit. |
| | Faulty equipment | Jacobs HSEP 8.10 Drilling and Drill Rig Safety or equivalent shall be followed (attached). An inspection checklist located in the back of the procedure shall be completed weekly; however, daily inspections of all equipment shall occur. |
| | Cuts/scraps<br>Falling from equipment or conveyors | Fall protection must be worn when working from heights over 6 feet with unprotected edges. Fall arrest system training must include the proper use, care, and limitations of fall protection equipment prior to being allowed to use the equipment. A competent person must be designated to provide instruction.<br>Training must, at a minimum, address the following areas:<br>• Company fall protection policy<br>• How to evaluate fall hazards<br>• Fall prevention measures<br>• Equipment use, care, and limitations<br>• Proper fitting and wearing of fall protection equipment<br>• Requirements and proper use of anchor points<br>• Inspection |
| Heavy Equipment Operation | Equipment Malfunction/Misuse | Only qualified personnel will be authorized to operate equipment (HSEP 8.3). |
| | | Equipment will only be operated in accordance with the manufacturer's instructions. |
| | | Use of equipment for specific tasks will be discussed in detail during daily safety meeting. |
| | | The operator will inspect, test, and document equipment daily at the start of each shift. If the loader is found to be unsafe, it will be taken out of service and tagged until the unsafe condition has been corrected. |
| | | Maintenance and repairs will be performed in accordance with the manufacturer's specifications. |

## Attachment D1
## Project-Specific Hazard Analysis

| JOB/STEP | HAZARDS | SAFE PLAN |
|---|---|---|
| Heavy Equipment Operation (continued) | Unsafe Operation | Activities will be determined by the field supervisor and thoroughly discussed with the operator and ground support personnel during the daily safety meeting. |
| | | Ground support personnel assisting the loader operator will remain in sight of operator and will serve as a safety watch. |
| | | All ground support personnel will be familiar with traffic patterns and work areas. Barriers and signs will be used to identify the work area. |
| | Unsafe Operation on Slopes, and Soft or Unstable Ground | Side slopes will be avoided when possible. Slopes will be negotiated by traveling up or down the slopes with the bucket in low position. |
| | Injury to Operator and Support Personnel | Operator will access and exit machine by means of ladder or step pads and handholds provided by machine's manufacturer. |
| | | Ladders and step pads will be kept free of any debris or buildup of mud. |
| | | The operator and ground support personnel will wear level D PPE and hearing protection. |
| | | The operator will wear seat belt or other approved restraining devices as required. |
| | | The backhoe will have a proper, working backup alarm, or a dedicated signal person will assist the operator. |
| | | Ground support personnel will yield right-of-way to heavy equipment. The operator will yield to personnel on the grounds that enter the work area. |
| | | Ground support personnel will not stand close to or work under raised loader bucket. |
| | Fire | The engine will be shut off during fueling operations. |
| | | The fire extinguisher will be mounted on the machine and will be inspected and recharged as necessary. |
| | | Caution will be used to prevent overfilling of machine and to prevent spilling of fuel on ground. |
| | | Machine engine compartment and exhaust system will be kept free of oil, fuel, and debris accumulation. |
| | Using Absorbent Materials for Contaminated Materials | Dermal contact with contaminated media |
| | | Inhalation of vapors |
| | | Manual lifting hazards - muscle strain, crushed toes, pinched fingers or hands |
| Obtaining and Handling Samples | Heat stress | Comply with Jacobs HSEP 11.5, Heat Stress. |
| | Exposure to chemicals | Utilize care when handling jars with preservatives. Wear nitrile gloves when handing glassware and environmental media. Wear safety glasses to prevent chemicals from splashing into the eyes. Note that safety glasses will not be worn if they themselves impair vision (i.e. if they have collected rainwater, or if they have fogged up due to body heat generated when samplers are working hard) |

## Attachment D1
## Project-Specific Hazard Analysis

| JOB/STEP | HAZARDS | SAFE PLAN |
|---|---|---|
| Obtaining and Handling Samples (continued) | Heavy equipment | In some instances, sampling will be conducted at sites in which heavy equipment is operating. Care will be taken to avoid heavy equipment when it is operating. Sampling near heavy equipment will be conducted only when the equipment is idle and stationary. When such sampling must be conducted, appropriate PPE will be utilized, such as a hard hat and safety glasses. Note that a hard hat will not be necessary when sampling is being conducted at sites with no heavy equipment and no other recognizable overhead hazards. |
| Soil sampling using shovels and spoons and packaging them into sampling jars | Contact with sulfuric, hydrochloric, and nitric acid | Wear PPE as prescribed in Table 2-5 of this Attachment. Ensure adequate ventilation |
| | Inhalation of gases or vapors | Perform monitoring as shown in Section 7 of the SSHP. Perform monitoring as prescribed in Attachment C1 |
| Assemble jars needed for groundwater sampling event | Broken glass | Inspect jars for cracks and wear gloves. |
| Obtaining and Handling Samples | Skin contact with contaminated or sample preservatives | Wear PPE as prescribed in Table 2-5 of this Attachment. |
| Open wells for sampling | Pinched fingers or hands | Use care when opening well caps. Wear leather gloves. |
| Conduct monitoring and preserve samples with sulfuric, hydrochloric and/or nitric acid. | Contact with sulfuric, hydrochloric and nitric acid | Use appropriate gloves (neoprene for nitric and hydrochloric acid, PVC or nitrile for sulfuric acid) when handling acids. Have eye wash bottles readily available. |
| Decontaminating Sampling Equipment | Skin contact with decontamination solution (e.g., hexane or methanol) Methanol | Wear PPE as prescribed in Table 2-5 of this Attachment. Ensure adequate ventilation |
| Manage Waste Water<br>Minimize all waste | Not using best management practice by creating unnecessary waste | Define waste streams at the beginning of the project to discover safer and more cost effective ways to minimize waste. |
| Segregate and control of waste | Mixing waste and storing incompatible waste streams together | Provide segregation of waste etc. solids, liquids combustibles, flammables, hazardous, and highly hazardous, and compatibility of storage and packaging.<br>Placard waste streams as required by State, Federal and best management practices.<br>Provide required container storage and manifests.<br>Store in a segregated area by using barricades. |
| Spills and fire prevention | | Only personnel trained to understand the hazards, safe handling, segregation and packaging shall be responsible for waste handling. Everyone should participate in identifying better methods and controls. |
| IDW Management | Pinch points | Use caution and watch the placement of your hands, wear nitrile gloves w/ leather gloves over them and tyvek suit to keep potentially contaminated soil or water off clothes and handling drum lids. |
| | Lifting drums rigging failure or dropping the load | Use proper rigging when moving drums. |
| | Back injury loading drums | Use lifting aids or get help moving materials. |

## Attachment D1
## Project-Specific Hazard Analysis

| JOB/STEP | HAZARDS | SAFE PLAN |
|---|---|---|
| All Terrain Vehicles | Injury to Operator | Only personnel who are competent in operation of ATV can operate it. Read manufacturers training info and understand operation. |
| | Unsafe Operations on Slopes and Soft Unstable Ground. | |
| Loading and Transporting Debris/ Waste Streams | Injury to Co-workers | Ground support personnel will yield right-of-way to all heavy equipment operators. |
| | | Ground support personnel will be familiar with work zones and traffic patterns. |
| | Tipping Truck, Overturning Machine | Only authorized personnel will operate the unit. |
| | | Seat belts and factory- installed restraining devices will be used during operations. |
| | | Slopes will be negotiated by going straight up and down. |
| | | Severe or sudden turns will be avoided. |
| | | The unit will be operated on level and solid surface when possible. Otherwise caution will be used when proceeding. |
| | Excess Dust | On unpaved roadways, vehicles will not exceed 10 mph to minimize dust emissions. |
| | | Upon approval from the Site Manager, water spray may be used on haul routes to minimize dust emissions. |
| | | Operations will cease until dust is controlled. |
| Working Around Debris Piles and Staging Areas | Slips, Trips, Falling Debris, Cuts from Sharp Objects | Workers will refrain from walking or climbing on the debris pile. |
| | | Workers will remain a safe distance away from equipment placing debris in the piles or containers. |
| | | Any recognized instability of the piles will be immediately corrected. |
| | | If possible, workers will refrain from handling debris. |
| | | Leather gloves must be worn when handling debris. Use good housekeeping and material handling practices see HSEP 16.4 attached at the end of this section. |
| | Back Injuries | Personnel will evaluate the size and weight of material and avoid lifting items weighing more than 40 pounds. |
| | | Personnel will use proper lifting techniques (i.e., lift with the legs and not the back). |
| Drum Handling and Drum Transportation | Manual Lifting Hazards (Muscle Strains, Crushed Toes, Pinched Fingers or Hands) | Use proper lifting techniques. |
| | Inhalation of Gases or Vapors | Monitor in accordance with Section 7 and follow action plan as prescribed in Attachment C1 |
| | Dermal Contact with Potential Contaminants | Wear nitrile gloves, leather gloves and tyvek coveralls. |
| | Drums Falling on Workers | Use mechanical means from a distance where possible. The buddy system will be used during manual removal. |
| | Hazards Working Around Heavy Equipment | Only qualified personnel will be authorized to operate equipment. Wear orange vests. Equipment will only be operated in accordance with the manufacturer's instruction. |

## Attachment D1
## Project-Specific Hazard Analysis

| JOB/STEP | HAZARDS | SAFE PLAN |
|---|---|---|
| Demobilization | | |
| Heavy lifting of bags and boxes etc. | Personnel Injury | Use proper lifting technique; watch out for one another; ask for & offer assistance. Use hand carts when available |
| Transporting materials | Damage of equipment and violation of federal, state or local law | Secure all loads prior to movement. Pack all containers boxes and vehicles to prevent damage to equipment and items being transported. Follow all state, federal, and local safe driving rules. 360° walk around and inspect vehicle prior to use. Pull over and stop prior to placing or receiving cell phone or radio communications. |
| Packing chemicals | Packing incompatible chemicals together | Use caution and proper PPE when handling sample containers and preservatives. Separate incompatibles for storage. Place flammable materials in the proper cabinet. |
| Inclement Weather | Cold weather related injuries and illnesses | Be prepared for inclement weather and changing weather conditions. Wear multiple warm loose fitting layers and change any clothing that becomes wet. Warm up as needed to prevent cold related injuries such as hypothermia. Watch out for coworkers |
| Stranded in transit | Inclement weather and loose of lodging | Have back-up plan for bad weather and discuss with other travelers. |
| Heavy lifting of bags and boxes etc. | Personnel Injury | Use proper lifting technique; watch out for one another; ask for & offer assistance. Use hand carts when available |

## Attachment D2: HSEP

Lockout and Tagout HSEP 15.1

Utility Clearance HSEP 7.3.3

Equipment Operator Qualification HSEP 8.3

Excavations HSEP 8.4

Cold Stress Control HSEP 11.4

Heat Stress HSEP 11.5

Housekeeping and Material Handling HSEP 16.4

Unexploded Ordnances HSEP 9.5

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| HSE Procedure | | Document No: HSEP 15.1 | Page: 1 of 12 |
|---|---|---|---|
| Lockout and Tagout | | Supersedes: CHSP 15.1 | Rev. 1 |
| Issuing Department: Corporate HSE | Approval: Mike.Coyle@Jacobs.com | Previous Rev. Date: 1-Jun-97 | Current Revision Date: 22-Jul-02 |

## Table of Contents



## 1.0 PURPOSE AND SCOPE

The purpose of this Corporate Health, Safety, and Environment Procedure (HSEP) is to establish minimum procedures to ensure the safety and health of personnel who may work on any type of equipment capable of being energized or storing energy.

This HSEP applies to all employees and subcontractors, who may be required to work on this type of equipment or otherwise be exposed to the unexpected energization of this equipment.

## 2.0 RESPONSIBILITIES

General responsibilities for HSE procedures implementation are stated in HSEP 1.5. Additional responsibilities specific to this HSEP include the following.

### 2.1. Site Manager

The Site Manager shall verify that all requirements specified in this work instruction have been met prior to authorizing a supervisor to remove an authorized person's lockout device.

The Site Manager shall assure that annual and post-incident reviews, as defined below, have been performed.

The Site Manager shall maintain a spare or multiple spare keys for locks used in the lockout program in a safe, secure manner.

### 2.2. Site Supervision

It is the responsibility of each person, who supervises employees that perform work covered by this procedure, to:

- Train employees in the recognition of hazardous energy sources and the method and means of isolating such sources.
- Monitor the work to verify compliance with this procedure.
- Ensure that adequate supplies of energy isolating devices and lockout devices, i.e., locks, tags, etc., are readily available.
- Confirm that each job is properly prepared by Operations and/or client personnel prior to implementing lockout and tagout procedures.
- Determine the best lockout method (individual or group) for each lockout and tagout operation.
- Supervise all group lockout activities.

## 3.0 DEFINITIONS

| | |
|---|---|
| Affected Employee | A person whose job requires him/her to operate or use machines, equipment, or process on which service is being performed under the lockout and tagout program, or whose job requires him/her to work in an area where such service is performed. |
| Authorized Employee | A person who is authorized to lock out and tag out machines, equipment, or process in order to perform service or maintenance work on that machine, equipment, or process. |
| Electrical Plug and Connector Lockout Box | A box specifically designed to lock out electrical plug assemblies or, in the case of engine driven equipment, its battery cables. |
| Energy Sources | Electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other source. |
| Energy Isolation Device | A mechanical device that provides a positive means of control to prevent the transmission or release of energy. Examples of these devices include circuit breakers, disconnects, pins, blinds, blanks, valves, blocks, and double block and bleed. They do not include secondary controls such as start buttons or controls that regulate valves. |
| Group Lockbox | A box or similar device provided for the placement and safekeeping of keys used to secure energy isolation devices in a group lockout. Group lockboxes are generally clearly labeled as to their purpose, are tamper proof and are capable of being locked by one lockout lock or a multiple gang attachment. |
| Group Lockout | A procedure which provides a level of protection equivalent to that provided by a personal lockout or tagout device, when servicing and/or maintenance is performed by a crew, department, or other group. |
| Lockout | The placement of a lockout device—usually a lock—on an energy isolation device to ensure that the energy isolating device and the equipment being controlled may not be operated until the lockout device is removed. |
| Lockout Device | A device used to secure an energy isolation device in a particular position (valve handle covers, switch covers, or circuit breaker devices) in such a way that the position of the energy isolation device cannot be changed without the removal of the lock out device. |
| Point(s) of Protection | Point or place where a lockout device has been placed on an energy isolation device to protect employees from the hazardous release of energy. |

| | |
|---|---|
| Specific Energy Control Procedure | A written procedure that details specific actions to be taken to control hazardous energy during servicing or maintenance. A specific lockout written procedure, a Safe Plan of Action or job safety analysis specific to the machine, equipment, or process being worked on are examples of acceptable specific energy control procedures. |
| Tagout | The placement of a tagout device—usually a tag—on an energy isolation device to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed. |
| Verification | Verification (try-out) of machines, equipment, or processes to assure that energy sources have been isolated. |

## 4.0 PROCEDURE

### 4.1. Specific Energy Control Procedure

Specific Energy Control Procedures must be developed in writing for each operation covered under the purpose and scope of this HSEP. These specific Energy Control Procedures must contain the following steps:

4.1.1. Step 1 — Preparing To Shut Down The Machine, Equipment, Or Process

Examples of Step 1 issues to be addressed follow.

- Identify all sources of energy and potential for stored and residual energy.
- Identify methods that will be used to isolate and lockout these energy sources.
- How will Operations or the client prepare the machine, equipment, or process for shutdown and servicing? Do process lines, pumps, or other equipment need to be drained and flushed to eliminate a chemical exposure?
- How will the affected persons be notified of the impending shut down of the machine, equipment, or process?
- How will the machine, equipment, or process be shut down?
- How will stored and/or residual energy be relieved, cooled, blocked, or isolated?
- How will all sources of energy to the machine, equipment, or process be isolated, locked, and tagged out?
- Identify the proper type and placement for locks, tags, and lockout devices at all points of protection where an energy isolation device is used.
- Determine if and where temporary blocking or supports will be needed and how to lock them in place.
- Will the individual or group lockout method be used for the lockout and/or tagout?

All of this information shall be placed in a written procedure specific to the operation, and this information will be conveyed to the personnel, who will perform the servicing and/or maintenance of the equipment.

4.1.2. Step 2 — Shutting Down The Machine and/or Equipment

Examples of issues to be addressed and actions to be taken include the following.

- Prior to shutting down the process and/or equipment, verify that the client is aware of and approves of the deactivation of the machine, equipment, or process. Obtain permits.
- Notify all affected persons that the machine, equipment, or process will be shut down and shall not be reactivated until further notice.
- Shut down the machine, equipment, or process in accordance with the written plan.

4.1.3. Step 3 — Isolating The Machine, Equipment, Or Process From The Energy Sources

Examples of issues to be addressed and actions to be taken in this phase are the isolation of all electrical, mechanical, pneumatic, chemical, thermal, or other energy sources by the application of appropriate energy isolation devices, lockout devices, locks, and tags.

4.1.4. Step 4 — Applying The Lockout And Tagout Devices

Examples of issues to be addressed and actions to be taken in this phase follow.

- If using the individual lockout method, verify that all authorized persons place a lock and tag on each energy source.
- If using the group lockout method, the supervisor must place a lock and tag on each energy source, verify that the key for each lock is placed in the group lock box, and that the group lock box is secured by placing their lock and tag on the lock box. Then each individual involved with the locked out equipment shall apply a lock on the group lock box, including subcontractors.

4.1.5. Step 5 — Safely Releasing All Potentially Hazardous Stored Or Residual Energy

Examples of issues to be addressed and actions to be taken in this phase are:

- Placing temporary energy isolating devices or supports, as needed. The energy isolating devices shall be locked in place and clearly identify as to their purpose.
- Safely releasing any stored or residual electrical energy by a qualified electrician.
- Safely releasing any stored or residual hydraulic or pneumatic energy by removing and/or bleeding lines and equipment or utilizing another, equivalent safe method.
- Safely releasing any stored or residual thermal or chemical energy by draining and flushing lines, pumps, or other equipment that may contain chemicals, steam, hot water, etc.
- Safely releasing any mechanical energy by allowing the equipment to cycle, or other safe means.

4.1.6. Step 6 — Verifying (Trying Out) The Isolation Of The Machine, Equipment, or Process

Before starting the maintenance or servicing of the machine, equipment, or process, proper isolation must be verified. Examples of issues to be addressed and actions to be taken in this phase follow.

- A qualified electrician shall test all electrical conductors with an approved meter. The meter shall be tested on a known source, the locked out equipment is then tested, and afterwards the meter is tested on the known source again.
- Attempt to restart the equipment by pushing the start button, manual controls, etc., to verify that the machine, equipment, or process cannot be inadvertently started during servicing.
- If the machine, equipment, process, or a component thereof does start during the verification phase, stop the process and notify the supervisor. Additional steps shall be taken to identify, isolate, lockout, and tagout the energy source. If necessary, the Specific Energy Control Procedure shall be revised before work resumption.

## 4.2. Energy Isolation

4.2.1. General Requirements

No attempt shall be made to operate equipment on which a lockout device has been placed.

*No one shall remove another person's lockout device, except as described in 4.2.4.*

Lockout devices must be inspected before each use to ensure they are working properly.

Locks for energy source isolation must have a means of identification that distinguishes them from any other locking device on the project. A particular color, shape, or size may be used as the means of identification. Locks should also be numbered.

A local HSE professional must approve lockout devices.

Lockout devices shall not be used for any other purpose other than to lockout equipment.

When a machine, equipment, or process must be isolated and locked out for a long period of time, periodic inspections should be performed to verify that locks and tags are still in place. The frequency of these inspections will vary depending upon the circumstances, e.g., inspect prior to each shift for an active operation or weekly for an inactive operation.

4.2.2. Locks

Locks used for isolating an energy source, shall not be used for any other purpose.

Locks used as part of an energy isolation device must be individually keyed. While in use, the key shall remain in the possession of the individual who placed the lock(s) or in the group lock box.

Spare keys for locks must be placed in a lock box in the possession of the Site Manager.

A Lockout Log (Figure 3) should be used to identify the location of locks while in use.

Locks must be durable and able to withstand the environment to which they are exposed.

4.2.3. Tags

Tags used in conjunction with lockout devices for the purpose of isolating an energy source shall be standardized in such a way as to serve as a prominent warning, e.g., DANGER — DO NOT OPERATE.

The tag must have spaces available for date, identification of energy source, and name of the individual placing the tag.

The construction, markings, and written information on the tag shall be such that deterioration will not occur when exposed to weather and/or corrosive environments.

Tags and tag attachment devices should not be re-used and are to be appropriately disposed after removal.

The means of attachment shall be

- Of a non-reusable type,
- Attachable by hand,
- Self-locking and non-releasable with a strength to withstand at least 50 pounds of pull, and
- Resistant to weather and corrosive environments.

4.2.4. Removal of Locks and Tags

Only the person who applied the lock and/or tag shall remove that lock and/or tag except as provided in this section.

In cases where the person who applied the lock and/or tag is not available to remove it, the Site Manager may authorize the supervisor to remove the lock and/or tag only in accordance with the following procedure. This procedure should be used only as a last resort to remove a lockout.

- Step 1 – Verification that the person who applied the lock and/or tag is not present at the facility.
- Step 2 – Make all reasonable efforts to contact the person, who applied the lock and/or tag to inform him/her that the lock and/or tag will be removed.
- Step 3 – The supervisor must verify that the equipment that was locked out is safe to return to service. All personnel involved in the lock out are clear and no damage will occur when the equipment is restarted.
- Step 4 – The supervisor must document how all previous steps have been met. Documentation should be kept on file at the site.

Once this has been done, the lock may be removed, but step five shall also be completed.

- Step 5 – Ensure that the person who applied the lock and/or tag is notified of the removal before he/she resumes work at the facility.

4.2.5 Tasks Involving Multiple Shifts

For tasks requiring lockout and/or tagout, which involve multiple shifts, the supervisor must ensure the continuity of the lockout and/or tagout as follows:

- The off going supervisor will remove his/her lock and tag only after the incoming supervisor has placed his lock and tag on the lock box.
- The incoming supervisor will ensure that the incoming craft workers verify isolation and place their locks and tags on the lock box.

## 4.3. Energy Isolation Methods

There are three methods of energy isolation: individual lockout, group lockout, and tagout only.

The method to be used in each situation will depend on

- The complexity of the system,
- The number of persons who will place locks,
- The number of locks to be placed to effectively lock out the machine, equipment, or process, and
- Whether or not the system is designed to accept a lock.

The supervisor shall determine which method is appropriate for each situation and will identify the method in Step 1 of the Specific Energy Control Procedures.

4.3.1. Individual Lockout Method

The individual lockout method is normally used when the number of persons and locks that will be required on energy isolation devices is small.

When using the individual lockout method, each person involved in the service or repair of the machine, equipment, or process shall:

- Place a lock on each appropriate energy isolation device.
- Place a completed tag on each lock.
- Remove his/her lockout devices and tags after verification that all of his/her
  - Work is completed,
  - Tools and materials are cleared, and
  - Blocks or temporary energy isolation devices have been removed.

4.3.2. Group Lockout Method

The group lockout method is normally used when a larger number of persons or locks will be required to assure isolation of energy sources.

When using the group lockout method, the following procedure shall be used.

- The supervisor of the authorized employees shall place a single lockout device on each energy isolation device.
- The supervisor of the authorized employees places a single completed tag on each lockout device.
- The supervisor places the keys for the single lockout device in the group lockbox or equivalent device.

- Each authorized employee and the supervisor shall affix a lock and tag to the group lockout device, group lockbox, or equivalent device before he/she begins work, and shall remove those devices only when he/she completes work on the machine, equipment, or process being serviced or maintained.
- The supervisor shall ensure that all work of personnel under their supervision is completed, and that their personnel will no longer be affected by the lockout prior to removal of lockout devices and tags.
- The supervisor shall remove his/her lockout devices and tags after verification that all
  - Work is completed,
  - Tools and materials are cleared, and
  - Blocks or temporary energy isolation devices have been removed.

4.3.3. Tagout Only

The tagout-only method shall be used only when energy sources are not capable of being locked out. This should be very rare considering the variety of lock out devices available on the market.

Use of the tagout-only method requires approval of the Site Manager.

All other requirements of this work instruction apply.

When tagout systems are used, employees shall also be trained in the following limitations of tags:

- Tags are essentially warning devices affixed to energy isolating devices, and do not provide the physical restraint on those devices that is provided by a lock and lockout device.
- When a tag is attached to an energy isolating means, it is not to be removed without authorization of the authorized person responsible for it, and it is never to be bypassed, ignored, or otherwise defeated.
- Tags must be legible and understandable by all authorized employees, affected employees, and all other employees whose work operations are or may be in the area, in order to be effective.
- Tags and their means of attachment must be made of materials, which will withstand the environmental conditions encountered in the workplace.
- Tags may evoke a false sense of security, and their meaning needs to be understood as part of the overall energy control program.
- Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use.

**4.4. Start-up Procedures**

Before lockout and energy isolation devices are removed and energy is restored to the machine, equipment, or process, the following steps shall be taken in order.

4.4.1. Step 1

Verify that machine and equipment components, guards, etc., have been replaced and are intact.

Also, verify that all tools and materials such as screws, wrenches, nuts, bolts, rags, etc., have been removed from the machine, equipment, or process.

4.4.2. Step 2

Verify that the person who applied the devices removes all energy isolation and lockout devices.

4.4.3. Step 3

Verify that all personnel are removed from the machine, equipment, or process and are safely positioned so that start-up will not expose them to hazardous energy sources.

4.4.4. Step 4

Remove temporary blocking and structural supports as set forth in the Specific Energy Control Procedure.

**4.5. Shop Equipment**

4.5.1. Specific procedures will be required for each piece of shop equipment unless all of the following exceptions are met.

- The machine or equipment has no potential for stored or residual energy or reaccumulation of stored energy after shut down which could endanger employees;
- The machine or equipment has a single energy source which can be readily identified and isolated;
- The isolation and locking out of that energy source will completely deenergize and deactivate the machine or equipment;
- The machine or equipment is isolated from that energy source and locked out during servicing or maintenance;
- A single lockout device will achieve a locked-out condition;
- The lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance;
- The servicing or maintenance does not create hazards for other employees; and
- The employer, in utilizing this exception, has had no accidents involving the unexpected activation or reenergization of the machine or equipment during servicing or maintenance.

The shop manager shall review these procedures annually.

The procedures shall clearly and specifically outline the scope, purpose, authorization, rules, and techniques to be utilized for the control of hazardous energy, and the means to enforce compliance including, but not limited to, the following:

- A specific statement of the intended use of the procedure;
- Specific procedural steps for shutting down, isolating, blocking, and securing machines or equipment to control hazardous energy;
- Specific procedural steps for the placement, removal, and transfer of lockout devices or tagout devices and the responsibility for them; and
- Specific requirements for testing a machine or equipment to determine and verify the effectiveness of lockout devices, tagout devices, and other energy control measures.

4.5.2. Locks out procedures, as provided elsewhere in this section, are not required for portable electric tools if all of the following conditions are met:

- The equipment must not produce or use any stored energy, for example a portable air compressor, a steam washer, or a chemical pump.
- The equipment can be and is unplugged and the plug remains under the exclusive control of the operator or it is placed in a lockout device and locked.
- The service on the tool is limited to changing bits, blades, or other such devices. The tool must be properly locked out if any maintenance or servicing is to take place.

4.5.3. Operators of shop equipment must de-energize and lock out their equipment to change tools, chucks, blades, and perform similar tasks. A power disconnect switch must be provided for this purpose at or near the equipment unless the equipment can be unplugged.

The activation of push-button or butterfly controls will not be solely relied upon for lockout.

### 4.6. Lockout and Tagout Program Review

Inspections shall be conducted to verify that the site's lockout and tagout program is effective.

A written review of lockout and tagout procedures shall be performed at least annually and/or after any incident involving lockout or tagout, in order to verify that the requirements of the procedure are being followed.

A designated employee, other than the one(s) utilizing the lockout and tagout procedure, shall perform the review.

The program review shall include an evaluation of employees' compliance with the lockout and tagout procedure.

The program review shall document the machine, equipment, or process on which the energy control procedure was being utilized, the date of the review, the employees included in the review, and the name of person performing the review. See Figure 1, Lockout and Tagout Program Review Report.

Safety Evaluation Reports and other written safety audits that include lockout and tagout program review may, in some cases, fulfill the program review requirements.

The Site Manager shall assure that annual and post-incident reviews have been performed.

### 4.7. Training

Authorized and affected personnel, who have operational control, must receive training in the contents of this work instruction and the relevant HSE training module prior to work involving lockout and tagout.

The training shall be conducted at least annually thereafter, anytime this work instruction is revised, and when a change in machinery, equipment, or process presents new potential hazards.

Training documentation will be maintained at the site and shall include copies of quizzes and the Lockout and Tagout Training Record, or equivalent. (See Figure 2.)

### 4.8. Disciplinary Action

Due to the consequences of failure to comply with the directives set forth in this work instruction, disciplinary action, up to and including discharge, should be considered for any person:

- Who operates an energy source isolation device to which lockout devices and tags are attached or removes a lockout device or tag without authorization;
- Who works on an energy source without following this work instruction; or
- Who deviates from this work instruction.

## 5.0 REFERENCES AND RELATED DOCUMENTS

29 CFR 1910.147, The Control of Hazardous Energy, Lockout/Tagout

29 CFR 1926.417, Lockout and Tagging of Circuits

HSEP 8.5

HSEP 19.1

HSEP 19.4

## 6.0 FIGURES

Figure 1: Lockout and Tagout Program Review Report

Figure 2: Lockout and Tagout Training Record

Figure 3: Lockout Log

Top of the Document

# Figure 1

## Lockout and Tagout Program Review Report

Project Number:____________________________ Location:_______________________________________

Project:_____________________________________________________ Date:_________________________

INSPECTION

Machine, Equipment, or Process Inspected:_________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

Employees Included In Inspection: ____________________________ ____________________________

______________________________ ____________________________ ____________________________

______________________________ ____________________________ ____________________________

Inspection Results:__________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

Review of Incidents (involving lockout/tagout):_____________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

Conclusion and Findings:_____________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

_____________________________________________________________________________________________

Annual Training Completed and Documented: Yes__________ No___________

Inspector:______________________________________Signature:____________________________________

Site Manager____________________________________Signature:____________________________________

# Figure 2

## Lockout and Tagout Training Record

My signature indicates that I acknowledge that I have received training in the Lockout and Tagout HSEP 15.1 and that I fully understand the requirements of this work instruction. I agree to abide by these requirements. I understand that violation of these requirements may subject me to disciplinary action up to, and including, discharge.

| Name Printed | Signature | Social Security No. | Date of Training |
|---|---|---|---|
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Name of instructor: ____________________________________________

Attach a copy of the training module to this training attendance roster.

Maintain training roster and copy of training module with project records.

# Figure 3

## Lockout Log

| Date | Lock No. | Issued To | Task or Energy Source Isolated | Date Out | Date In |
|---|---|---|---|---|---|
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| HSE Procedure | Document No: HSEP 7.3.3 | | Page: 1 of 5 |
|---|---|---|---|
| Utility Clearance | | Supersedes: CHSP 7.3.3 | Rev. 2 |
| Issuing Department: Corporate HSE | Approval: Mike.Coyle@Jacobs.com | Previous Rev. Date: 26 Jul 00 | Current Revision Date: 26 Aug 02 |

## Table of Contents



## 1.0 PURPOSE AND SCOPE

To establish Health, Safety, and Environment (HSE) requirements to minimize, and to the extent possible, eliminate the risk to personnel and property from contact with buried or aboveground utility service lines.

This Work Instruction applies to all field activities where there could be contact with aboveground utilities or sub-surface utilities or related service lines.

## 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

None

## 4.0 PROCEDURE

For work involving buried utilities and service lines:

- All three of the following Clearance Steps shall be utilized prior to drilling.
- Follow clearance Steps 1 and 2, in addition to the requirements set forth below for trenching and excavation, before any trenching or excavation work is done.

### 4.1. Clearance Step 1

Prior to field activities, appropriate property maps, blue lines, and/or as-builts will be examined in an effort to locate underground utility and service lines. Such reviews shall be supplemented by interviews of knowledgeable facility engineering and maintenance personnel.

During the project site walk, any discrepancies or new information regarding utility locations will be added to project maps.

For projects on Federal land, facility-engineering personnel will be asked to provide utility clearance and sign off. The Site Manager shall obtain and submit proper facility utility service clearance request forms.

For projects within local government jurisdiction, the Site Manager shall request the services of the local utility locater service.

If the project occurs in a state or location, which has an agency that conducts utility clearances, they will be notified. The services of State Underground Service Alert (USA), DigAlert, or other appropriate service will be used. The utility locater service will assign a "ticket" number to your site, which shall be recorded. This ticket number is valid for a limited time.

**4.2. Clearance Step 2**

4.2.1. Sub-surface Survey

Following map reviews, personnel interviews, and use of locater services, one or more of the most appropriate of the following geophysical sub-surface survey methods shall be used to locate underground utility or service lines.

- Electromagnetic (EM) methods,
- Ground penetrating radar (GPR),
- Magnetic survey, and/or
- Pipe locator.

4.2.2. Finding Pipes and Other Objects via Metal Detection

Magnetic detection can be used to find the following:

- Iron, steel, and copper water lines
- Metal gas lines
- Surveying pins (property markers)
- Copper tracer wire
- Copper and aluminum electrical wires
- Steel cables
- Telephone and TV cables
- Aluminum conduit
- Any continuous metal pipe or line

For magnetic detection to work, the target must contain some iron or steel or have an electrical current flowing through it so that a magnetic detector can find it. Nonferrous objects or objects not carrying an electrical current, such as polyvinyl chloride or high-density polyethylene pipe, must be detected by other means.

The strongest signals come from the ends of an object, as this is where the magnetic fields of force tend to concentrate. Therefore, if an object is oriented vertically, it will produce a stronger signal than one oriented horizontally. This can make a relatively small object, such as a steel drum, easier to find than a long, cast-iron water main.

The same object buried horizontally will likely produce two weaker signals, one directly above each end—one signal being positive and one being negative. Cast-iron or steel water pipe laid end-to-end will produce a strong signal at each joint, even if the pipes are welded together. Magnetic detection of metal pipes often results in a series of peak signals designating the locations of welded end joints.

Electric cables must be energized to be detected magnetically.

 

4.2.3. Ground-Penetrating Radar

Ground-penetrating radar (GPR) uses an electromagnetic (radio wave) antenna tuned to a frequency that can penetrate soils, rock, concrete, ice, and other common natural and manmade materials. Such capabilities make radar a prime technique in obtaining geotechnical information and evaluating hazardous-waste sites. As such, it is more suited for use outside of urban areas where natural conditions predominate. Furthermore, a GPR unit requires considerably more time to process than do simpler magnetic detection techniques.

GPR functions in a manner similar to standard aerial radar. A GPR determines subsurface conditions by sending pulses of high-frequency radio waves into the ground from a transmitter antenna located on the surface. Subsurface structures cause some of the wave energy to be reflected back to the surface, while the rest of the energy continues to penetrate deeper. The result is a series of radio "echoes" that delineate underground interfaces such as bedding, cementation, changes in moisture and clay content, voids, fractures, and intrusions as well as manmade objects.

Resolution of radar reflections can be increased by increasing the frequency of the radar waves transmitted into the ground.

GPR is best suited for determining a region’s hydrogeology, which is its main function. Smaller manmade objects such as individual drums and utilities are harder for a GPR to delineate, though a sensitive unit can reveal their locations as part of a general survey.

4.2.4. Marking Utilities

The following color code is recommended for marking utility locations.

- white work location
- red electrical
- yellow gas or oil
- orange telephone
- blue water
- green sewer

**4.3. Clearance Step 3**

When earth drilling or borings are to be done, hand augering (not to be done with a power auger) will be done to a minimum of seven feet for all locations where there is a potential to impact buried utilities.

Prior to drilling, the hole shall be reamed by hand to a diameter of 120% of the drill bit to be used.

For soil gas surveys, the survey probe shall be placed as close as possible to the hand auger.

In cases where hand augers meet refusal at depths less than seven feet bgs, the following steps will be taken to ensure the cause of the refusal is not an underground utility.

- A geologist or other individual qualified to classify soil shall examine the substrate to ensure it appears to be native and/or undisturbed material.
- Two additional step-out hand-augered borings shall be drilled approximately two feet laterally from the original boring. The borings shall be located such that a right triangle is formed, with the original boring forming the apex of the 90-degree angle. If these borings also meet refusal at a similar depth to the first boring, and a qualified person determines the soil is native material, hand augering to the total depth of 7 feet will not be required.

**4.4. Trenching and Excavations**

Prior to groundbreaking, where trenching or excavating will be done, the soil must be probed with a magnetometer. (Magnetometers sense ferrous metallic objects, or iron-rich rock such as basalt, but give no information about objects such as fiberglass or concrete tanks.)

To assist the equipment operator in locating any underground obstructions, a spotter will observe the excavation.

Additional requirements for trenching and excavating activities can be found in the Jacobs HSEPs/CHSPs on this subject.

### 4.5. Other Requirements

The Project Manager and HSE Manager will determine methods for utility clearance for horizontal and slant boring.

All uncovered utilities must be supported. If support is not required, so indicate under "Deviations From CHSP Approval", Paragraph 8, on the attached Utility Clearance form.

Utility lines shall be locked-out and/or tagged-out prior to repairs or modifications.

### 4.6. Above Ground Power Lines

Minimum clearances for working in proximity to overhead power lines are

| Nominal Voltage | Minimum Clearance |
|---|---|
| 0 -50 KV | 20 ft., or one mast length; whichever is greater |
| 50 KV+ | 20 ft. + 4 in. for every 10 KV over 50 KV or 1.5 mast lengths; whichever is greater |

If it is necessary to work without the minimum clearance, the overhead line must be de-energized or re-routed by the utility company or a competent electrician.

### 4.7. Approval

The attached Utility Clearance Permit must be completed and signed by the Site Manager or the Project Manager's designee prior to commencement of relevant site work.

The Project Manager after collaboration with the site HSE Officer or HSE Manager must approve deviations from this CHSP. Approval via telephone is acceptable in the event the Project Manager is not on site.

### 4.8. Existing Utility Repair

Prior to field work, locate the utility shut-offs. Obtain keys and/or tools (or arrange a means to promptly summon the contact person) to access the shut-offs.

Plan other appropriate steps necessary to reduce the emergency response time in the event of a damaged underground line incident, to limit property damage from the leak, and to minimize personnel exposure to a potentially hazardous environment.

When repairing existing utilities, refer to the CHSP for Lock-Out and Tag-Out. Repairs should be made only as directed by utility owners.

## 5.0 REFERENCES

29 CFR 1926.650 –1926.652, Excavations

29 CFR 1910.333, Selection and Use of Work Practices in Sub-part S – Electrical

29 CFR 1926.955, Provisions for Preventing Accidents Due to Proximity to Overhead Lines

## 6.0 FIGURES

Utility Clearance Permit

# Figure 1

## Utility Clearance Permit

Project: ______________________________ Completed by: ______________________________

Site Location: __________________________________________________Date: ____________

Reason for Clearance: ___________________________________________________________

| DESCRIPTION OF ACTIVITY | YES | NO | N/A | DATE | INITIALS |
|---|---|---|---|---|---|
| 1. Review of Existing Maps | | | | | |
| 2. Interviewed Personnel Familiar With Area? | | | | | |
| 3. Above Ground Utilities | | | | | |
| a) marked on site maps | | | | | |
| b) necessary to lockout | | | | | |
| c) document procedures used to lockout or re-route | | | | | |
| 4. Underground Utilities | | | | | |
| a) State Agency called: (specify) | | | | | |
| Ticket Number: | | | | | |
| b) State name of additional utility called: | | | | | |
| Ticket Number: | | | | | |
| c) Specify geophysical clearance method used: | | | | | |
| Done By: | | | | | |
| d) Utility locations marked with appropriate color code? | | | | | |
| Done By: | | | | | |
| e) Utilities marked on site map (please attach) | | | | | |
| Done By: | | | | | |
| 5. Hand augering to ______ feet done by : | | | | | |
| 6. Trench/Excavation probed by: | | | | | |
| a) Hand Clearance required: | | | | | |
| 7. Clearance Approval<br>Site Manager:<br>Client Representative: | | | | | |
| 8. Procedure Deviations Approval:<br>Project Manager:<br>HSE Manager: | | | | | |

Describe Deviations: ____________________________________________________________

_________________________________________________________________________

Justification: __________________________________________________________________

_________________________________________________________________________

JACOBS

| HSE Procedure | | Document No: HSEP 8.3 | Page: 1 of 3 |
|---|---|---|---|
| **Equipment Operator Qualification** | | Supersedes: CHSP 8.3 | Rev. 2 |
| Issuing Department: Corporate HSE | Approval: Mike.Coyle@Jacobs.com | Previous Rev. Date: 1 Jun 97 | Current Revision Date: 14 Aug 01 |

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## 1.0 PURPOSE AND SCOPE

This HSEP provides the minimum procedures to be followed for qualification of equipment operators. Further guidelines for "Heavy Equipment" operator qualifications can be found in Section 17.0 in this manual.

This HSEP applies to all employees engaged in operations covered by the Company Health, Safety, and Environment Program.

## 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

None

## 4.0 PROCEDURE

Only persons authorized by a current Qualified Operator's Listing will be permitted to operate the following equipment:

- Hydraulic Cranes (Cherry Pickers, Drotts, etc.)
- Lifting Cranes (Boom/cable types)
- Overhead Gantry Cranes
- Front End Loaders / Back Hoe / Track Hoe
- Bulldozers
- Dumpster Trucks
- Tractor / Trailer Trucks
- Forklifts
- Aerial Lifts
- Buses
- Powder actuated tools

Operators will be assigned by the respective Site Manager and the listings will be updated as necessary.

The listings will be kept in readily available files at the project location.

Use Attachment 1 to assign Qualified Operators for the above required equipment.

## 5.0 REFERENCES

Various from OSHA standards found in 29 CFR 1910 & 1926

ANSI B30.5 – 1995; Mobile and Locomotive Cranes

## 6.0 FIGURES

Operator Qualification

# Figure 1

## Operator Qualification

TO: HSE DEPARTMENT

FROM: ___________________________________ (Superintendent)

Through past experience, training, and personal observation, the following person(s) is a Qualified Operator for the equipment indicated.

| | **Name** | **Equipment** |
|---|---|---|
| 1. | | |
| 2. | | |
| 3. | | |
| 4. | | |
| 5. | | |
| 6. | | |
| 7. | | |
| 8. | | |
| 9. | | |
| 10. | | |
| 11. | | |
| 12. | | |

**Date:**_________________________ ______________________________________

**Site/Project Manager's Signature**

JACOBS

| HSE Procedure | | Document No: HSEP 8.4 | Page: 1 of 8 |
|---|---|---|---|
| Excavations | | Supersedes: CHSP 8.4 | Rev. 2 |
| Issuing Department: Corporate HSE | Approval: Mike.Coyle@Jacobs.com | Previous Rev. Date: 1 Jun 97 | Current Revision Date: 14 Aug 01 |

## Table of Contents



## 1.0 PURPOSE AND SCOPE

This Corporate Health, Safety, and Environment Procedure (HSEP) provides minimum procedures to be followed when employees are engaged in operations or activities requiring entry into or work around excavations.

This HSEP applies to all employees and subcontractors engaged in operations covered by the Company HSE Program.

## 2.0 RESPONSIBILITIES

### 2.1. Site Management

Site Management is responsible for assuring the overall implementation and compliance with the Company's excavation HSEP. They must be familiar with the excavation HSEP and utilize expertise at their disposal to ensure employees are protected form excavation hazards.

Site Management shall designate Competent Persons for trenching and excavation activities on-site, only after they have completed an appropriate course taught by the Corporate HSE Department, or some other recognized third party.

### 2.2. Site Supervision

Supervisors responsible for employees performing work covered by the Company's excavation HSEP must:

- Ensure Competent Persons have been assigned to inspect the safety of excavations and monitor the work for any hazardous situations. Confirm each excavation job is properly evaluated and prepared with hazards being addressed ensuring employees are protected.
- Ensure employees are aware of any hazards associated with their work, and they are properly trained on this HSEP and any site-specific excavation procedures.
- Ensure employees adhere to all excavation HSEP requirements and any task requirements established.
- Continuously monitor the work to assure compliance with this HSEP.

### 2.3. Competent Persons

Competent Persons assigned to excavation sites have the responsibility to:

- Train employees on the content of this procedure and ensure it is clearly understood.
- Evaluate whether the excavation is also a confined space.
- Perform documented daily inspections of excavations, the adjacent areas, and protective systems before the start of work each day and as necessary throughout the shift.
- Inspections shall additionally be made after every rainstorm or other hazard-increasing occurrence.
- Where evidence indicates a possible cave-in, failure of the protective system, or other hazardous condition, employees shall be removed until the proper precautions have been taken.

### 2.4. Employees

Employees must know the hazards associated with their work in and around excavations and ensure these hazards are properly addressed according to training received.

### 2.5. Site Health, Safety, and Environment Supervisor

The Site HSE Supervisor shall assist Site Management and Supervision in compliance with this HSEP.

The Site HSE Supervisor shall be responsible for maintaining site documentation required by this HSEP.

### 2.6. Corporate Health, Safety, and Environment

Corporate HSE will assist Site Management and Supervision in the safe execution of excavation activities. The Corporate HSE will function to assist in the monitoring of excavation activities and ensure any concerns are communicated to Site Management and Supervision and properly resolved.

## 3.0 DEFINITIONS

| | |
|---|---|
| Aluminum Hydraulic Shoring | A pre-engineered excavation shoring system comprised of aluminum hydraulic cylinders (cross braces) used in conjunction with vertical rails (uprights) or horizontal rails (wales). |
| Bell Bottom Pier Hole | A type of shaft or footing excavation, the bottom of which is made larger than the cross section above to form a belled shape. |

| | |
|---|---|
| Benching | A method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels. |
| Cave-in | The separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, injure, or immobilize a person. |
| Competent Person | One who is capable of identifying existing and predictable hazards in the work environment and who has the authority to correct them. For purposes of a Competent Person for excavation activities, this person must receive training and designation through the Corporate Health, Safety, and Environment Department. |
| Excavation | Any man made cut, cavity, trench, or depression in an earth surface, formed by earth removal. |
| Oxygen Deficient | Having an oxygen concentration of less than 19.5%. |
| Protective System | A method of protecting employees from cave-ins; from material that could fall or roll from an excavation face or into an excavation. Protective systems include: sloping systems, benching systems shoring systems and shield systems. |
| Ramp | An inclined walking or working surface that is used to gain access to one point from another, and is constructed from earth or from structural materials such as steel or wood. |
| Registered Professional Engineer | A person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed appropriate when approving designs for pre-engineered or manufactured protective systems. |
| Shield | A structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structures, or can be designed to be portable and moved along as work progresses. |
| Shoring | A structure such as a timber shoring system, or an aluminum hydraulic shoring system that supports the sides of an excavation and which is designed to prevent cave-ins. |
| Sloping | A method of protecting employees form cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of the slope varies with differences in soil type, environmental conditions and application of imposed loads. |
| Support System | A structure such as underpinning, bracing, or shoring which provides support to an adjacent structure, underground installation, or the sides of an excavation. |
| Trench | A narrow excavation, the depth of which normally exceeds the width (not more than 15 feet wide). |

## 4.0 PROCEDURE

### 4.1. General Requirements

All employees shall be protected with personal protective equipment for the protection of head, eyes, respiratory organs, hands, feet, and other parts of the body as required.

In many instances excavations are considered confined spaces (See HSEP 7.2.) If this is the case, all parts of both the excavation and the confined space entry procedures must be followed.

Physical barricades must be placed around all excavations.

Employees outside of excavations and exposed to vehicular traffic shall be provided with and wear reflectorized or highly visible warning vests.

No person shall be permitted under loads handled by lifting or digging equipment.

No employees shall remain near a vehicle being loaded. Operators may remain in the enclosed cab of the vehicle.

All excavating work must have the prior approval of the area Supervisor.

The proper permit must be issued before excavation work may be done.

The possibility of flammable or toxic gases settling in low places of excavations must be assessed before entering excavations or doing hot work.

**4.2. Specific Requirements**

Employees entering excavations five feet or more in depth must be protected by an adequate protective system (as described in Section 9.10).

Employees entering excavations less than five feet in depth must be protected by an adequate protective system when a Competent Person determines the possibility of hazardous ground movement.

Prior to opening an excavation, the estimated location of utility installations that may be encountered shall be determined.

Utility companies or owners shall be contacted to establish the location of the underground utility installations. The location and depth shall be marked indicating the type of service.

While the excavation is open, underground installations shall be protected, supported or removed to safeguard employees.

All surface objects that may present a hazard to employees by rolling or falling into an excavation shall be removed or all excavations four feet or more in depth require a safe means of access and egress.

**4.3. Access and Egress**

A stairway, ladder, ramp or other safe means of access and egress shall be located in excavations that are four feet or more in depth so as to require no more than 25 feet of lateral travel for employees.

Ladders must extend 36 inches above the point of support at the top of the excavation.

Structural ramps used solely by employees shall be designed by a Competent Person.

Structural ramps used by equipment shall be designed by a Competent Person qualified in structural design and shall be constructed accordingly.

**4.4. Hazardous Atmospheres**

Where oxygen deficiency (less than 19.5%) or a hazardous atmosphere exists or could exist, the atmosphere in the excavation shall be tested before employees enter excavations greater than four (4) feet in depth.

Adequate precautions shall be taken to prevent employee exposure to oxygen deficiency or hazardous atmospheres. These precautions may include providing proper respiratory protection or ventilation.

Periodic testing shall be conducted to ensure all potentially hazardous atmospheres remain safe.

Emergency rescue equipment such as breathing apparatus and safety harness and lifeline shall be readily available where hazardous atmospheres exist or may be expected to develop. This equipment shall be attended by a Qualified Attendant.

Employees entering bell-bottom pier holes or other similar deep and confined footing excavations shall wear a harness with a lifeline securely attached. The lifeline shall be individually attended at all times.

### 4.5. Water Accumulation

Employees shall not work in excavations in which there is accumulated water, or which water is accumulating unless the proper precautions have been taken.

Precautions include support or shield systems, water removal to control the level, and use of a safety harness and lifeline. When used, a Competent Person must monitor water removal equipment.

### 4.6. Stability of Adjacent Structures

Except in stable rock, excavation below the level or base of footing of any foundation or retaining wall shall not be permitted unless the wall is underpinned and all other precautions taken to ensure the stability of the adjacent walls and the safety of employees involved in the work.

Shoring, bracing, or underpinning shall be inspected daily, or more often as conditions warrant by a Competent Person and the protection effectively maintained.

### 4.7. Protection of Employees from Loose Rock or Soil

Excavated or other material and equipment shall be kept at least two (2) feet from the edge of excavations or behind retaining devices sufficient to prevent material or equipment from falling or rolling into the excavation.

If the Operator of mobile equipment adjacent to or near the edge of an excavation does not have a clear view of the edge of the excavation, a warning system such as barricades, stop logs, or hand signals shall be used. If possible, the grade should be away from the excavation.

### 4.8. Fall Protection

Where employees or equipment are required or permitted to cross over excavations, walkways or bridges with standard guardrails shall be provided.

Adequate barricades providing physical protection shall be provided at all excavations. All wells, pits, shafts, etc., shall be barricaded or covered.

Upon completion of operations, temporary wells, pits, shafts, etc., shall be promptly and adequately back filled.

### 4.9. Soil Classification

Each soil and rock deposit shall be classified by a Competent Person as stable rock, type A, type B, or type C in accordance with the definitions set forth in 29 CFR 1926.652 (Appendix A) and documented on Daily Trench and Excavation Inspection Form (Figure 1).

The classification shall be based on at least one visual and at least one manual analysis. Such analysis shall be conducted by a Competent Person using tests described in 29 CFR 1926.652 (Appendix A).

### 4.10. Protective Systems

4.10.1. Sloping and Benching

A Registered Professional Engineer shall design Sloping and Benching systems for excavations greater than 20 feet deep.

For excavations 20 feet deep or less, one of the following options may be used:

- Option 1 - Excavations shall be sloped one and one half horizontal to one vertical (34 degrees measured from the horizontal) unless you use Option 2, 3, or 4. Slopes shall be excavated to form configurations in accordance with slopes shown for Type C Soil in Appendix B, Maximum Allowable Slopes, of 29 CFR 1926.652.
- Option 2 - Slopes and configurations for sloping and benching systems shall be determined in accordance with Section 9.9, Soil Classification and Appendix B, Maximum Allowable Slopes, of 29 CFR 1926.652.
- Option 3 - Designs of sloping and benching systems shall be in accordance with tabulated data and charts identifying parameters, limits of use, and explanatory information as necessary. This data must be in written form on the jobsite and bearing the seal of the approving Registered Professional Engineer.

When excessive loads from stored material or equipment, operating equipment or traffic are present, the Competent Person shall determine to what degree the slope must be reduced below the maximum allowable slope.

4.10.2. Support and Shield Systems (Shoring)

For excavations greater than 20 feet deep, a Registered Professional Engineer must design or approve any support/shield systems used.

For support and shield systems in excavations 20 feet or less in depth, one of the following options may be used.

- Option 1 - Designs for timber shoring shall be determined using tables C1.3 or C2.3 (29 CFR 1926.652 Appendix C) for soil type C. Designs for aluminum hydraulic shoring shall be in accordance with manufacturers data or 29 CFR 1926.652 (Appendix D).
- Option 2 - Designs for timber shoring shall be determined according to Section 9.9, Soil Classification and Section 9.11, Timber Shoring.
- Option 3 - Use of pre-fabricated support systems, such as aluminum hydraulic shoring or other protective systems drawn from manufacturers data, must be used in accordance with all specifications and limitations issued by the manufacturer.
- Option 4 - Designs of support, shield or other protective systems must be in accordance with tabulated data and bear the seal of the approving Registered Professional Engineer.

4.10.3. Materials and Equipment

Materials and equipment used for protective systems shall be free from damage or defects that might impair their proper function. Manufactured materials and equipment shall be used in a manner that is consistent with the recommendations from the manufacturer. Damaged material or equipment shall be removed from use.

4.10.4. General Requirements for Shoring

Members of support systems shall be securely connected together to prevent sliding, falling, kick outs or other failure.

Support systems shall be installed and removed in a manner that protects employees from cave ins, collapses, or being struck by support members. Removal shall begin at and progress from the bottom of the excavation. Members shall be released slowly so as to note any changes in the stability of the structure or excavation.

Components of pre-fabricated systems must be supplied with the manufacturers seal or identification markings. These markings must remain legible.

Excavations of material no greater than two feet below the bottom of the support or shield systems is permitted if the system is designed to resist the forces of the full depth.

Employees shall not be allowed in excavations when shields are being installed, removed, or moved.

### 4.11. Timber Shoring

Timber shoring may be provided as a means of protection from cave ins in excavations that do not exceed 20 feet.

A Registered Professional Engineer must design timber shoring for excavations greater than 20 feet deep.

In order to use this section, the soil type or types in which the excavation is made must first be determined by a Competent Person using Section 9.9, Soil Classification.

There are six tables in 29 CFR 1926.652; Appendix C, two for each soil type. Minimum sizes of shoring members are specified for each soil type. Using the appropriate table, the selection of the size and spacing of members is made. The selection is based on the depth and width of the trench and spacing of the cross braces.

The members specified in the table **are not** considered adequate when:

- Stored material adjacent to the excavation exceeds the load imposed by a two-foot soil surcharge.
- When surcharge loads are present from equipment weighing in excess of 20,000 pounds.
- When vertical loads imposed on cross braces exceeds a 240 pound gravity load distributed on a one foot section of the center of the cross brace.
- When any of the above conditions exist, an alternate timber shoring or protective system shall be used.

### 4.12. Inspection and Storage

Designated Competent Persons shall make inspections of excavations, the adjacent areas, and protective systems before any employees or equipment are allowed to enter an excavation, before the start of work each day and as necessary throughout the shift, using the Daily Trench/Excavation Inspection Form found in Figure 1.

The designated Competent Person must also determine whether the excavation is also a confined space, and what additional requirements shall apply.

Inspections by Competent Persons shall additionally be made after every rainstorm or other hazard-increasing occurrence.

Where there is any evidence, which indicates a possible cave-in, failure of the protective system, or other hazardous condition, employees shall be removed until the Competent Person can inspect the situation, and proper precautions have been taken.

### 4.13. Training

All employees involved in trenching and excavations shall be properly trained in accordance with this HSEP.

Employee training shall be conducted and documented by Competent Persons.

Competent Persons shall be so designated by the Site Manager, only after completing an appropriate excavation and trenching course taught by the Corporate HSE Department, or some other recognized third party.

## 5.0 REFERENCES

29 CFR 1926 Subpart P, Excavations

HSET Training Program No. 021, Excavations

## 6.0 FIGURES

Daily Trench/Excavation Inspection

# Figure 1

## Daily Trench/Excavation Inspection

Date: _________________ Time: ________Site Name:________________________________________

Excavation Location______________________________________________________________________

**Site Evaluation**

_____ Surface encumbrances

_____ Underground installations

_____ Access and egress

_____ Exposure to vehicular traffic

_____ Exposure to falling loads

_____ Hazardous atmospheres

_____ % Oxygen (O2)

_____ Warning system for mobile equipment

_____ Protection from water accumulation

_____ Stability of adjacent structures

_____ Employee protection - loose rock/soil

_____ Inspections

_____ Fall protection

_____ % Flammables (L.E.L.)

Note: Atmospheres in excavations greater than four feet shall be tested for oxygen content and flammable gas concentrations prior to entry of personnel. Emergency rescue equipment shall be readily available.

**Soil Classification**

Soil classification shall be made based on the results of at least one visual, and one manual test.

_____ Stable rock _____ Type A _____ Type B _____ Type C

**Visual Tests**

Inspect worksite for:

_____ Fissured ground

_____ Layered soil

_____ Previously disturbed earth

_____ Seepage

_____ Vibration

_____ Poor drainage

**Manual Tests**

Analyze soil for:

_____ Plasticity

_____ Dry strength

_____ Thumb penetration

_____ Pocket penetrometer

_____ Sherevane

_____ Drying test

**Protective Support Systems**

**Sloping & Benching**

_____ Stable rock: 90 degrees

_____ Type A: 53 degrees

_____ Type B: 45 degrees

_____ Type C: 34 degrees

**Shoring & Shielding**

_____ Timber or hydraulic

_____ Trench boxes, trench shields

_____ Design using tabulated data

_____ RPE design

**Additional Comments or Information**:_______________________________________________________

____________________________________________________________________________________

Inspection performed by: _____________________________________________________________

**Authorized Competent Person**

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| HSE Procedure | Document No: HSEP 11.4 | Page: 1 of 5 |
|---|---|---|
| **Cold Stress Control** | Supersedes: CHSP 11.4 | Rev. 2 |

| Issuing Department: | Approval: | Previous Rev. Date: | Current Revision Date: |
|---|---|---|---|
| Corporate HSE | Mike.Coyle@Jacobs.com | 11 Apr 01 | 18 Sept 01 |

## Table of Contents



## 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<br>In < hr with dry skin. Maximum danger of false sense of security | | | | INCREASING DANGER<br>Danger from freezing of exposed flesh within one minute. | | | | GREAT DANGER<br>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.

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Source: American Conference of Governmental Industrial Hygienists, Threshold Limit Values and Biological Exposure Indices for 1990-1991, Cincinnati, Ohio, 1990.

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| 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

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

# 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<br>25% rest, each hour | 87.1 (30.6) | 82.4 (28.0) | 78.6 (25.9) |
| 50% work<br>50% rest, each hour | 88.5 (31.4) | 84.9 (29.4) | 82.2 (27.9) |
| 25% work<br>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]

| ADJUSTED TEMPERATURE[6] | NORMAL WORK ENSEMBLE[7] | IMPERMEABLE 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.

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.

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| HSE Procedure | | Document No: HSEP 16.4 | Page: 1 of 3 |
|---|---|---|---|
| **Housekeeping and Material Handling** | | Supersedes: CHSP 16.4 | Rev. 2 |
| Issuing Department: Corporate HSE | Approval: Mike.Coyle@Jacobs.com | Previous Rev. Date: 1 Jun 97 | Current Revision Date: 20 Jul 01 |

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## 1.0 PURPOSE AND SCOPE

This Health, Safety, and Environment Procedure (HSEP) provides the minimum procedures to be followed when maintaining orderliness and material handling in the workplace.

This HSEP applies to all employees and subcontractors on all Jacobs projects.

## 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

None

## 4.0 PROCEDURE

### 4.1. General

### 4.2. Housekeeping Procedures

The procedures listed below, as well as good work practices and cleanliness, can prevent most accidents and are minimum requirements for all work areas.

Keep air hoses, welding leads, and extension cords out of doorways and walkways and off the floor to prevent tripping.

Each person is responsible for keeping his immediate work area free of trash, excess scrap material, and tools not in use.

Immediately clean up all spilled liquids and barricade the area if necessary.

Stack materials and supplies in a safe manner, out of walkways.

Do not pile trash or materials in areas where they block exits or fire doors, fire extinguishers, electrical disconnects, or safety showers.

Stack or pile safely. Always start with a safe base. Uneven surfaces of floor or yard should be leveled. Make sure the pile will not shift. Barrels or other round objects that may roll should be checked.

Pile to a safe predetermined height by floor load limit, by types of materials and strength of containers, or by requirements of fire protection. Cross-tile (interlock) the pile if necessary. There must be a space of at least 18 inches between the top of the pile and any sprinkler heads. More space must be allowed if materials can burn easily. Never store items close to open light bulbs or hot pipes.

Trash containers shall be emptied on a regular basis as not to allow debris to gather next to them.

### 4.3. Manual Material Handling and Lifting

Inspect the object that is to be lifted to estimate its size and weight and to see if there are nails, splinters, or other items that might cause injury.

Procedure to follow when lifting:

- Crouch as close to the object as practical.
- Get a good grip.
- Keep feet apart and bend knees.
- Lift slowly by straightening legs. (Keep back relatively straight. Leg muscles, not the back, should do the work.)
- Avoid awkward lifting positions. Shift the body until a straight lift can be made.

If the object must be lifted more than waist high, first lift the load waist high and then rest it on a support. Next, bend the knees again to give added leg muscle power for the final lift.

When carrying an object, do not try to change its position or adjust your grip while in motion. Stop and rest the object against a support while making the change.

When changing direction of travel, do not twist. Instead, turn the entire body, including your feet.

To set the load down, bend the legs, not the back. Follow the lifting procedure in reverse order. Always set one corner of the load down first, then slide your hands out so they will not get pinched.

Get help before handling a large or heavy object. When two or more carry a load, it should be decided beforehand how it is to be handled. Routes and clearances should be checked. One man should act as the leader. The leader should position himself so he can watch and coach the others. Persons carrying a long object should be on the same side of the project and remain in step with each other.

If an object appears to be too heavy, get someone to assist you.

### 4.4. Training

All employees shall be instructed in the housekeeping and lifting requirements outlined in this HSEP.

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| HSE Procedure | | Document No: HSEP 9.5 | Page: 1 of 3 |
|---|---|---|---|
| **Unexploded Ordnance Clearance** | | Supersedes: CHSP 9.5 | Rev. 2 |
| Issuing Department: Corporate HSE | Approval: Mike.Coyle@Jacobs.com | Previous Rev. Date: 26 Jul 01 | Current Revision Date: 18 Sept 01 |

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## 1.0 PURPOSE AND SCOPE

This HSEP applies to all field activities where there is possible contact with ordnance. This unexploded ordnance clearance procedure is a support procedure for well drilling, sampling and remediation and actual ordnance clearance is not to be performed unless specifically directed by the Contracting Officer. If the client facility UXO clearance procedure is at least as stringent as this HSEP, their procedure may take precedence over this HSEP.

The Company and its UXO subcontractor do not clear UXO unless specifically required in the scope of work.

## 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.

### 2.1. Project Manager (PjM)

It is the responsibility of the Project Manager (PM) to assure full compliance with this HSEP. The PM shall pre-approve the UXO subcontractor capabilities and procedures.

### 2.2. UXO Project Leader

The UXO Project Leader and Technicians (UPL), and Company subcontractors, must be trained UXO personnel. The training must meet the requirements of a Master EOD Technician and be a graduate of the EOD school at Indian Head, Maryland or equivalent. They will have the responsibility for field implementation of this procedure. They have the authority and responsibility to immediately stop work and take corrective action when an unsafe act or unsafe condition is encountered.

## 3.0 DEFINITIONS

None

## 4.0 PROCEDURE

Prior to any site access, a historical record search must be conducted to determine the location, type and extent of unexploded ordnance in the areas to be accessed. If historical or visual information indicates UXO may be on site, complete the following steps.

- The UXO clearance procedures below will be employed in the investigation and handling of ordnance and other hazardous items until it is determined that no explosive hazard exists. The Base Contract Official shall be notified and coordinate activities with Base's input.
- A command post will be established prior to conducting any field operations. All UXO Technicians operating away from the command post will maintain communications (consistent with the base safety plan) with the command post. The command post will maintain communication with the local fire, ambulance and police departments, and the base EOD team.
- A team consisting of two UXO Technicians will conduct a surface visual sweep of the proposed sampling site. They will maintain a line of sight with each other at all times and maintain communication with other field crewmembers and the command post.
- If unexploded ordnance is encountered, they will attempt to find safe routes around the hazardous item. If this cannot be done, an alternate site free and suitable for sampling / drilling and free of excess overgrowth will be located and identified on appropriate maps.
- When unexploded ordnance is encountered, the UXO project leader will mark the item's location and contact the facility EOD to arrange for the item to be blown in place.
- UXO Technicians will mark or delineate access paths, and if required, perform brush removal. Separation will be maintained between the UXO employees and other UXO operations. Separation will be maintained between UXO operations and all non-UXO activities. As a minimum, minimum explosive quantity / distance guidelines are to be maintained for related and nonrelated operations. For DOD projects, reference the DOD Ammunition and Explosives Safety Standards, DOD 6055.9-STD. For Corps of Engineer projects, minimum explosive quantity / distance guidelines are calculated and approved by the Corps of Engineers.
- Two UXO Technicians will then conduct a geophysical survey of this area using a magnetometer locator to locate ferrous and nonferrous metallic objects to a minimum depth of three feet. All metallic contact will be marked with stakes and an alternate clear path will be used.
- If an alternate clear path cannot be found, the installation EOD employees, or if directed by the Contracting Officer, the subcontractor will perform the excavation to comply with approved standard operating procedures.

### 4.1. Drilling Operations Will Require

Verify that surface brush / overgrowth removal has been performed by UXO Technicians. The clearance of at least 50 feet radius should include access routes and an area for vehicle turn around, as well as an area at least 20 feet from the drill site for the rig and the support vehicle.

The UXO Technicians, using magnetometry, shall clear the subsurface to the depth intervals specified in the Statement of Work. The clearance depth intervals will depend on the local soils, the potential for other hazardous materials and specific facility HSEP directives. During magnetometry, the drill rig and vehicles must be at least 20 feet away to avoid interference.

After the work site has been determined to be free of UXO, using the drill, advance the borehole to the next cleared interval and repeat the downhole magnetometry. Each time a drilling interval is reached, the drill rig and vehicles will be moved to a cleared area a minimum of 20 feet away.

If a positive reading is obtained, abandon the hole according to local regulations, inform the project manager, and notify the client.

### 4.2. Other Site Activities

UXO clearance procedures for other subsurface investigations or remediation require guidance from the Corporate Health, Safety, and Environment Manager and the client.

When UXO are found during site activities, employees are not to disturb the items and are to inform the PjM or SHSO.

## 5.0 REFERENCES

U.S. Army Corps of Engineers "Safety and Health Requirements Manual," 385-1-1

Department of Defense, Ammunition and Explosives Safety Standards, July 1999, DOD 6055.9-STD

## 6.0 FIGURES

None

## APPENDIX C

## Response to Comments

**REVIEW COMMENTS** **PROJECT: ST32**
**DOCUMENT: ST32 Removal Action Work Plan, Draft, July 2004**
**LOCATION: Elmendorf AFB, Alaska**

| 3 CES / CVR / Elmendorf AFB | DATE: 09/07/04<br>REVIEWER: Louis Howard, ADEC<br>PHONE: 907-269-7552 | Action taken on comment by: |
|---|---|---|

| Item No. | Drawing Sht. No., Spec. Para. | COMMENTS | REVIEW CONFERENCE<br>A - comment accepted<br>W - comment withdrawn<br>(if neither, explain) | JACOBS RESPONSE | RESPONSE ACCEPTANCE<br>(A-AGREE)<br>(D-DISAGREE) |
|---|---|---|---|---|---|
| 1 | 4.5 | "Please ensure that all loads are covered, as specified in regulations, during transport via dump truck to the treatment facility." | | Agreed. Language will be added to the fourth paragraph of section 4.5, Excavation Methods, to indicate that any contaminated material loaded into dump trucks will be covered during transport. | |

# REVIEW COMMENTS

**PROJECT: ST32**

**DOCUMENT: ST32 Removal Action Work Plan, Draft, July 2004**

**LOCATION: Elmendorf AFB, Alaska**

| 3 CES / CVR / Elmendorf AFB | DATE: 09/07/04<br>REVIEWER: Jim Klasen<br>PHONE: | Action taken on comment by: |
|---|---|---|

| Item No. | Drawing Sht. No., Spec. Para. | COMMENTS | REVIEW CONFERENCE<br>A - comment accepted<br>W - comment withdrawn<br>(if neither, explain) | JACOBS RESPONSE | RESPONSE ACCEPTANCE<br>(A-AGREE)<br>(D-DISAGREE) |
|---|---|---|---|---|---|
| 1 | 4.0<br>(p. 4-1) | "…just use soil for backfill, not for storage or redistribution. His reasoning is that cleanup levels at this site are higher than the typical Method 2 (for instance, DRO is 2000 mg/kg but would be 250 mg/kg under Method 2). If we use the soil anywhere else, we risk contaminating another site. He thought it sounded confusing and would be best to drop the "storage" and "redistribution" part of the sentence." | | Agreed. Text will be modified to indicate that excavated soil found to be below site-specific cleanup levels will be used for backfill only. "Storage" and "redistribution" will be deleted from the sentence. | |

**REVIEW PROJECT: ST32**
**COMMENTS DOCUMENT: ST32 Removal Action Work Plan, Draft, July 2004**
**LOCATION: Elmendorf AFB, Alaska**

| 3 CES / CVR / Elmendorf AFB | DATE: 09/07/04<br>REVIEWER: Claude Mayer<br>PHONE: 907-552-7507 | Action taken on comment by: |
|---|---|---|

| Item No. | Drawing Sht. No., Spec. Para. | COMMENTS | REVIEW CONFERENCE<br>A - comment accepted<br>W - comment withdrawn<br>(if neither, explain) | JACOBS RESPONSE | RESPONSE ACCEPTANCE<br>(A-AGREE)<br>(D-DISAGREE) |
|---|---|---|---|---|---|
| 1 | 1.2 | Reference second sentence in first paragraph. Recommend deleting the word is after AFB and change the number of acres to 13,103. | | Agreed. Text will be corrected. | |
| 2 | 1.2 | Reference top of the page, first paragraph. The reference to Burns Road should be changed to Airlifter Drive. | | Agreed. Text will be corrected. | |
| 3 | 1.2.1 | Reference top of page, first paragraph. Recommend changing the first sentence to read, In 1996, a bioventing system was installed at Tank 2, 4, 5, 6, 7, and 8. | | Agreed. However, to further improve clarity, the following modification is proposed: "In 1996, a total of six bioventing systems were installed, one each at Tanks 2, 4, 5, 6, 7, and 8." | |
| 4 | Table 4-1 | Reference Tank 5. The second area under this tank should be 59BH99. | | Agreed. Table will be corrected. | |
| 5 | 4.4 | Reference last bullet at bottom of page. Please review well BV-04-1B this well should be 59 WL-19. | | Agreed. Text will be corrected. | |
| 6 | Appendix A2 | Reference Section 1.2 the third bullet on this page. Removal of one bioventing system should reflect three bioventing systems to be removed. | | Agreed. Text of last bullet will be modified to read as follows: Removal of three bioventing systems. | |
| 7 | Appendix A2 | Reference the Section bullets. Please review all bullets. When I compared the title listed with the list on this page nothing matched. | | Agreed. Bullets will be edited to correctly reflect QAPP sections.<br>Also, section 5.0, Corrective Action, will be deleted as it is contained twice in Appendix A2. | |

**REVIEW PROJECT: ST32**
**COMMENTS DOCUMENT: ST32 Removal Action Work Plan, Draft, July 2004**
**LOCATION: Elmendorf AFB, Alaska**

| 3 CES / CVR / Elmendorf AFB | DATE: 09/07/04<br>REVIEWER: Ellen Godden/Joe Williamson<br>PHONE: 907-552-7111 | Action taken on comment by: |
|---|---|---|

| Item No. | Drawing Sht. No., Spec. Para. | COMMENTS | REVIEW CONFERENCE<br>A - comment accepted<br>W - comment withdrawn<br>(if neither, explain) | JACOBS RESPONSE | RESPONSE ACCEPTANCE<br>(A-AGREE)<br>(D-DISAGREE) |
|---|---|---|---|---|---|
| 1 | 4.5<br>&<br>App. B | "Fence around any open digs." | | Placing physical barricades such as chain link fence panels around all unattended excavations is standard Jacobs procedure and is contained in third paragraph of section 4.5 (Excavation Methods). This requirement is reinforced in Appendix B, section 3.3.5, first bullet. | |