ENTERED

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 49TH WING (ACC)
HOLLOMAN AIR FORCE BASE NEW MEXICO

26 February 2015

DeAnna Rothhaupt
Chief, Holloman AFB Environmental
550 Tabosa Avenue
Holloman AFB NM 88330-8458

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NMED
Hazardous Waste Bureau

New Mexico Environment Department
Attn: Mr. John Kieling, Chief
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe NM 87505-6303

Dear Mr. Kieling,

Holloman Air Force Base (HAFB) is pleased to submit the RCRA Permit Renewal Application for 20,000-Pound Open Detonation (OD) Treatment Unit and Corrective Action Sites (New Mexico Environment Department Hazardous Waste Facility permit number: NM6572124422). The RCRA permit renewal application addresses the 20,000-Pound OD Treatment Unit and corrective action activities at HAFB covered under the existing permit.

If you have any questions, please contact me by phone at (575) 572-3931 or by email at deanna.rothhaupt@us.af.mil.

Sincerely,

DEANNA ROTHHAUPT, GS-12, DAFC

Attachment(s): RCRA Permit Renewal Application 20,000-Pound Open Detonation (OD) Treatment Unit and Corrective Action Sites.

cc:

(w/Atch)
Mr. Cornelius Amindyas
Hazardous Waste Bureau
5500 San Antonio Dr. NE
Albuquerque NM 87109-4127

(w/o Atch)
Mr. Will Moats
Hazardous Waste Bureau
5500 San Antonio Dr. NE
Albuquerque NM 87109-4127

(w/CD)
Mr. Chuck Hendrickson
USEPA, Region 6 (6PD-F)
1445 Ross Ave. Ste 1200
Dallas TX 75202-2750

February 2015

RCRA PERMIT RENEWAL APPLICATION
PERMIT NO. NM6572124422,
20,000 POUND OPEN DETONATION (OD) TREATMENT UNIT AND CORRECTIVE ACTION SITES
UNITED STATES DEPARTMENT OF THE AIR FORCE
HOLLOMAN AIR FORCE BASE, NEW MEXICO

Prepared for:
49 CES/CEIE
Holloman Air Force Base
New Mexico

Under Contract To:

U.S. Army Corps of Engineers
Albuquerque District
Albuquerque, New Mexico
Contract No. W912PP-13-P-0149
Task Order No. 1

Prepared by:
Hazair Inc.
1717 Louisiana Blvd NE, Suite 116
Albuquerque, New Mexico 87110

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EXECUTIVE SUMMARY

Holloman Air Force Base (HAFB) is classified as a hazardous waste facility under the New Mexico Hazardous Waste Act (Chapter 74, Article 4 NMSA) and Subtitle C of the Resource Conservation and Recovery Act (RCRA). As required by 20.4.1.900 NMAC incorporating 40 CFR §270.28 and Hazardous Waste Facility Permit No. NM6572124422 Section I.E.3, HAFB is submitting this RCRA Part B permit renewal application for the corrective action activities at HAFB and Solid Waste Management Unit (SWMU) # 168, 20,000 Pound Open Detonation (OD) Treatment Unit. HAFB operates under Hazardous Waste Facility Permit No. NM6572124422 which was initially issued by the New Mexico Environment Department (NMED) in 1991 and was last renewed in 2004; the permit primarily regulated activities at Holloman AFB's Container Storage Unit (CSU) facility. On 5 January 2015, HAFB received notification of approval from the NMED for clean closure of the HAFB CSU under the existing permit's closure plan as required by 20.4.1.500 NMAC, incorporating 40 CFR §264.111-115.

Hazardous Waste Facility Permit No. NM6572124422 Section I.E.3 requires that HAFB submit a renewal application at least one hundred eighty (180) calendar days before the expiration date of the existing permit, due 24 August 2013. On 12 June 2013 HAFB submitted an extension request of one (1) year which was verbally approved by the NMED Hazardous Waste Bureau (HWB), for a due date of 24 August 2014. On 11 June 2014, in a meeting between HAFB and the NMED HWB to discuss the current permitting approach it became apparent that additional information and preparation was required for the submittal process. On 12 June 2014, HAFB requested an additional six (6) month extension for the submittal process of the permit renewal application. On July 18, 2014 the NMED approved the extension request. This application is being submitted in accordance with the due date of 24 February 2014.

On 7 January 2015 the NMED HWB provided further guidance for inclusion of the 20,000 Pound OD Treatment Unit into the RCRA Part B permit renewal application. Therefore, the permit application sections from the 20,000 Pound OD Treatment Unit application submitted in 2009 (incorporating NMED comments and corrections) and the updated amended and expanded Sampling and Analysis Plan (SAP) and Closure Plan submitted to the NMED on 22 October 2014 have been included in this permit application. This application primarily addresses 20,000 Pound OD Treatment Unit, SWMU # 168, and the corrective action activities identified for the active designated SWMU and Area of Concern (AOC) units at HAFB as required by 40 CFR § 264.101.

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LIST OF FIGURES

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LIST OF TABLES

LIST OF ACRONYMS

AAF	Army Air Field
AAQS	Ambient Air Quality Standards
ACC	Air Combat Command
ACM	Accelerated Corrective Measures
AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AFI	Air Force Instruction
AFMAN	Air Force Manual
AFMC	Air Force Materiel Command
AFSC	Air Force Systems Command
AFSC	Air Force Specialty Code
AGE	Aerospace Ground Equipment
AVGAS	Aviation Gasoline
AISEB	Aerobic In-situ Enhanced Bioremediation
AK	Acceptable Knowledge
AMO	Authorized Military Official
AOC	Area of Concern
AQCR	Air Quality Control Regulations
AST	Aboveground storage tank
ASTM	American Society for Testing and Materials
BGS	Below Ground Surface
BHATE	Bhate Environmental Associates, Inc.
BLU	Bomb Loaded Units
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
BTOC	Below Top of Casing
BX	Base Exchange
CAC	Corrective Action Complete
CADs	Cartridge Actuated Devices
CAIS	Chemical Agent Identification Sets
CCD	Customer Concept Document
CDW	Construction-Derived Waste
CES	Civil Engineering Squadron
CES/CEV	Civil Engineering Squadron/Combat Engineer Vehicle
CFR	Code of Federal Regulation
CMS	Corrective Measures Study

COC	Chain of Custody
COMSEC	Communications Security
COPC	Chemicals of Potential Concern
CRS	Component Repair Squadron
CRZ	Contamination Reduction Zone
CSU	Container Storage Unit
CY	Cubic Yards
DAC	Defense Ammunitions Center
DDA	Designated Disposition Authority
DERA	Defense Environmental Restoration Account
DLADS	Defense Logistics Agency Disposition Services
DoD	Department of Defense
DPE	Duel-Phase Extraction
DPT	Direct Push Technology
DQOs	Data Quality Objectives
DRO	Diesel range organics
DRMO	Defense Reutilization Marketing Office
EBASCO	Electric Bond and Share Company Services, Inc.
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
ERP	Environmental Restoration Program
ESA	Endangered Species Act
FEC	Foothills Engineering Consultants, Inc.
FEMA	Federal Agency Management Agency
FWENC	Foster Wheeler Environmental Corporation
FS	Feasibility Study
FT	Feet
GPD	Gallons per day
GPS	Global Positioning System
GRO	Gasoline Range Organics
GTI	Groundwater Technology, Inc.
HAFB	Holloman Air Force Base
HAZWOPER	Hazardous Waste Operations and Emergency Response
HE	High Explosive
HEI	High Explosive Incendiary
HGL	HydroGeoLogic, Inc.
HQ	Headquarters
HWB	Hazardous Waste Bureau
IAP	Initial Accumulation Point

ICM/CBU	Improve Conventional Munitions/Cluster Bomb Units
IRP	Installation Restoration Program
IWPMP	Industrial Wastewater Pretreatment Management Plan
JP-4	Jet Propulsion fuel, Type 4
KOP	Knowledge of Process
LCS	Laboratory Control Sample
LDR	Land Disposal Restrictions
LUC	Land Use Controls
LTM	Long –term monitoring
MC	Munitions Constituents
MCL	Maximum Contaminant Level
MD	Munitions Debris
MDL	Method Detection Limit
MEC	Munitions and Explosives of Concern
MIDAS	Munitions Items Disposition and Action System
MLRS	Multiple Launch Rocket System
MMR	Military Munitions Rule
MOGAS	Motor Gasoline/ Mobility Gasoline
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MSAs	Mutual Support Agreements
MSDS	Material Safety Data Sheet
MSG	Mission Support Group
MSL	Mean Sea Level
NAAS	National Ambient Air Quality Standard
NAVSCOLEOD	Naval School Explosive Ordnance Disposal
NEW	Net Explosive Weight
NFA	No Further Action
NMAC	New Mexico Administrative Code
NMAQS	New Mexico Ambient Air Quality Standard
NMDGF	New Mexico Department of Game and Fish
NMED	New Mexico Environment Department
NMHHS	New Mexico Human Health Standard
NMWQCCR	New Mexico Water Quality Control Commission Regulations
NOA	Notice of Approval
NOD	Notice of Deficiency
NPS	National Park Service
OB	Open Burn
OBODM	Open Burn/Open Detonation Dispersion Model
OD	Open Detonation

OEL	Occupational Exposure Limits
OI	Operating Instructions
OPSEC	Operations Security
OSC	On-Site Coordinator
OSHA	Occupational Safety and Health Administration
OWS	Oil/Water Separator
PA	Preliminary Assessment
PADs	Propellant Actuated Devices
PAH	Polynuclear Aromatic Hydrocarbons
PARCC	Precision , Accuracy, Representativeness, Completeness, and Comparability
PCB	Polychlorinated Biphenyl
PCS	Petroleum-Contaminated Soils
PDI	Pre-Design Investigation
PK	Process Knowledge
PMR	Permit Modification Request
POL	Petroleum, Oil, and Lubricants
PPE	Personal Protective Equipment
PSH	Phase Separate Hydrocarbons
QA	Quality Assurance
QAPP	Quality Assurance Project Plans
QC	Quality Control
RA	Risk Assessment
RADIAN	Radian Corporation
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RI	Remedial Investigation
RPD	Relative Percent Difference
RSL	Regional Screening Level
RSO	Range Safety Officer
SAP	Sampling and Analysis Plan
SAR	SWMU Assessment Report
SCRAM	Support Center for Regulatory Air Models
SHAW	Shaw Environmental & Infrastructure, Inc.
SI	Site Investigation
SQ FT	Square feet
SOP	Standard Operating Procedures
SSFR	Site Specific Final Report
SSLs	Site Screening Levels

SVE	Soil Vapor Extraction
SVOCs	Semi Volatile Organic Compounds
SW	Solid Waste
SWMU	Solid Waste Management Unit
SWPPP	Storm Water Pollution Prevention Plan
TAL	Target Analyte List
TAPs	Toxic Air Pollutants
TCLP	Toxicity Characteristic Leaching Procedures
TDS	Total Dissolved Solids
TEL	Tetraethyl Lead
TCE	Trichloroethene
TO	Technical Order
TPH	Total Petroleum Hydrocarbons
TRPH	Total Recoverable Petroleum Hydrocarbons
TSD	Treatment, Storage and Disposal
UHCs	Underlying Hazardous Constituents
URS	URS Group Inc.
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USDA	U.S. Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
UST	Underground Storage Tank
UTL	Upper Tolerance Limit
UTS	Universal Treatment Standard
UXO	Unexploded Ordnance
VCM	Voluntary Corrective Measures
VOCs	Volatile Organic Compounds
WAP	Waste Analysis Plan
WHA	Walk, Haydel & Associates
WMM	Waste Military Munitions
WOT	Waste Oil Tank
WSMR	White Sands Missile Range
WSNM	White Sands National Monument
WWTP	Waste Water Treatment Plant

PART A

RCRA PERMIT RENEWAL APPLICATION
20,000 POUND OPEN DETONATION (OD) TREATMENT UNIT
AND CORRECTIVE ACTION SITES
UNITED STATES DEPARTMENT OF THE AIR FORCE
HOLLOMAN AIR FORCE BASE
OTERO COUNTY, NEW MEXICO

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United States
Environmental Protection
Agency

December 2011

RCRA Hazardous Waste Part A Permit Application

EPA Form 8700-23

RCRA PERMIT RENEWAL APPLICATION

20,000-POUND OPEN DETONATION (OD) TREATMENT UNIT
AND CORRECTIVE ACTION SITES
UNITED STATES DEPARTMENT OF THE AIR FORCE
HOLLOMAN AIR FORCE BASE
OTERO COUNTY, NEW MEXICO

EPA ID NO. NM 6572124422

SEND COMPLETED FORM TO: The Appropriate State or Regional Office.	United States Environmental Protection Agency **RCRA SUBTITLE C SITE IDENTIFICATION FORM**

1. Reason for Submittal MARK ALL BOX(ES) THAT APPLY	**Reason for Submittal:** ☐ To provide an Initial Notification (first time submitting site identification information / to obtain an EPA ID number for this location) ☐ To provide a Subsequent Notification (to update site identification information for this location) ☐ As a component of a First RCRA Hazardous Waste Part A Permit Application ☒ As a component of a Revised RCRA Hazardous Waste Part A Permit Application (Amendment # 3rd) ☐ As a component of the Hazardous Waste Report (If marked, see sub-bullet below) ☐ Site was a TSD facility and/or generator of ≥1,000 kg of hazardous waste, >1 kg of acute hazardous waste, or >100 kg of acute hazardous waste spill cleanup in one or more months of the report year (or State equivalent LQG regulations)
2. Site EPA ID Number	**EPA ID Number** N M 6 5 7 2 1 2 4 4 2 2
3. Site Name	**Name:** Holloman Air Force Base
4. Site Location Information	**Street Address:** 490 First Street, Suite 1700 **City, Town, or Village:** Holloman AFB — **County:** Otero **State:** New Mexico — **Country:** USA — **Zip Code:** 88330-8277
5. Site Land Type	☐ Private ☐ County ☐ District ☑ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other
6. NAICS Code(s) for the Site (at least 5-digit codes)	**A.** 9 2 8 1 1 0 — **C.** **B.** — **D.**
7. Site Mailing Address	**Street or P.O. Box:** 490 First Street, Suite 1700 **City, Town, or Village:** Holloman AFB **State:** New Mexico — **Country:** USA — **Zip Code:** 88330-8277
8. Site Contact Person	**First Name:** Robert — **MI:** E. — **Last:** Kiebler **Title:** 49th Wing Commander **Street or P.O. Box:** 490 First Street, Suite 1700 **City, Town or Village:** Holloman AFB **State:** New Mexico — **Country:** USA — **Zip Code:** 88330-8277 **Email:** Robert.Kiebler@us.af.mil **Phone:** (575) 572-5571 — **Ext.:** — **Fax:** (575) 572-5570
9. Legal Owner and Operator of the Site	**A. Name of Site's Legal Owner:** United States of America — **Date Became Owner:** 02/28/1991 **Owner Type:** ☐ Private ☐ County ☐ District ☑ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other **Street or P.O. Box:** 490 First Street, Suite 1700 **City, Town, or Village:** Holloman AFB — **Phone:** (575)572-5571 **State:** New Mexico — **Country:** USA — **Zip Code:** 88330-8277 **B. Name of Site's Operator:** 49 CES/CEIE — **Date Became Operator:** 02/28/1981 **Operator Type:** ☐ Private ☐ County ☐ District ☑ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other

10. Type of Regulated Waste Activity (at your site)
Mark "Yes" or "No" for all current activities (as of the date submitting the form); complete any additional boxes as instructed.

A. Hazardous Waste Activities; Complete all parts 1-10.

Y ☑ N ☐ **1. Generator of Hazardous Waste**
If "Yes", mark only one of the following – a, b, or c.

☑ a. LQG: Generates, in any calendar month, 1,000 kg/mo (2,200 lbs./mo.) or more of hazardous waste; **or** Generates, in any calendar month, or accumulates at any time, more than 1 kg/mo (2.2 lbs./mo) of acute hazardous waste; **or** Generates, in any calendar month, **or** accumulates at any time, more than 100 kg/mo (220 lbs./mo) of acute hazardous spill cleanup material.

☐ b. SQG: 100 to 1,000 kg/mo (220 – 2,200 lbs./mo) of non-acute hazardous waste.

☐ c. CESQG: Less than 100 kg/mo (220 lbs./mo) of non-acute hazardous waste.

If "Yes" above, indicate other generator activities in 2-4.

Y ☐ N ☑ **2. Short-Term Generator** (generate from a short-term or one-time event and not from on-going processes). If "Yes", provide an explanation in the Comments section.

Y ☐ N ☑ **3. United States Importer of Hazardous Waste**

Y ☐ N ☑ **4. Mixed Waste (hazardous and radioactive) Generator**

Y ☐ N ☑ **5. Transporter of Hazardous Waste**
If "Yes", mark all that apply.

☐ a. Transporter

☐ b. Transfer Facility (at your site)

Y ☑ N ☐ **6. Treater, Storer, or Disposer of Hazardous Waste** Note: A hazardous waste Part B permit is required for these activities.

Y ☐ N ☑ **7. Recycler of Hazardous Waste**

Y ☐ N ☑ **8. Exempt Boiler and/or Industrial Furnace**
If "Yes", mark all that apply.

☐ a. Small Quantity On-site Burner Exemption

☐ b. Smelting, Melting, and Refining Furnace Exemption

Y ☐ N ☑ **9. Underground Injection Control**

Y ☐ N ☑ **10. Receives Hazardous Waste from Off-site**

B. Universal Waste Activities; Complete all parts 1-2.

Y ☐ N ☑ **1. Large Quantity Handler of Universal Waste (you accumulate 5,000 kg or more) [refer to your State regulations to determine what is regulated]. Indicate types of universal waste managed at your site. If "Yes", mark all that apply.**

a. Batteries ☐
b. Pesticides ☐
c. Mercury containing equipment ☐
d. Lamps ☐
e. Other (specify) ______________ ☐
f. Other (specify) ______________ ☐
g. Other (specify) ______________ ☐

Y ☐ N ☑ **2. Destination Facility for Universal Waste**
Note: A hazardous waste permit may be required for this activity.

C. Used Oil Activities; Complete all parts 1-4.

Y ☐ N ☑ **1. Used Oil Transporter**
If "Yes", mark all that apply.

☐ a. Transporter

☐ b. Transfer Facility (at your site)

Y ☐ N ☑ **2. Used Oil Processor and/or Re-refiner**
If "Yes", mark all that apply.

☐ a. Processor

☐ b. Re-refiner

Y ☐ N ☑ **3. Off-Specification Used Oil Burner**

Y ☐ N ☑ **4. Used Oil Fuel Marketer**
If "Yes", mark all that apply.

☐ a. Marketer Who Directs Shipment of Off-Specification Used Oil to Off-Specification Used Oil Burner

☐ b. Marketer Who First Claims the Used Oil Meets the Specifications

D. Eligible Academic Entities with Laboratories—Notification for opting into or withdrawing from managing laboratory hazardous wastes pursuant to 40 CFR Part 262 Subpart K

❖ You can **ONLY** Opt into Subpart K if:

- you are at least one of the following: a college or university; a teaching hospital that is owned by or has a formal affiliation agreement with a college or university; or a non-profit research institute that is owned by or has a formal affiliation agreement with a college or university; AND
- you have checked with your State to determine if 40 CFR Part 262 Subpart K is effective in your state

Y ☐ N ☑ 1. Opting into or currently operating under 40 CFR Part 262 Subpart K for the management of hazardous wastes in laboratories **See the item-by-item instructions for definitions of types of eligible academic entities. Mark all that apply:**

☐ a. College or University

☐ b. Teaching Hospital that is owned by or has a formal written affiliation agreement with a college or university

☐ c. Non-profit Institute that is owned by or has a formal written affiliation agreement with a college or university

Y ☐ N ☑ 2. Withdrawing from 40 CFR Part 262 Subpart K for the management of hazardous wastes in laboratories

11. Description of Hazardous Waste

A. Waste Codes for Federally Regulated Hazardous Wastes. Please list the waste codes of the Federal hazardous wastes handled at your site. List them in the order they are presented in the regulations (e.g., D001, D003, F007, U112). Use an additional page if more spaces are needed.

D001	D010	F001	F026	U002		
D002	D011	F002	F032	U080		
D003	D018	F003		U122		
D004	D021	F005		U133		
D005	D023	F015		U151		
D006	D030	F016		U154		
D007	D035	F020		U159		
D008	D039	F021		U161		
D009	D040	F022		U220		

B. Waste Codes for State-Regulated (i.e., non-Federal) Hazardous Wastes. Please list the waste codes of the State-Regulated hazardous wastes handled at your site. List them in the order they are presented in the regulations. Use an additional page if more spaces are needed.

N/A						

12. Notification of Hazardous Secondary Material (HSM) Activity

Y ☐ N ☑ Are you notifying under 40 CFR 260.42 that you will begin managing, are managing, or will stop managing hazardous secondary material under 40 CFR 261.2(a)(2)(ii), 40 CFR 261.4(a)(23), (24), or (25)?

If "Yes", you must fill out the Addendum to the Site Identification Form: Notification for Managing Hazardous Secondary Material.

13. Comments

N/Ro

14. Certification. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations. For the RCRA Hazardous Waste Part A Permit Application, all owner(s) and operator(s) must sign (see 40 CFR 270.10(b) and 270.11).

Signature of legal owner, operator, or an authorized representative	Name and Official Title (type or print)	Date Signed (mm/dd/yyyy)
[signature]	Robert E.Kiebler, 49th Wing Commander	FEB 2 4 2015

ADDENDUM TO THE SITE IDENTIFICATION FORM:

NOTIFICATION OF HAZARDOUS SECONDARY MATERIAL ACTIVITY

ONLY fill out this form if:

- You are located in a State that allows you to manage excluded hazardous secondary material (HSM) under 40 CFR 261.2(a)(2)(ii), 261.4(a)(23), (24), or (25) (or state equivalent). See http://www.epa.gov/epawaste/hazard/dsw/statespf.htm for a list of eligible states; **AND**
- You are or will be managing excluded HSM in compliance with 40 CFR 261.2(a)(2)(ii), 261.4(a)(23), (24), or (25) (or state equivalent) **or** you have stopped managing excluded HSM in compliance with the exclusion(s) and do not expect to manage any amount of excluded HSM under the exclusion(s) for at least one year. Do not include any information regarding your hazardous waste activities in this section.

1. Indicate reason for notification. Include dates where requested.

☐ Facility will begin managing excluded HSM as of ____________ (mm/dd/yyyy).

☐ Facility is still managing excluded HSM/re-notifying as required by March 1 of each even-numbered year.

☐ Facility has stopped managing excluded HSM as of ____________ (mm/dd/yyyy) and is notifying as required.

2. Description of excluded HSM activity. Please list the appropriate codes and quantities in **short tons** to describe your excluded HSM activity ONLY (do not include any information regarding your hazardous wastes). Use additional pages if more space is needed.

a. Facility code (answer using codes listed in the Code List section of the instructions)	**b. Waste code(s) for HSM**	**c. Estimated short tons of excluded HSM to be managed annually**	**d. Actual short tons of excluded HSM that was managed during the most recent odd-numbered year**	**e. Land-based unit code** (answer using codes listed in the Code List section of the instructions)

3. Facility has financial assurance pursuant to 40 CFR 261.4(a)(24)(vi). (Financial assurance is required for reclaimers and intermediate facilities managing excluded HSM under 40 CFR 261.4(a)(24) and (25))

Y☐ N☐ Does this facility have financial assurance pursuant to 40 CFR 261.4(a)(24)(vi)?

United States Environmental Protection Agency

HAZARDOUS WASTE PERMIT INFORMATION FORM

1. Facility Permit Contact	**First Name:** Robert	**MI:** E.	**Last Name:** Kiebler
	Contact Title: 49th Wing Commander		
	Phone: (575) 572-5571	**Ext.:**	**Email:** Robert.Kiebler@us.af.mil
2. Facility Permit Contact Mailing Address	**Street or P.O. Box:** 490 First Street, Suite 1700		
	City, Town, or Village: Holloman AFB		
	State: New Mexico		
	Country: USA	**Zip Code:** 88330-8277	
3. Operator Mailing Address and Telephone Number	**Street or P.O. Box:** 490 First Street, Suite 1700		
	City, Town, or Village: Holloman AFB		
	State: New Mexico	**Phone:** (575) 572-5571	
	Country: USA	**Zip Code:** 88330-8277	
4. Facility Existence Date	**Facility Existence Date (mm/dd/yyyy):** 02/28/1981		

5. Other Environmental Permits

A. Facility Type *(Enter code)*	**B. Permit Number**												**C. Description**
N	D	P	-	1	4	9	7						T-38 Landfarm Groundwater Discharge Permit
N	D	P	-	1	4	4	6						FT-31 Landfarm Groundwater Discharge Permit
N	D	P	-	1	1	2	7						WWTP Groundwater Discharge Permit
N	N	M	0	0	2	9	9	7	1				WWTP NPDES Permit
N	N	M	R	0	5	0	0	0	0				MSGP 2008 NPDES MSGP
E	P	1	0	5	-	R	2	M	2				Air Quality Title V Operating Permit
E	1	5	0	8	C	-	M	2	R	4			Air Quality New Source Review (NSR) Permit
E	1	5	0	8	-	M	2	R	5				Air Quality NSR Permit

6. Nature of Business:

HAFB hosts the Air Combat Command (ACC) 49th Wing, which supports national security objectives with activities that include pilot training, mobility support, motor pool/vehicle maintenance, test track, and combat operations. The ACC readiness requirements necessitate the use of a variety of products to maintain and repair aircraft and aerospace equipment (AGE) as well as HAFB structures and roads. Certain processes have also required the open detonation of waste munitions.

7. Process Codes and Design Capacities – Enter information in the Section on Form Page 3

A. PROCESS CODE – Enter the code from the list of process codes below that best describes each process to be used at the facility. If more lines are needed, attach a separate sheet of paper with the additional information. For "other" processes (i.e., D99, S99, T04 and X99), describe the process (including its design capacity) in the space provided in Item 8.

B. PROCESS DESIGN CAPACITY – For each code entered in Item 7.A; enter the capacity of the process.

1. **AMOUNT – Enter the amount. In a case where design capacity is not applicable (such as in a closure/post-closure or enforcement action) enter the total amount of waste for that process.**
2. **UNIT OF MEASURE – For each amount entered in Item 7.B(1), enter the code in Item 7.B(2) from the list of unit of measure codes below that describes the unit of measure used. Select only from the units of measure in this list.**

C. PROCESS TOTAL NUMBER OF UNITS – Enter the total number of units for each corresponding process code.

Process Code	Process	Appropriate Unit of Measure for Process Design Capacity
	Disposal	
D79	Underground Injection Well Disposal	Gallons; Liters; Gallons Per Day; or Liters Per Day
D80	Landfill	Acre-feet; Hectares-meter; Acres; Cubic Meters; Hectares; Cubic Yards
D81	Land Treatment	Acres or Hectares
D82	Ocean Disposal	Gallons Per Day or Liters Per Day
D83	Surface Impoundment Disposal	Gallons; Liters; Cubic Meters; or Cubic Yards
D99	Other Disposal	Any Unit of Measure Listed Below
	Storage	
S01	Container	Gallons; Liters; Cubic Meters; or Cubic Yards
S02	Tank Storage	Gallons; Liters; Cubic Meters; or Cubic Yards
S03	Waste Pile	Cubic Yards or Cubic Meters
S04	Surface Impoundment	Gallons; Liters; Cubic Meters; or Cubic Yards
S05	Drip Pad	Gallons; Liters; Cubic Meters; Hectares; or Cubic Yards
S06	Containment Building Storage	Cubic Yards or Cubic Meters
S99	Other Storage	Any Unit of Measure Listed Below
	Treatment	
T01	Tank Treatment	Gallons Per Day; Liters Per Day
T02	Surface Impoundment	Gallons Per Day; Liters Per Day
T03	Incinerator	Short Tons Per Hour; Metric Tons Per Hour; Gallons Per Hour; Liters Per Hour; BTUs Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Gallons Per Day; Metric Tons Per Hour; or Million BTU Per Hour
T04	Other Treatment	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Short Tons Per Day; BTUs Per Hour; Gallons Per Day; Liters Per Hour; or Million BTU Per Hour
T80	Boiler	Gallons; Liters; Gallons Per Hour; Liters Per Hour; BTUs Per Hour; or Million BTU Per Hour

Process Code	Process	Appropriate Unit of Measure for Process Design Capacity
	Treatment (Continued)	**(for T81 – T94)**
T81	Cement Kiln	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; BTU Per Hour; Liters Per Hour; Kilograms Per Hour; or Million BTU Per Hour
T82	Lime Kiln	
T83	Aggregate Kiln	
T84	Phosphate Kiln	
T85	Coke Oven	
T86	Blast Furnace	
T87	Smelting, Melting, or Refining Furnace	
T88	Titanium Dioxide Chloride Oxidation Reactor	
T89	Methane Reforming Furnace	
T90	Pulping Liquor Recovery Furnace	
T91	Combustion Device Used in the Recovery of Sulfur Values from Spent Sulfuric Acid	
T92	Halogen Acid Furnaces	
T93	Other Industrial Furnaces Listed in 40 CFR 260.10	
T94	Containment Building Treatment	Cubic Yards; Cubic Meters; Short Tons Per Hour; Gallons Per Hour; Liters Per Hour; BTU Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Metric Tons Per Day; Gallons Per Day; Liters Per Day; Metric Tons Per Hour; or Million BTU Per Hour
	Miscellaneous (Subpart X)	
X01	Open Burning/Open Detonation	Any Unit of Measure Listed Below
X02	Mechanical Processing	Short Tons Per Hour; Metric Tons Per Hour; Short Tons Per Day; Metric Tons Per Day; Pounds Per Hour; Kilograms Per Hour; Gallons Per Hour; Liters Per Hour; or Gallons Per Day
X03	Thermal Unit	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; BTU Per Hour; or Million BTU Per Hour
X04	Geologic Repository	Cubic Yards; Cubic Meters; Acre-feet; Hectare-meter; Gallons; or Liters
X99	Other Subpart X	Any Unit of Measure Listed Below

Unit of Measure	Unit of Measure Code	Unit of Measure	Unit of Measure Code	Unit of Measure	Unit of Measure Code
Gallons	**G**	**Short Tons Per Hour**	**D**	**Cubic Yards**	**Y**
Gallons Per Hour	**E**	**Short Tons Per Day**	**N**	**Cubic Meters**	**C**
Gallons Per Day	**U**	**Metric Tons Per Hour**	**W**	**Acres**	**B**
Liters	**L**	**Metric Tons Per Day**	**S**	**Acre-feet**	**A**
Liters Per Hour	**H**	**Pounds Per Hour**	**J**	**Hectares**	**Q**
Liters Per Day	**V**	**Kilograms Per Hour**	**X**	**Hectare-meter**	**F**
		Million BTU Per Hour	**X**	**BTU Per Hour**	**I**

7. Process Codes and Design Capacities (Continued)

EXAMPLE FOR COMPLETING Item 7 (shown in line number X-1 below): A facility has a storage tank, which can hold 533.788 gallons.

Line Number		A. Process Code (From list above)			B. PROCESS DESIGN CAPACITY (1) Amount (Specify)	(2) Unit of Measure	C. Process Total Number of Units	For Official Use Only					
X	**1**	**S**	**0**	**2**	**533.788**	**G**	**001**						
	1	X	0	1	420,000	P	001						
	2												
	3												
	4												
	5												
	6												
	7												
	8												
	9												
1	**0**												
1	**1**												
1	**2**												
1	**3**												

Note: If you need to list more than 13 process codes, attach an additional sheet(s) with the information in the same format as above. Number the line sequentially, taking into account any lines that will be used for "other" process (i.e., D99, S99, T04, and X99) in Item 8.

8. Other Processes (Follow instructions from Item 7 for D99, S99, T04, and X99 process codes)

Line Number (Enter #s in sequence with Item 7)		A. Process Code (From list above)			B. PROCESS DESIGN CAPACITY (1) Amount (Specify)	(2) Unit of Measure	C. Process Total Number of Units	For Official Use Only					
X	**2**	**T**	**0**	**4**	**100.00**	**U**	**001**						
					N/A								

9. Description of Hazardous Wastes - Enter Information in the Sections on Form Page 5

A. **EPA HAZARDOUS WASTE NUMBER – Enter the four-digit number from 40 CFR, Part 261 Subpart D of each listed hazardous waste you will handle. For hazardous wastes which are not listed in 40 CFR, Part 261 Subpart D, enter the four-digit number(s) from 40 CFR Part 261, Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.**

B. **ESTIMATED ANNUAL QUANTITY – For each listed waste entered in Item 9.A, estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in Item 9.A, estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.**

C. **UNIT OF MEASURE – For each quantity entered in Item 9.B, enter the unit of measure code. Units of measure which must be used and the appropriate codes are:**

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure, taking into account the appropriate density or specific gravity of the waste.

D. **PROCESSES**

1. **PROCESS CODES:**

For listed hazardous waste: For each listed hazardous waste entered in Item 9.A, select the code(s) from the list of process codes contained in Items 7.A and 8.A on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all listed hazardous wastes.

For non-listed waste: For each characteristic or toxic contaminant entered in Item 9.A, select the code(s) from the list of process codes contained in Items 7.A and 8.A on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed hazardous wastes that possess that characteristic or toxic contaminant.

NOTE: THREE SPACES ARE PROVIDED FOR ENTERING PROCESS CODES. IF MORE ARE NEEDED:

1. **Enter the first two as described above.**
2. **Enter "000" in the extreme right box of Item 9.D(1).**
3. **Use additional sheet, enter line number from previous sheet, and enter additional code(s) in Item 9.E.**

2. **PROCESS DESCRIPTION: If code is not listed for a process that will be used, describe the process in Item 9.D(2) or in Item 9.E(2).**

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER – Hazardous wastes that can be described by more than one EPA Hazardous Waste Number shall be described on the form as follows:

1. **Select one of the EPA Hazardous Waste Numbers and enter it in Item 9.A. On the same line complete Items 9.B, 9.C, and 9.D by estimating the total annual quantity of the waste and describing all the processes to be used to store, treat, and/or dispose of the waste.**
2. **In Item 9.A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In Item 9.D.2 on that line enter "included with above" and make no other entries on that line.**
3. **Repeat step 2 for each EPA Hazardous Waste Number that can be used to describe the hazardous waste.**

EXAMPLE FOR COMPLETING Item 9 (shown in line numbers X-1, X-2, X-3, and X-4 below) – A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operations. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter Code)									(2) PROCESS DESCRIPTION (If code is not entered in 9.D(1))
X	1	K	0	5	4	900	P	T	0	3	D	8	0				
X	2	D	0	0	2	400	P	T	0	3	D	8	0				
X	3	D	0	0	1	100	P	T	0	3	D	8	0				
X	4	D	0	0	2												Included With Above

9. Description of Hazardous Wastes ***(Continued. Use additional sheet(s) as necessary; number pages as 5a, etc.)***

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES									
								(1) PROCESS CODES (Enter Code)									(2) PROCESS DESCRIPTION (If code is not entered in 9.D(1))
	1	D	0	0	1	4,200	P	X	0	1							
	2	D	0	0	3	6,600	P	X	0	1							
	3	D	0	0	5	240	P	X	0	1							
	4	D	0	0	7	240	P	X	0	1							
	5	D	0	0	8	360	P	X	0	1							
	6	D	0	0	9	120	P	X	0	1							
	7	D	0	1	8	240	P	X	0	1							
	8																
	9																
1	0																
1	1																
1	2																
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3	3																
3	4																
3	5																
3	6																

10. Map

Attach to this application a topographical map, or other equivalent map, of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all spring, rivers, and other surface water bodies in this map area. See instructions for precise requirements.

11. Facility Drawing

All existing facilities must include a scale drawing of the facility (see instructions for more detail).

12. Photographs

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment, and disposal areas; and sites of future storage, treatment, or disposal areas (see instructions for more detail).

13. Comments

Holloman Air Force Base (HAFB) operates under Hazardous Waste Facility Permit No. NM6572124422-2 which had primarily regulated activities at HAFB's Container Storage Unit (CSU) facility. On 5 January 2015, HAFB received approval of closure of the CSU from the New Mexico Environmental Department (NMED) Hazardous Waste Bureau (HWB) in accordance with the permit's closure plan. Therefore, this renewal application only addresses the remaining corrective action activities identified for units designated as Solid Waste Management Units (SWMUs) and Areas of of Concern (AOCs) and the 20,000 Pound Open Detonation (OD) treatment unit (SWMU #168). Section No. 11.A of the RCRA Subtitle C Site Identification Form lists all of the Federal hazardous waste codes for wastes currently generated at HAFB, however, only seven (7) of those codes have been identified for the 20,000 Pound OD unit. They are addressed in Section Nos. 7 and 9 of the Hazardous Waste Permit Identification Form. Section Nos. 10, 11, and 12 of the Hazardous Waste Permit Identification Form are addressed in this permit application.

20,000 POUND OD UNIT PHOTOGRAPHS

RCRA PERMIT RENEWAL APPLICATION
20,000 POUND OPEN DETONATION (OD) TREATMENT UNIT
AND CORRECTIVE ACTION SITES
UNITED STATES DEPARTMENT OF THE AIR FORCE
HOLLOMAN AIR FORCE BASE,
OTERO COUNTY, NEW MEXICO

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Photograph A-1. View of OD Unit from the southern berm.

Photograph A-2. View of OD Unit from the southwest.

Photograph A-3. View of west portion of OD Unit.

Photograph A-4. View of OD Unit from the east.

Photograph A-5. View of OD Unit from the east.

Photograph A-6. Access gate at the south end of the OD Unit.

Photograph A-7. View to the north from the south access gate.

Photograph A-8. View of west fence from the OD Unit berm.

Photograph A-9. View of Tula Peak from the OD Unit.

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PART B

RCRA PERMIT RENEWAL APPLICATION
PERMIT NO. NM6572124422,
20,000 POUND OPEN DETONATION (OD) TREATMENT UNIT
AND CORRECTIVE ACTION SITES
UNITED STATES DEPARTMENT OF THE AIR FORCE
HOLLOMAN AIR FORCE BASE,
OTERO COUNTY, NEW MEXICO

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1.0 CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the permit or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

FEB 24 2015

Robert E. Kiebler Colonel, USAF Commander, 49th Wing	Date Signed

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ATTACHMENT A

FACILITY DESCRIPTION

HOLLOMAN AIR FORCE BASE
OPEN DETONATION (OD) TREATMENT UNIT

Permit No. NM6572124422

ATTACHMENT A
FACILITY DESCRIPTION

INTRODUCTION

The following information is provided in accordance with New Mexico Administrative Code (NMAC), Title 20, Chapter 4, Part 1, Subpart IX (20.4.1.900 NMAC) incorporating Title 40 Code of Federal Regulations (CFR) §270.14 (b)(1). A general description of the location of the subject OD Unit and site characteristics is included.

A.1 GENERAL DESCRIPTION [20.4.1.900 NMAC §270.14(b) (1)]

Holloman Air Force Base (HAFB) is located on approximately 59,743 acres of land in Otero County, south-central New Mexico, of which 52,411 acres are deemed main base Holloman and 7,332 acres are deemed Boles Wells Water System Annex. HAFB lands are situated in the northern Chihuahuan Desert in the region known as the Tularosa Basin that is bounded on the east and west by the Sacramento and San Andres Mountains respectively. HAFB is located adjacent to White Sands Missile Range (WSMR), and White Sands National Monument (WSNM) is located west of the Base. Regional water supplies are derived from Bonito Lake, located approximately 60 miles north of the base and the Boles, Douglas, and San Andres Well Fields located 14 miles to the southeast.

The nearest population center to HAFB is the city of Alamogordo, located approximately seven miles to the east. Regional metropolitan centers include El Paso, Texas, located 75 miles south-southwest, Las Cruces, New Mexico, located 65 miles to the southwest, and Albuquerque, New Mexico, located 210 miles north of the facility. The primary transportation route for the facility is Highway 70 that traverses the southern boundary of the base in a northeasterly direction. The general location of HAFB is depicted in Figure A-1.

HAFB was initiated as a temporary facility developed to provide gunnery and bomber training to aircrews during the Second World War. The Base mission was altered in the postwar years to the development of pilotless aircraft, guided missiles, and associated equipment. In the late 1950s the base was transferred to the Air Force Systems Command (AFSC) and designated as the Air Force Missile Development Center. On January 1, 1971, the base mission expanded to provide lead-in fighter training for the 479th Tactical Training Wing and its components.

Currently, HAFB hosts the Air Combat Command (ACC) 49th Wing, which includes pilot training, mobility support, and combat support operations. The primary Air Force Materiel Command (AFMC) component located at HAFB is the 46th Test Group, which is responsible for evaluation of propulsion and navigational systems for aircraft, space vehicles, and missiles. A variety of tenant organizations are assigned to HAFB, including the 4th Space Control Squadron and Detachment 4, the 50th Weather Squadron. A general layout of the facility is provided in Figure A-2. As a result of ACC readiness requirements and the 96th Test Group activities, a variety of ordnance, munitions, incendiaries, and propellants become waste because of exceedence of shelf-life, unanticipated deterioration, or failure to attain specifications that render the device non-serviceable. These waste explosives are considered characteristically hazardous under the Resource Conservation and Recovery Act (RCRA) due to reactivity (D003). Rocket motors exceeding 300 pounds are treated at the 20,000-Pound OD Unit that is subject to this permit. These units are regulated under 40 CFR §264.600, Subpart V.

The 20,000-Pound OD Unit is located at the northern boundary of HAFB, approximately 15 miles from the HAFB entrance. The OD Unit consists of a clear zone approximately 400 feet in diameter. It is located adjacent to the northern boundary of HAFB. The area to the north is part of the White Sands Missile Range. The OD Unit is 11.2 miles north of the WSNM and 15.9 miles from the closest recreational areas of WSNM. The eastern boundary of the HAFB/WSMR restricted area is approximately four miles east of the OD Unit. No human receptors are within this four mile area. There are a few rural residences six to seven miles east and seven to eight miles southeast and northeast of the OD Unit. The village of Tularosa is located nine to 10 miles to the northeast. The OD Unit is surrounded by a three-strand barbed wire fence with an overall height of four feet that defines the perimeter of the OD Unit. Warning signs in English, Spanish, German and Mescalero Apache are posted at key locations around the fence, and visible at a distance of 50 feet. The fence restricts unauthorized personnel and wild life from gaining access to the site.

The area surrounding the OD Unit was thoroughly surveyed for cultural resources by the University of New Mexico. The nearest potentially significant archaeological site (Laboratory of Anthropology number LA 67591) was identified approximately 300 meters southwest of the OD Unit. That site was excavated and reported in 1989 (Doleman, et al.) and the recovered materials are curated for future reference, which prevents the OD Unit from having any effect on those potentially significant cultural resources. No archaeological sites are in the area affected by use of the OD Unit.

No areas of specific ecological or natural environmental concern have been identified in the immediate area affected by the OD Unit. Tula pond, a man-modified natural spring, is approximately two miles north, and a population of gypsum adapted cottonwood trees (*Populus deltoides* ssp. *wislizeni*) is several miles to the southwest; neither is affected by the OD Unit. The Malone and Ritas Draws and the Lost River drainage are approximately 10 miles away from the OD Unit. These areas, classified as Essential Pupfish Habitat, are protected under the Cooperative Agreement for the Protection and Maintenance of White Sands Pupfish between the U.S. Army - WSMR, U.S. Air Force - HAFB, National Park Service - WSNM, U.S. Fish and Wildlife Service, and New Mexico Department of Game and Fish, but are not affected by the use of the OD Unit.

The 20,000-Pound OD Unit derives its name from the relevant operating procedures for this treatment activity. The net explosive weight (NEW) of solid propellant rocket motors that are, and will be simultaneously treated in the trench is limited to 20,000 pounds per treatment event. This total does not include the mass of the casings, other associated containment devices, and detonating charges. Although the precise number of treatment occurrences during any year is variable, the maximum amount of NEW treated at the unit per calendar year is 420,000 pounds. More specific information on ordnance constituents, the OD Unit, and operating procedures is provided in other attachments to this permit application.

Treatment of the wastes is accomplished according to the Automated Explosive Ordnance Disposal Publication System, T.O. 11A-1-42, T.O. 11A-1-60, AF Man 91-201 or manufacturer's disposal instructions within a 100-foot diameter area at the center of the clear zone. The waste is then treated by detonation. The force of the explosion often creates a depression in the ground, which is inspected to ensure that the waste has been completely destroyed. Unexploded ordnance (UXO) that may have been ejected from the depression is collected and returned to the depression and exploded again to treat the UXO. Casings and fragments that do not have UXO are collected and containerized. Additional detonations on the same day are performed at locations surrounding the first depression within the 100-foot diameter detonation area. When the detonation area is covered with depressions, a bulldozer or similar heavy equipment smoothes out the site, filling in the depressions if sampling is not required. During soil sampling, the last detonation depression is not filled in, nor is any dirt work conducted, until the soil samples have been collected. A berm, with a minimum height of 2 feet, exists at the south end of the OD Unit to prevent carryover of fragments towards the test track area.

The location of the OD Unit and its surrounding area relative to the main base is provided in Figure A-2. A drawing of the area, showing dimensions of the unit, is shown in Figure A-3.

A.2 TRAFFIC INFORMATION [20.4.1.900 NMAC §270.14(B) (10)]

Access to the 20,000-Pound OD Unit is restricted to explosive ordnance disposal (EOD) personnel and personnel with appropriate security clearance and identification or escorted visitors.

A.2.1 ROUTES OF TRAVEL AND TRAFFIC VOLUME

Access to the 20,000-Pound Unit is provided by a single paved road. A dirt road provides access from the paved road to the edge of the OD Unit. The detonation area is approximately one quarter mile from the paved road. Traffic along this route is restricted to official use by the EOD personnel during explosive operations, but may be accessed by personnel using the adjacent Test Track. As a result of these restrictions, the typical traffic volume and pattern consist of several vehicles that are in transit to or from the Test Track facility each day.

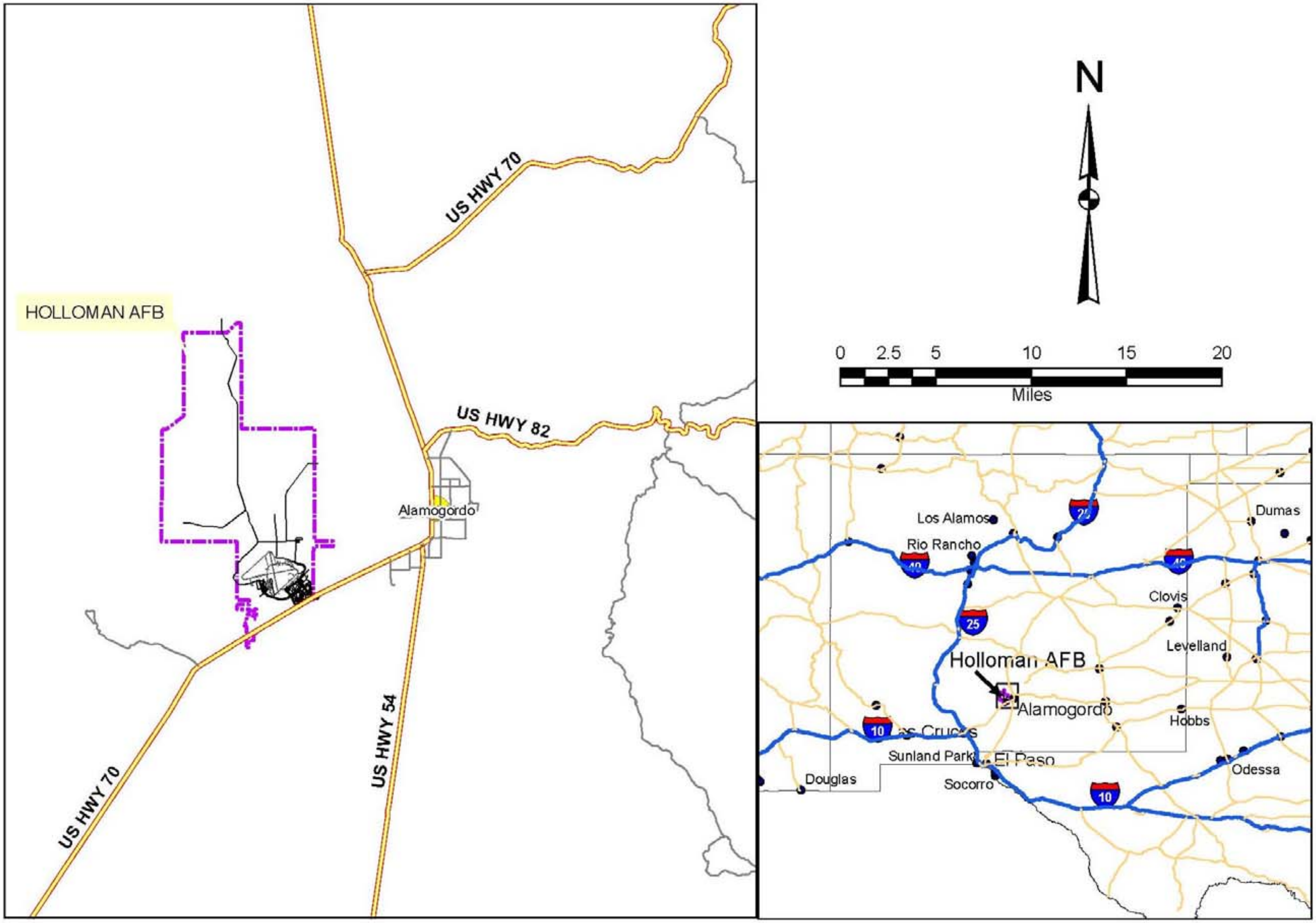


Figure A-1. General Location of Holloman Air Force Base

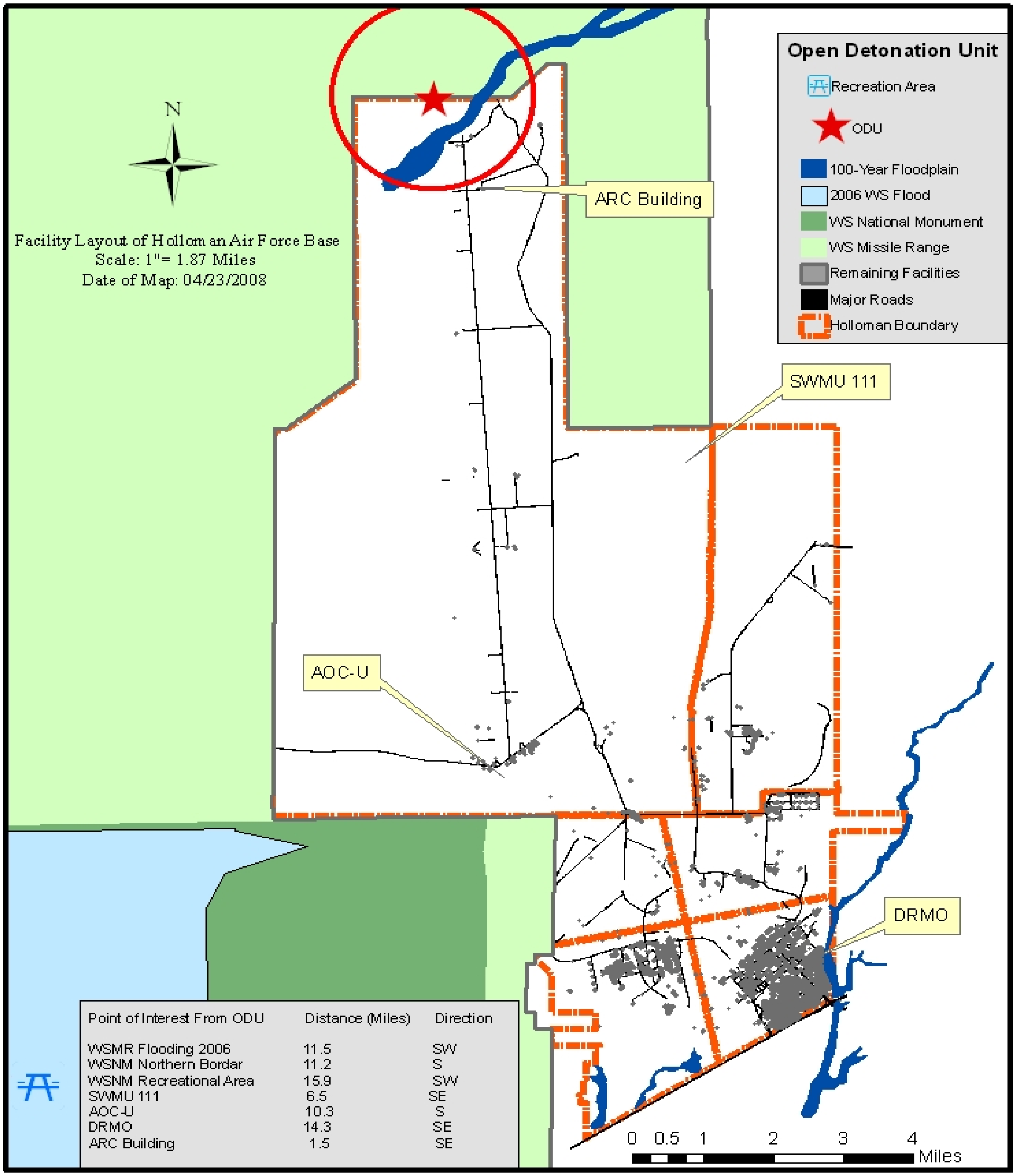
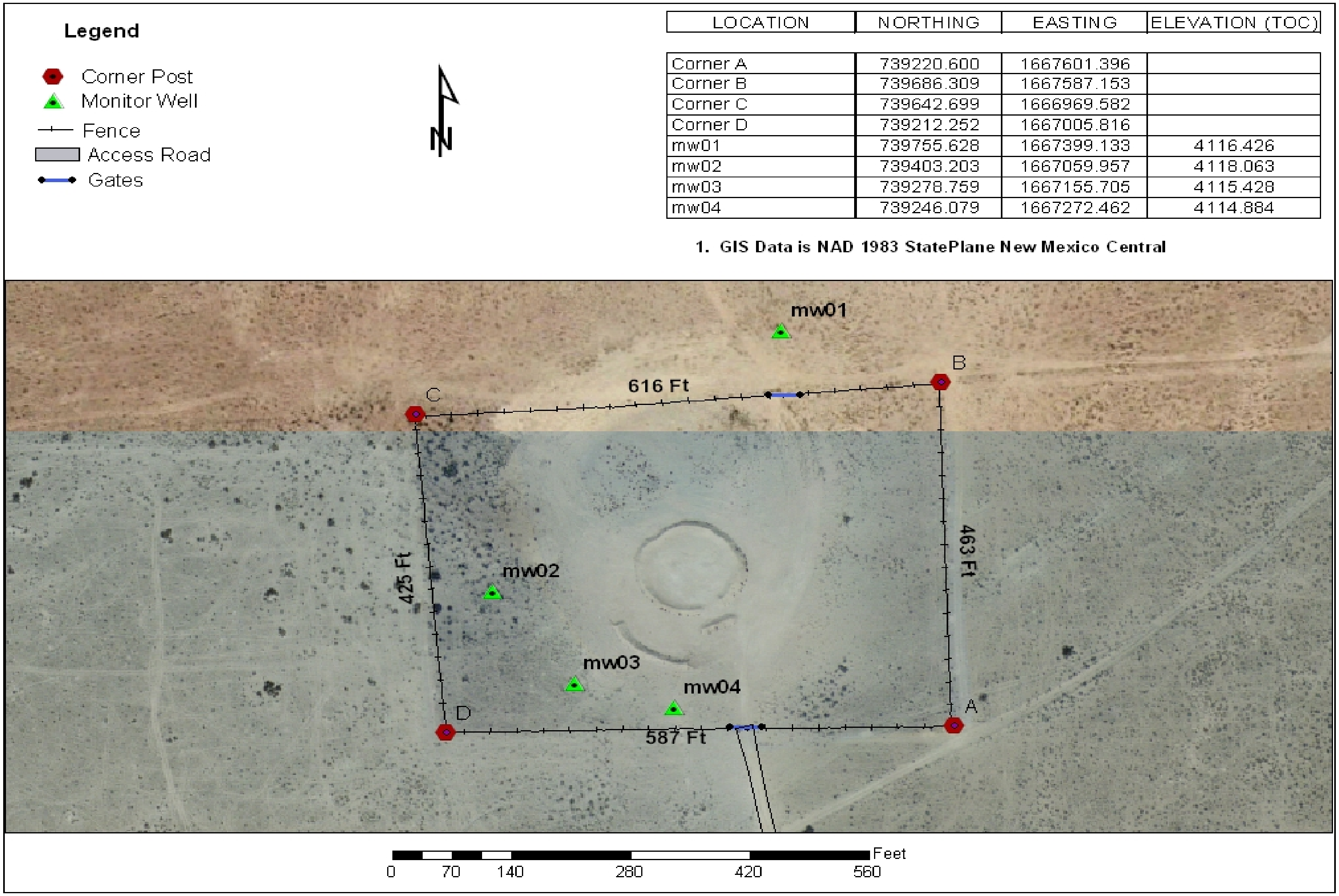


Figure A-2. Facility Layout of Holloman Air Force



LOCATION	NORTHING	EASTING	ELEVATION (TOC)
Corner A	739220.600	1667601.396	
Corner B	739686.309	1667587.153	
Corner C	739642.699	1666969.582	
Corner D	739212.252	1667005.816	
mw01	739755.628	1667399.133	4116.426
mw02	739403.203	1667059.957	4118.063
mw03	739278.759	1667155.705	4115.428
mw04	739246.079	1667272.462	4114.884

1. GIS Data is NAD 1983 StatePlane New Mexico Central

Figure A-3. Detailed Drawing of the 20,000-Pound Open Detonation Unit

A.2.2 ACCESS ROAD SURFACE AND LOAD BEARING CAPACITY

The only access road to the subject OD treatment unit is a paved surface. This surface is periodically maintained to prevent formation of holes, ditches, or other deformation that would increase the possibility of accidental detonation during transport.

The paved service road was graded and compacted to provide capacity for automobiles, trucks, and service vehicles. The maximum amount of waste moved per vehicle movement along the paved surface road is 40,000 pounds. This total weight includes the net explosive weight and the weight from inert casings, canisters, and other materials. See Figure A-4.

A.3 LOCATION INFORMATION [20.4.1.900 NMAC §270.14(b) (11)]

Information addressing the seismic standard and 100-year floodplain standard is presented below.

A.3.1 SEISMIC STANDARD [20.4.1.900 NMAC §§270.14(b) (11) (i and ii) and 20.4.1.500 NMAC §264.18(a)]

HAFB is an "existing" facility and is exempt from this requirement.

A.3.2 FLOODPLAIN STANDARD [20.4.1.900 NMAC §270.14(b) (11) (iii), (iv), and (v); §270.14(b) (19) (ii); and 20.4.1.500 NMAC §264.18(b)]

The FEMA floodplain map included as Figure A-5 shows that the OD Unit is not located within the 100-year floodplain which is defined in §264.18(b)(2)(i) as "any land area which is subject to a one percent or greater chance of flooding in any given year from any source."

The implications would be if the OD Unit was located in that plain, it must be designed, constructed, operated, and maintained to prevent washout of any hazardous waste by a 100-year flood. In 2006, the WSNM was closed to the public due to flooding; however, the OD Unit is located 11.2 miles from the northern boundary of the WSNM. The OD Unit is situated on relatively flat, basin-floor upland, approximately 1000 feet north of and 27 feet in elevation above the Allen Draw channel, is surrounded by a minimum 2 foot high berm, and therefore would not be subject to washout as defined in §264.18(b) (2) (ii) as "the movement of hazardous waste from the active portion of the facility as a result of flooding." Typically, surface water from precipitation in the area of the OD Unit is either lost to evaporation, transpiration, and infiltration.

A.4 TOPOGRAPHIC MAPS [20.4.1.900 NMAC §270.14(b) (19)

The general requirements of 20.4.1.900 NMAC §270.14(b) (19) are met in a topographic map of the 20,000-Pound OD Unit and the surrounding area in Figure A-5. The American National Standards Institute size E ANSI E map depicts the OD Unit features, sub-surface flow direction beneath the site, terrain relief, surrounding geographic features, the WSMR and HAFB boundaries, and prevailing wind direction. Elevation contour intervals and scale per guidance are

1 meter (3.28 ft), with an absolute scale of 1:1,130 (1 inch equals 94 ft) respectively. Data indicates that the OD Unit itself and the majority of the surrounding area falls within FEMA flood designation zone X. This area is outside the 1-percent annual chance floodplain, or an area of 1% annual chance sheet flow flooding where average depths are less than 1 foot, or has 1% annual chance stream flooding where the contributing drainage area is less than 1 square mile, or is protected from the 1% annual chance flood by levees. No Base Flood Elevations or depths are shown within this zone (FEMA 2009). The nearest interment stream Allen Draw falls within a FEMA zone A. This area has 1% annual chance of flooding and a 26% chance of flooding over a 30 year time period. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones (FEMA 2009). All within map pertinent features are labeled accordingly, with off map points of interest listed indicating both direction and distance from the ODU.

Included as inserts at the end of Attachment A are two maps showing the locations of the active SWMUs/AOCs and monitoring wells at HAFB. Both maps also meet the general requirements of 20.4.1.900 NMAC §270.14(b) (19).

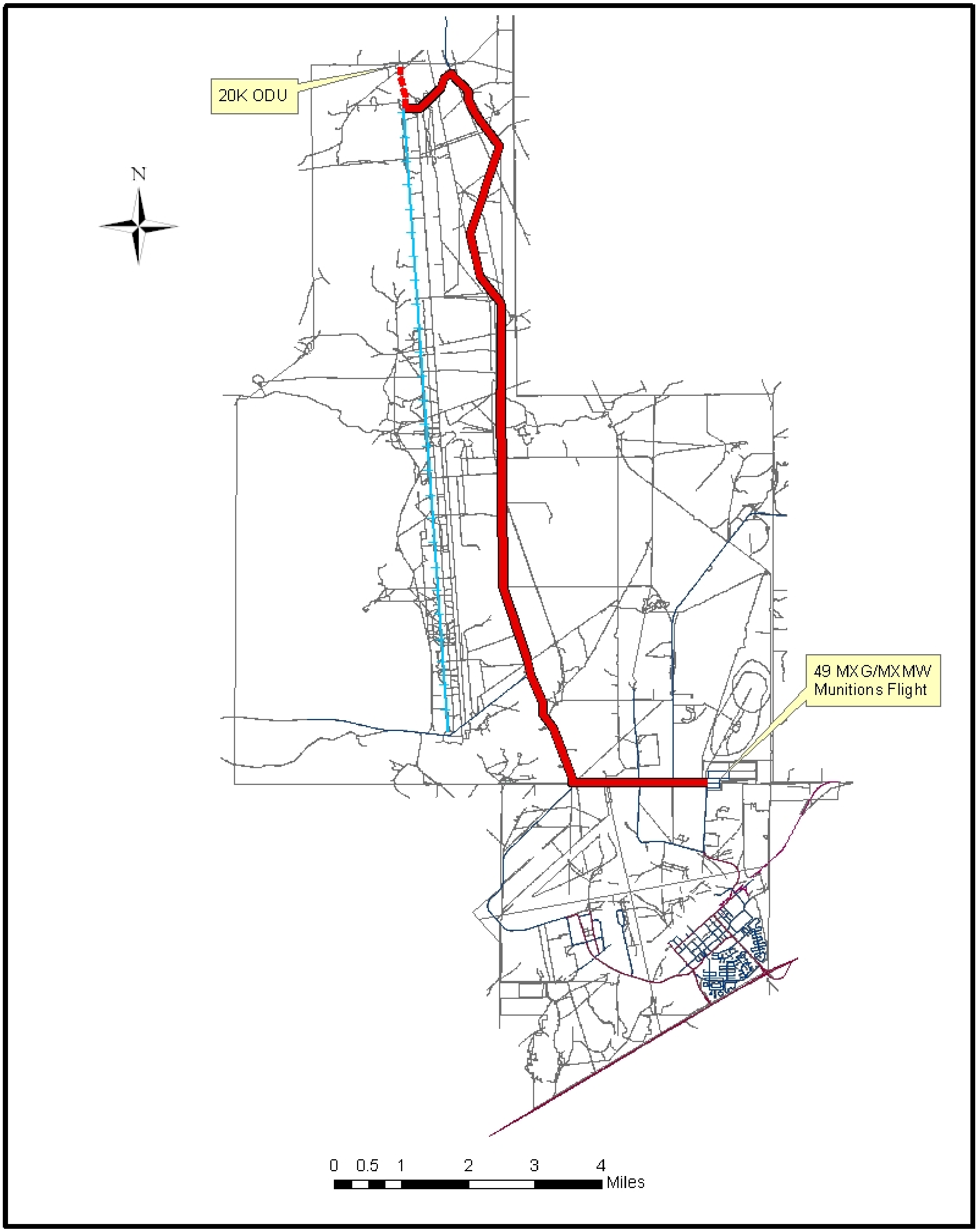


Figure A-4 Explosive Waste Hauling Route

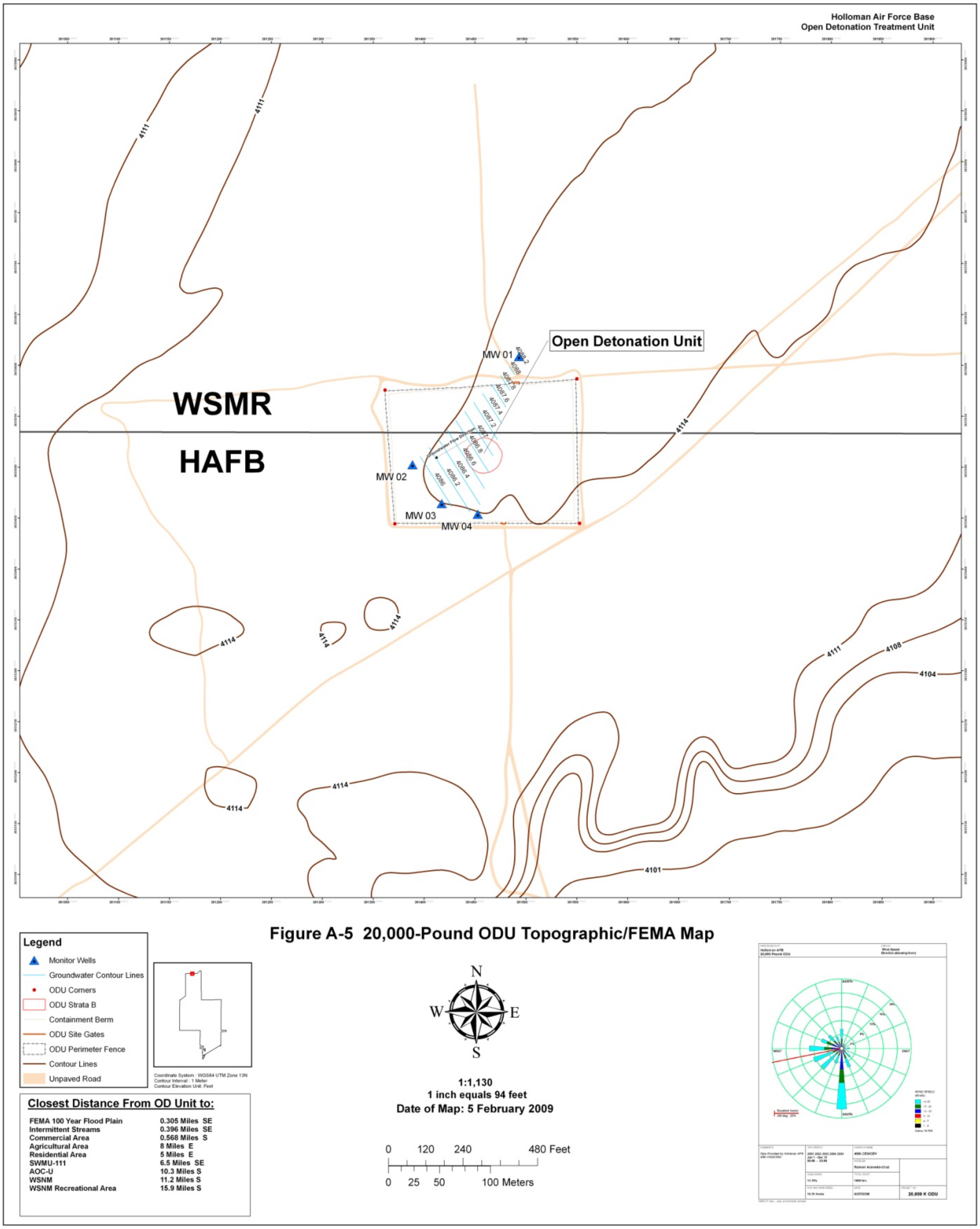


Figure A-5 20,000-Pound ODU Topographic/FEMA Map

- Surface waters including intermittent streams (Figure A-5) – No surface water of constant flow conditions is located in the area, although arroyos that contain runoff are located in the vicinity of the unit.

- A wind rose (i.e., prevailing wind-speed and direction) – Wind roses for 2000 through 2005 are shown on Figures A-6 through A-10**.** Figure A-5 shows a five year combined wind rose depicting a resultant vector from 259 degrees and an average wind speed of 18.76 knots.

- Surrounding land uses (residential, commercial, agricultural, recreational) – Due to the size of the installation, several insets are used to show the required features (Figure A-11). The 20,000-Pound OD Unit is located on the northern boundary of HAFB. White Sands Missile Range lies to the north and west of the adjacent base boundaries. The unit is situated on undeveloped grassland near areas of barren land (dunes) and arroyos and is isolated from commercial and residential land uses. The closest building (storage facility) off the OD Unit is approximately .75 mile from the OD Unit. The distances to the nearest residential buildings is 13.8 miles, to a public roadway is 9.1 miles, and to a passenger railroad is 85 miles.

- Orientation of the map (north arrow) – All maps included in the permit application show the orientation (north arrow).

- Legal boundaries of the Hazardous Waste Management facility site – The legal boundaries of HAFB are shown on Figure A-3**.**

- Access control (fences, gates) – All lands within HAFB boundaries are under the control of the U.S. Air Force. Thus, the unit is surrounded by access-controlled Federal lands for a distance of several miles in all directions.

- Injection and withdrawal wells both on-site and off-site – The location of the monitoring wells around the OD Unit are shown on Figure A-5.

- Buildings; treatment, storage, or disposal operations; or other structures (such as recreation areas, runoff control systems, access and internal roads, storm, sanitary, and process sewerage systems, loading and unloading areas, fire control facilities) – As indicated above, the area around the OD Unit is owned/controlled by the Federal government (Department of Defense). Figure A-2 shows the nearest point of interest, roads and structures. The nearest facility (storage area) is approximately .75 mile~~s~~ from the OD Unit.

- Barriers for drainage or flood control – An earthen berm provides a barrier to prevent drainage from the area of the OD Unit. The OD Unit is not located within the 100-year floodplain, and barriers for flood control are not necessary.

- Location of operational units within the hazardous waste management facility site (Solid Waste Management Units [SWMUs] and Installation Restoration Program [IRP] site), where hazardous waste is (or will be) treated, stored, or disposed (include equipment cleanup areas) – The location of the OD Unit and other operational units are shown on Figure A-2.

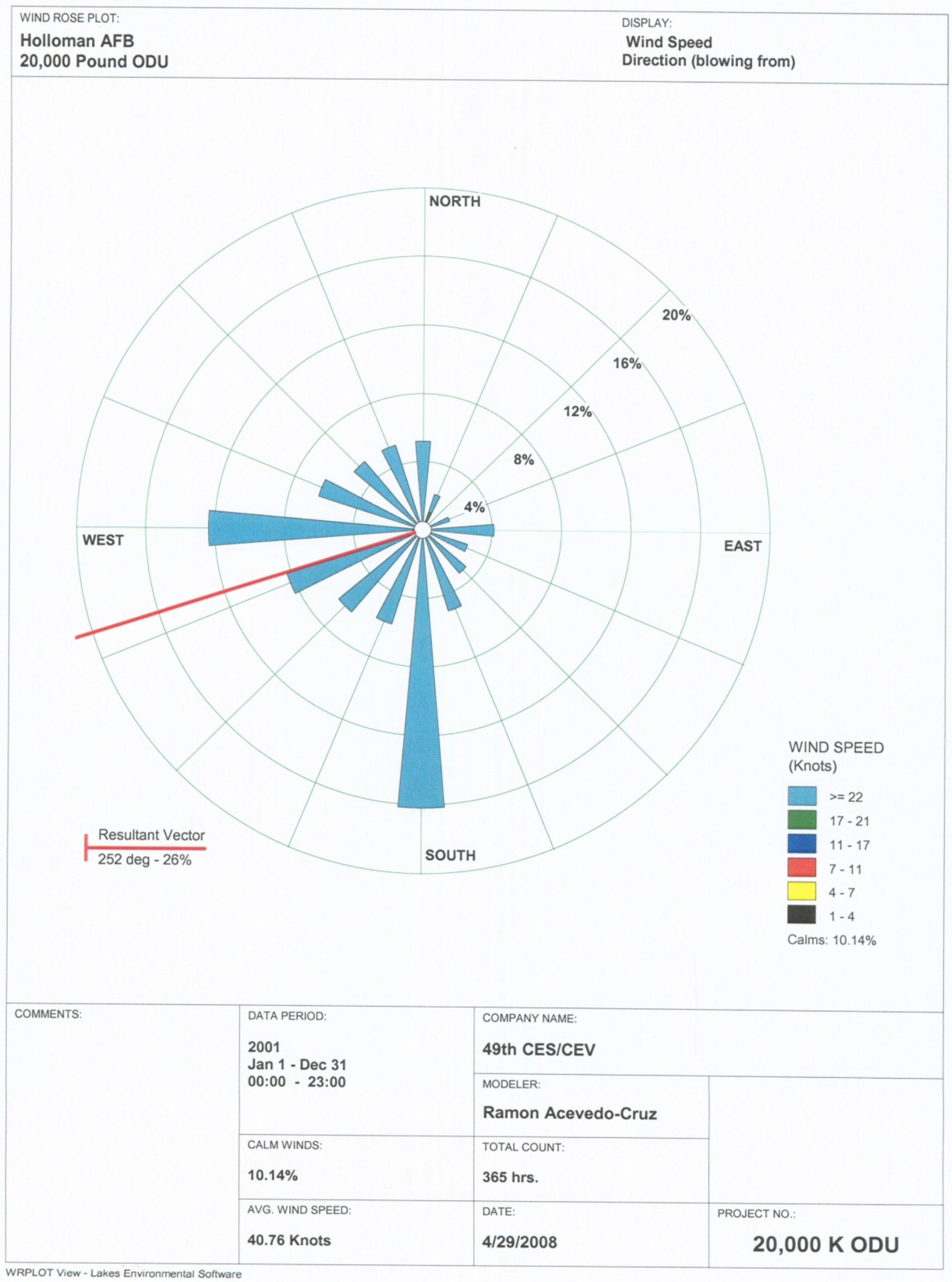


Figure A-6 Frequency (%) of Wind Speed by Direction – 2001

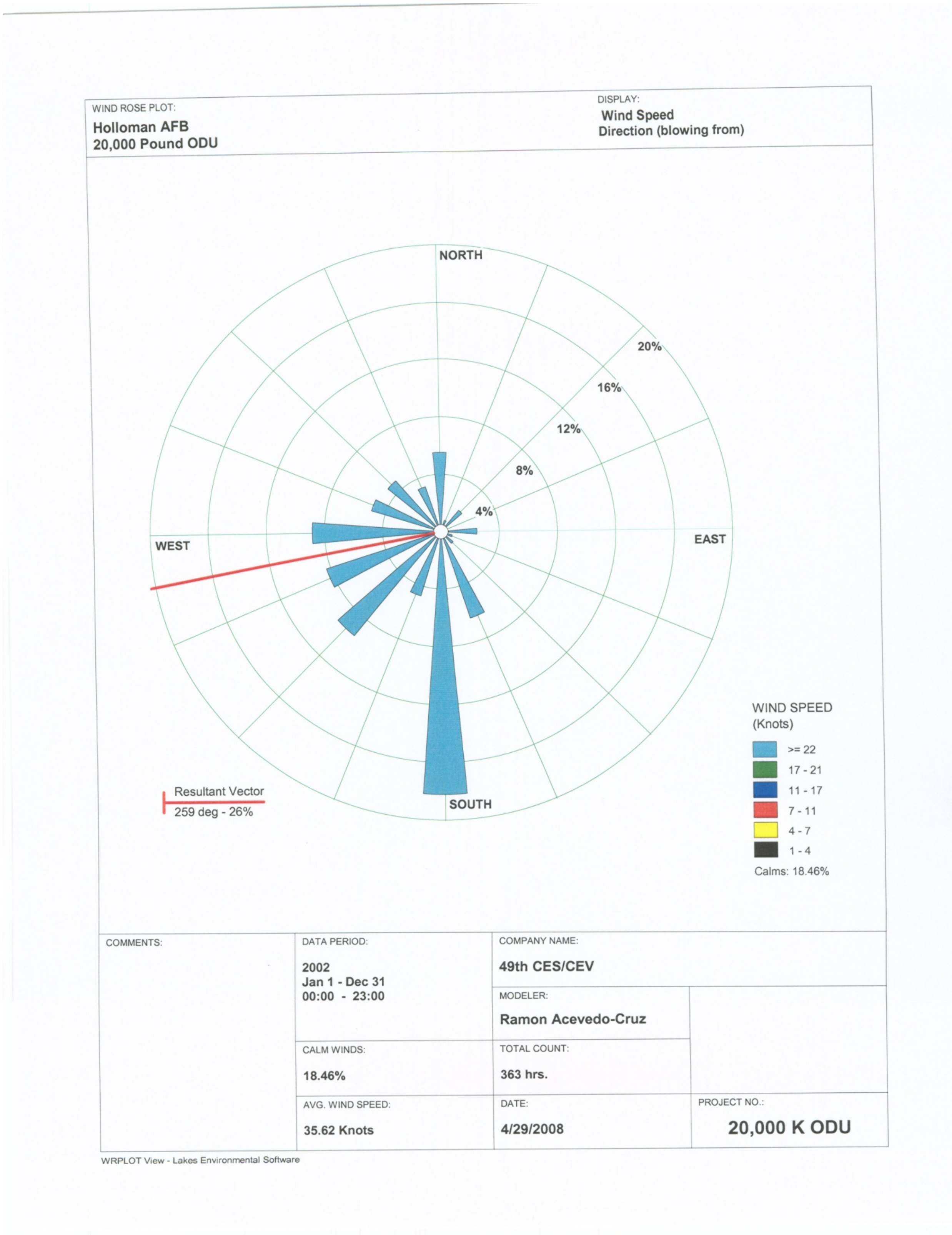


Figure A-7 Frequency (%) of Wind Speed by Direction – 2002

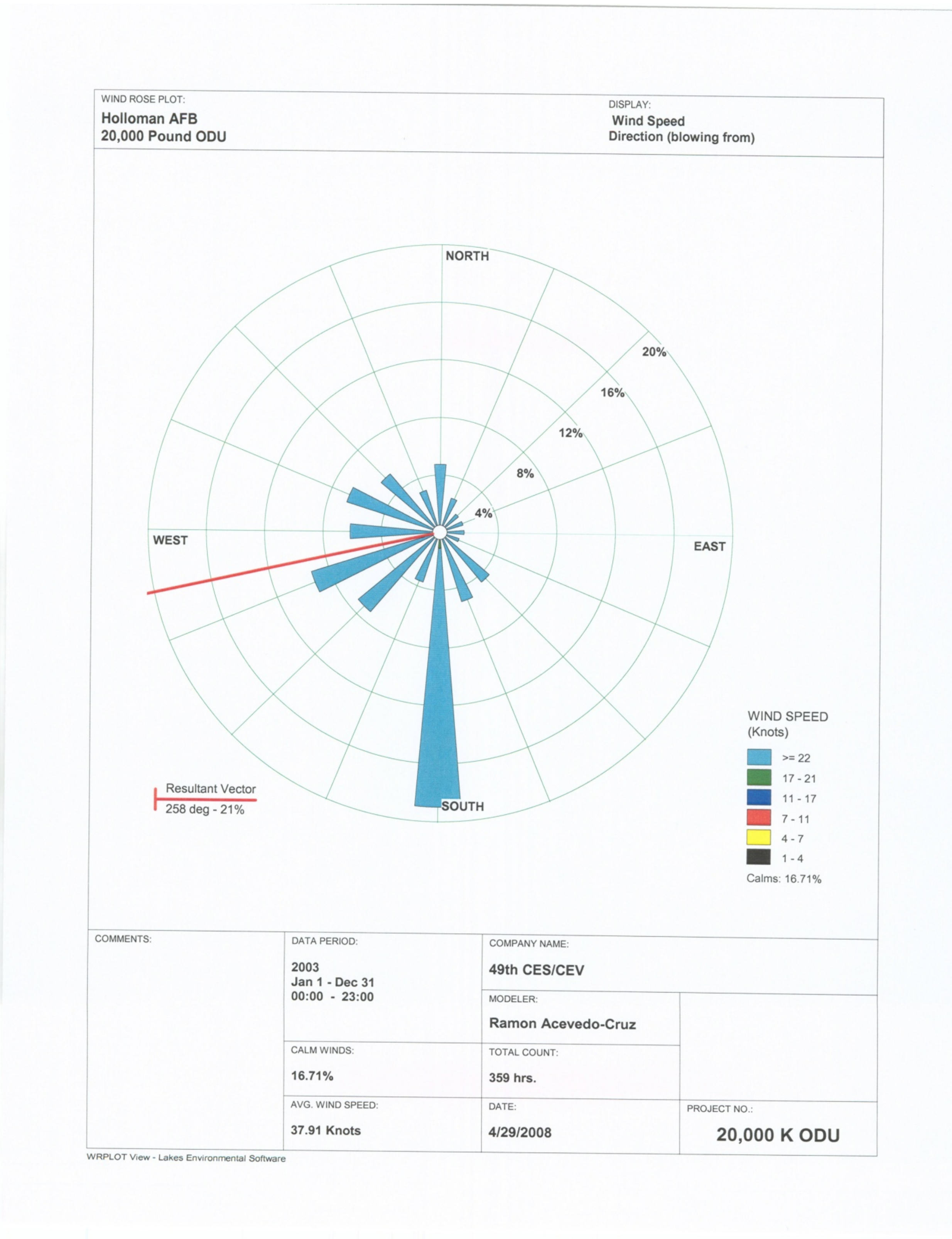


Figure A-8 Frequency (%) of Wind Speed by Direction – 2003

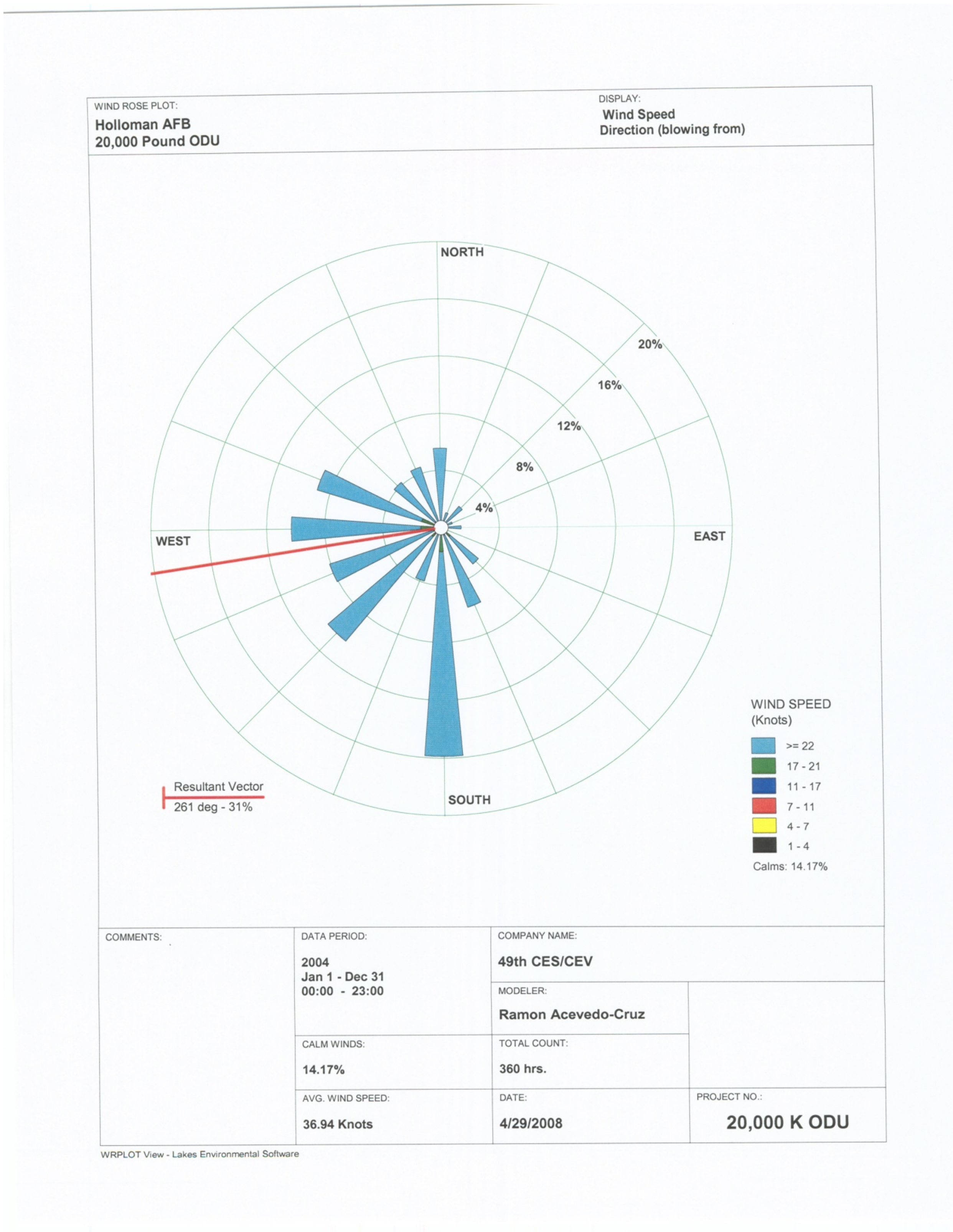


Figure A-9 Frequency (%) of Wind Speed by Direction – 2004

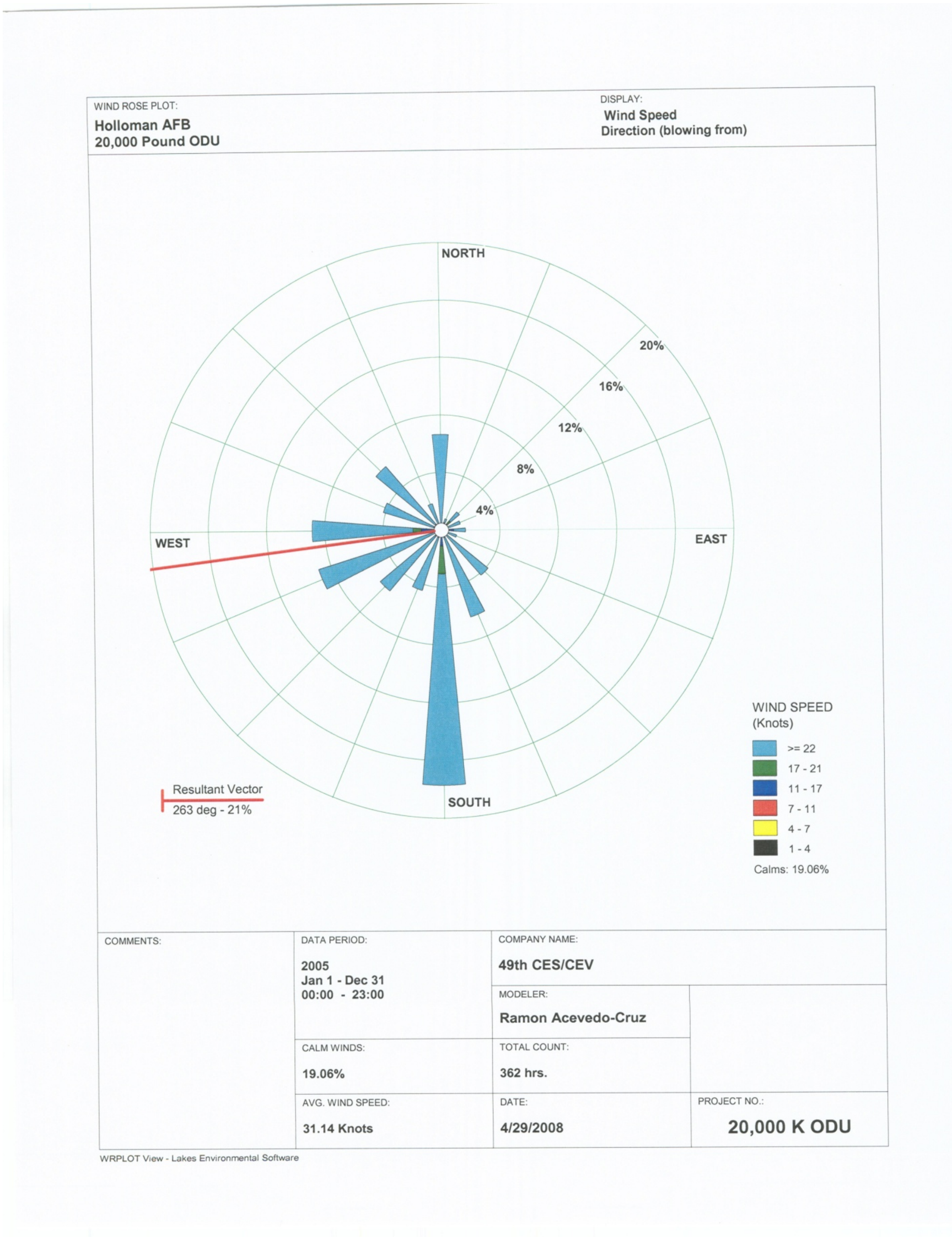
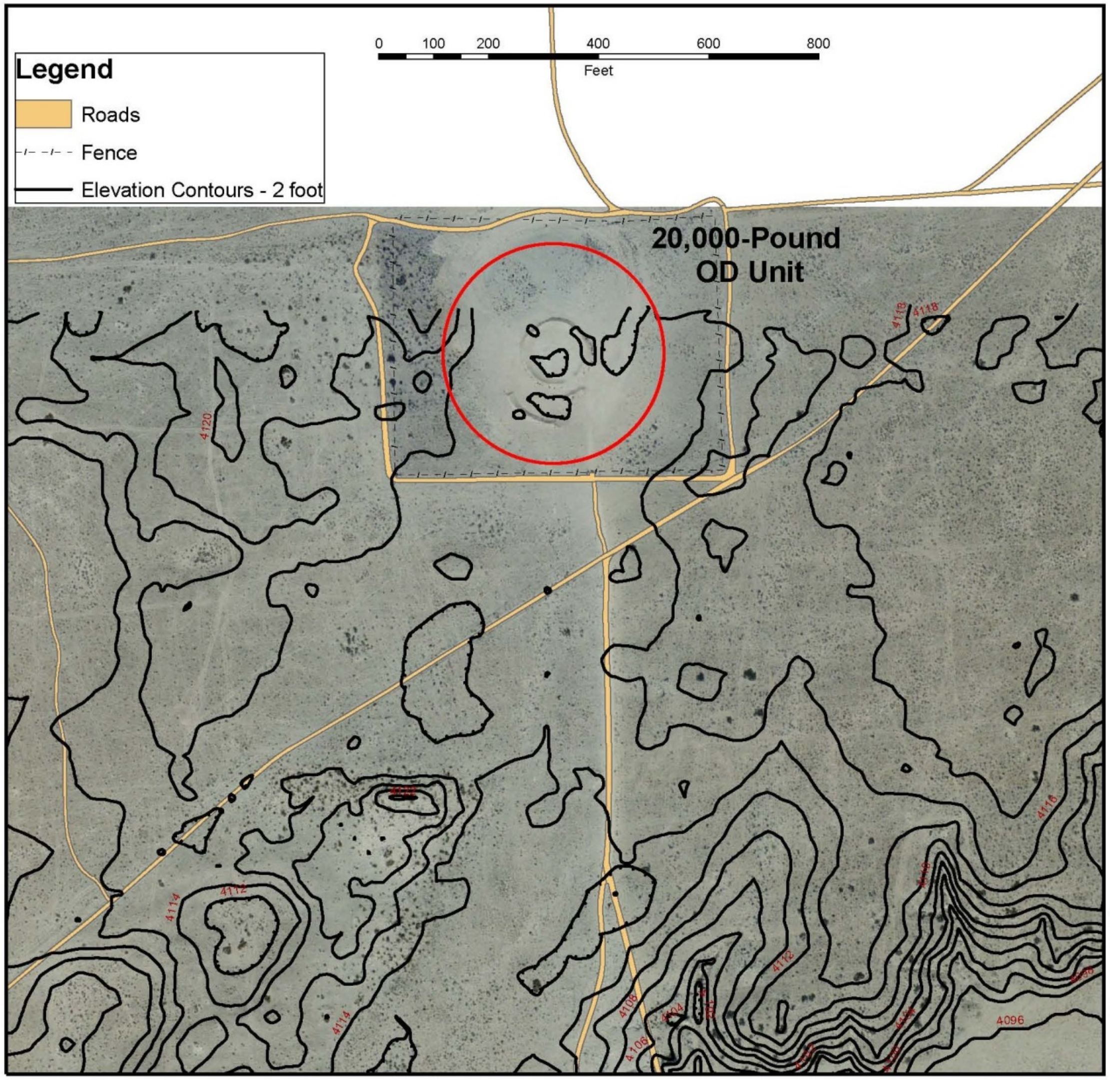
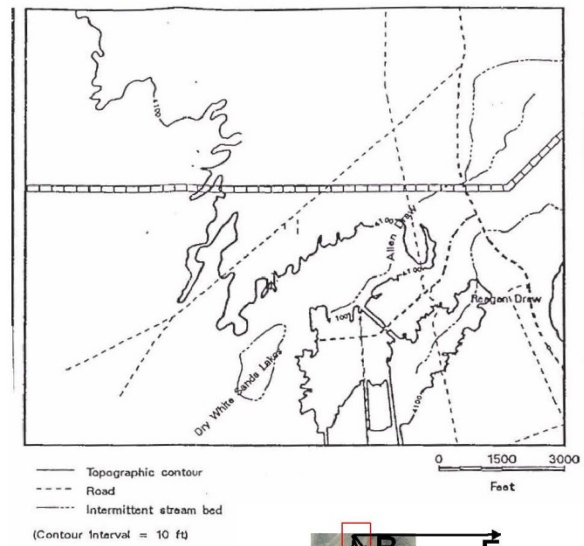
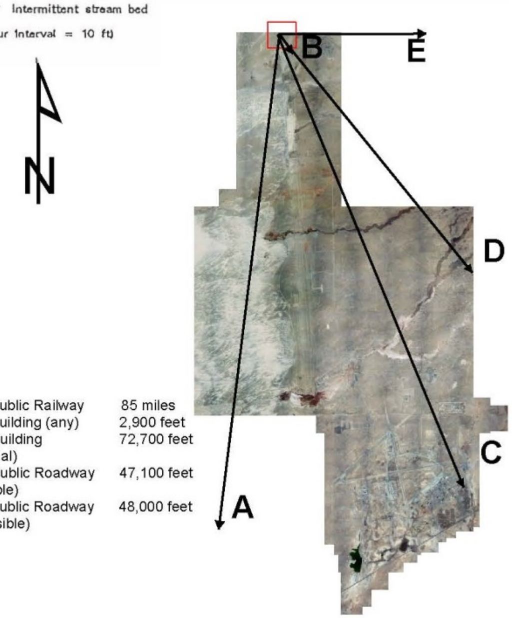


Figure A-10 Frequency (%) of Wind Speed by Direction – 2005







A	Nearest Public Railway	85 miles
B	Nearest Building (any)	2,900 feet
C	Nearest Building (residential)	72,700 feet
D	Nearest Public Roadway (accessible)	47,100 feet
E	Nearest Public Roadway (inaccessible)	48,000 feet

Figure A-11 Location and Surrounding Land Use Map of the 20,000-Pound OD Unit

A.5 ADDITIONAL INFORMATION REQUIREMENTS [20.4.1.900 NMAC §270.14(c)]

Owners or operators of "regulated units" are required to provide additional information regarding protection of groundwater. Regulated units, as described in 20.4.1.500 NMAC §264.90(a) (2) include surface impoundments, waste piles, land treatment units, or landfills that receive hazardous waste after July 26, 1982. There are no "regulated units" at the HAFB; therefore, the requirements of this regulation are not applicable.

Note: Geology and meteorological information is presented in Attachment I, Environmental Protection.

ATTACHMENT B

WASTE ANALYSIS PLAN

HOLLOMAN AIR FORCE BASE
OPEN DETONATION TREATMENT UNIT

Permit No. NM6572124422

ATTACHMENT B
WASTE ANALYSIS PLAN

INTRODUCTION

This Waste Analysis Plan (WAP) describes the procedures used to characterize wastes that are treated and residues that are generated during treatment at the 20,000-Pound Open Detonation (OD) Unit. The WAP addresses the applicable waste analysis requirements in the Title 20, Chapter 4, Part 1, Section V New Mexico Administrative Code (20.4.1.500 NMAC, incorporating 40 Code of Federal Regulations (CFR) §§264.13, 264.602, and 270.14(b), and 20.4.1.300 NMAC, incorporating 40 CFR Part 268. The content of this WAP follows the guidance provided in "Waste Analysis at Facilities That Generate, Treat, Store, and Dispose of Hazardous Wastes: A Guidance Manual" (U.S. Environmental Protection Agency [EPA], 1994). This WAP is organized to address the six major elements recommended in the guidance, as follows:

Section B.1, Facility Description, references general descriptions of the Holloman AFB Open Detonation Treatment Unit; summarizes processes and activities that generate or are used to manage the waste; describes wastes that are treated, identifies appropriate waste accepted for treatment; and describes the hazardous waste management unit.

Section B.2, Waste Classification and Identification, addresses basic energetic chemistry and definitions; discusses various classifications of the waste military munitions; identifies typical waste treated at the OD Unit; summarizes typical waste constituents and specific physical and chemical parameters important for fate and transport; and describes the process for characterization of the waste using acceptable knowledge prior to treatment in the OD Unit. A glossary of munitions terms is included at the end of this Plan.

Section B.3, Selection of Waste Analysis Parameters, addresses munitions constituents (MC) of concern prior to treatment of the wastes at the OD Unit and post-treatment residues and soils, rationale for selection of MC, selection of analytical parameters and the rationale for the selection of these analytical parameters. The WAP also references the Sampling and Analysis Plan (SAP), included as Attachment H, which describes post-treatment sampling of residues and soil.

Section B.4, Summary of Analytical Methods and Sampling, presents information on the selection of the analytical laboratory and the methods. In addition, this section references the SAP at Appendix H for the analytical parameters for post-treatment soil sampling at the OD Unit.

Section B.5, Waste Re-Evaluation Frequencies, discusses the criteria used to determine the frequencies by which waste characterization information will be reevaluated.

Section B.6, Special Procedural Requirements, identifies the special procedures that will be followed to meet the provisions for complying with land disposal restrictions (LDR) requirements.

Section B.7, Glossary, provides definitions used throughout this document, summarized in one location.

The information collected under this WAP provides Holloman AFB (HAFB) personnel with information that is sufficient to safely manage the wastes treated at the OD Unit.

B.1 FACILITY DESCRIPTION

A general description of the HAFB OD Unit is provided in Attachment A. The facility information provided in this section is specific to processes and activities associated with the OD Unit.

B.1.1 DESCRIPTION OF FACILITY PROCESSES AND ACTIVITIES THAT GENERATE THE WASTE TREATED AT THE OD UNIT

Wastes treated at the OD Unit consist of military energetic materials that have exceeded their shelf life. Energetic materials are chemical compounds or mixtures of chemical compounds that are divided into three classes according to use: explosives, propellants, and pyrotechnics. When munitions are demilitarized because shelf lives have been exceeded, the overall chemical composition and resulting combustion products will not be affected.

The determination of when military munitions become waste military munitions (WMM) has been formalized in the DoD Regulation to the EPA's Military Munitions Rule Implementation Plan (MRIP) issued 1 July 1998. A Designated Disposition Authority (DDA) was established and an evaluation process developed. The DDA evaluation process assigns the authority to designate military munitions as waste to the DDA, thereby introducing only two ways a military munitions becomes a WMM. Based on the MMR, the point of generation of WMM occurs when the military munitions are removed from storage to be transported to the OD Unit for disposal

Open detonation is a thermal treatment process used for the treatment of unserviceable, obsolete, and/or waste munitions whereby an explosive donor charge ignites the munitions to be detonated. Detonation of the energetic materials is a violent chemical reaction within a chemical compound evolving heat and pressure (exothermic redox reaction), which is self-sustaining after the initial activating energy has been applied. The reaction rate is determined by the velocity of the shock wave that moves at supersonic speeds through the explosive causing decomposition of the explosive material (TM9-1300-214, U.S. Army, 1984). The detonation process is quasi-instantaneous with temperatures ranging from 800º K (981º F) to 1000º K (1341º F) (EPA 2002). The detonation reaction renders the explosive wastes non-reactive.

B.1.2 DESCRIPTION OF WASTES TREATED

The wastes that are treated in the 20,000-Pound OD Unit are generally propellant devices and explosives with expired shelf lives. Rocket motors exceeding 300 pounds are regularly treated at the 20,000-Pound OD Unit. Similar constituents are used in the formulation of the different items, but the quantity of specific energetic materials varies. In addition to the energetic material, the waste consists of the unit metallic components associated with these devices such as the casings. The reactive wastes to be treated at the 20,000-Pound OD Unit are solid in nature and contain no free liquid. The total mass of the energetic material is typically limited to less than 10,000 pounds per device.

Historically, the annual amount of waste treated at the OD Unit is less than the treatment event permit capacity. Explosive Reactivity Waste, D003, treated at the OD Unit and reported on the Biennial Report is listed in Table B-1.

Table B-1 Waste Treated at the OD Unit and Reported on Biennial Report

Reporting Year	Waste Code	Waste Description	Quantity Generated (pounds)
2005	D003	SPENT AND EXPIRED REACTIVE MUNITIONS AND ROCKET MOTORS FROM VARIOUS MILITARY OPERATIONS; TREATED ON SITE	6697
2003	D003	SPENT AND EXPIRED REACTIVE MUNITIONS AND ROCKET MOTORS FROM VARIOUS MILITARY OPERATIONS; TREATED ON SITE.	3751
2001	D003	SPENT AND EXPIRED REACTIVE MUNITIONS AND ROCKET MOTORS FROM VARIOUS MILITARY OPERATIONS; TREATED ON-SITE.	3305

B.1.3 DESCRIPTION OF ACCEPTABLE WASTE CATEGORIES

Wastes appropriate for Open Detonation are limited to hazardous wastes that have the explosive characteristic of reactivity (D003). These wastes meet the explosive reactivity definition specified in 20.4.1 NMAC §§261.23(a) (6 – 8). The energetic wastes must meet one or more of the following conditions:

a. The waste is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.

b. The waste is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

c. The waste is considered a forbidden explosive as defined by 49 CFR 173.51.

d. The waste is one of the following Class 1 explosives as defined by 49 CFR 173.50.

- Division 1.1 (Class A) - consists of explosives that have a mass explosion hazard. A mass explosion hazard is one that affects almost the entire load instantaneously.
- Division 1.2 (Class A or B) - consists of explosives that have a projection hazard but not a mass explosion hazard.
- Division 1.3 (Class B) - consists of explosives that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard.

Explosive ordnance disposal (EOD) Operating Instruction 32-3001-05 identifies the acceptable waste munitions for treatment at the OD Unit as Division 1.1. Categories of waste accepted for treatment at the OD Unit includes, but is not limited to, the propellants, explosives, and pyrotechnics further defined and identified in section B.2.

B.1.4 DESCRIPTION OF THE 20,000-POUND OD UNIT

The OD Unit consists of a cleared area approximately 400 feet in diameter within which waste explosives and propellant devices are detonated. Attachment F contains the operational procedures at the OD Unit. The actual treatment is accomplished according to the Automated Explosive Ordnance Disposal Publication System, T.O. 11A-1-42, T.O. 11A-1-60, AF Manual 91-201, or manufacturer’s disposal instructions by placement of the waste items within a 100 foot diameter area at the center of the clear zone. C-4 (RDX) donor charges are attached to the waste item. An "explosive train" is constructed, and remote control detonation is initiated from the designated clear zone. The donor device consists of a series of components that are referred to as an explosive train once the individual devices are placed in combination. An explosive train consists of a primer, an initial detonating agent, and a high explosive. Explosive train detonation is achieved by step-wise detonation of the components. The detonation reaction renders the explosive wastes nonreactive and results in both solid and gaseous by-products. Depending upon combustion conditions, the gaseous by-products will consist of carbon monoxide (CO), carbon dioxide (CO_2), water (H_2O), nitrogen (N_2), and various nitrogen oxides (NO_X). Solid by-products include casings from the waste and possibly trace concentrations of incompletely oxidized reactive material. Reaction by-products that are solid will be retained in the depression created by the explosive force (except for ejected components), but the gaseous reaction by-products vent to the atmosphere. These solid by-products will be gathered and re-detonated or drummed for proper disposal. Due to the difficulties and obvious hazards associated with collection of gas samples in the immediate vicinity of the detonation zone, this plan does not address the gas phase reaction by-products. An assessment of the gaseous constituents released during combustion is provided in Permit Attachment I.

The 20,000-Pound OD Unit (as designed) derives its name from the relevant operating procedures for this thermal treatment activity. The maximum net explosive weight (NEW) that will be simultaneously treated is limited to 11,900 pounds per treatment event, according to a memorandum dated 3 February 2005 from the Department of Defense (DoD) Explosives Safety Board (ESB). The DoD ESB memorandum is shown in Exhibit B-1. This total does not include the mass of the casings, other associated containment devices, and detonating charges. Although the precise number of treatment occurrences during any year is variable, discrete treatment events will occur at typical frequencies of at least one event per month, the total amount of treated hazardous waste will not exceed a total of 420,000 pounds NEW per calendar year.

B.2 WASTE CLASSIFICATION AND IDENTIFICATION

Process knowledge and munitions specifications are used to obtain the necessary chemical and physical data to designate waste prior to treatment of the energetic materials at the OD Unit. This section addresses basic definitions that are critical to understanding the nature of the waste stream and various classifications of military munitions based on energetic materials, munitions categories, and munitions families. Waste military munitions will be defined based on the

Military Munitions Rule (MR). Typical WMM treated at the OD Unit will be identified and basic chemical and physical properties of the constituents in the waste munitions will be briefly discussed. This information is provided as background to support the use of acceptable knowledge for characterization of the WMM prior to treatment at the OD Unit and to support rationale for selection of sampling and analysis parameters identified in Attachments G (Closure Plans), H (SAP for soil), and I (Environmental Protection).

Military Munitions are defined in 40 CFR 260.10 as all ammunition products and components produced or used by or for the DoD or the U.S. Armed Services for national defense and security, including military munitions under the control of DoD, the U.S. Coast Guard, DOE, and National Guard personnel. The definition includes confined gaseous, liquid, and solid propellants, explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries used by DoD Components, including bulk explosives and chemical warfare agents, chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges, and devices and components thereof.

B.2.1 CLASSIFICATION OF MILITARY ENERGETIC MATERIALS (US ARMY, 1984)

Energetic materials are chemical compounds, or mixtures of chemical compounds, that are divided into three classes according to use: propellants; explosives; and pyrotechnics (PEP). Explosives and propellants, when initiated, evolve large quantities of gas in a short time. The difference between explosives and propellants is the rate at which the reactions proceed. For explosives, a fast reaction produces a very high pressure in the surrounding medium; this pressure is capable of significant destruction. In propellants, a slower reaction produces lower pressure over a longer period of time. This lower sustained pressure is used to propel objects. Pyrotechnics evolve large amounts of heat but much less gas than propellants or explosives.

Propellants cannot be distinguished from explosives by chemical composition or by chemical reaction rate alone, although propellants characteristically react (burn) at a rate much lower than the detonation rate of explosives. Propellants are characterized by the ability to burn at reproducible, controllable, and predetermined rates.

The properties of explosives are put to practical use in military munitions by an arrangement called an explosive train and an ignition train. The explosive train is used to set off a main charge and is composed of various explosive elements (initiator [primer/detonator], booster, main charge). These elements are arranged from decreasing sensitivity to high potency. The initiator consists of a small amount of primary explosive, and is highly sensitive. The booster contains a larger quantity of less sensitive but more powerful material called a secondary or high explosive. The main charge, also a secondary explosive is the least sensitive material but comprises the bulk of the explosive charge. The ignition train is used to ignite propellants. A primer ignites the igniter which in turn ignites the propellant charge. The primer consists of a mixture of fuels and oxidants.

While there are many kinds of explosive compounds, the number of explosive compounds used in military applications is relatively small. The explosives must meet specific chemical and physical requirements associated with the intended military application. Many explosive items are designed for a minimum lifespan of ten years. Stringent tests are designed to characterize the explosives as much as possible before deployment to avoid problems during use. Table B-2 summarizes the military explosive compounds used in military munitions. The chemicals are specific, but are arranged in different compositions depending on the use of the energetic materials. The following information addresses energetic materials classified based on use.

B.2.1.1 Propellants

Propellants are low explosive agents such as explosive powder or fuel that provide the energy for propelling ordnance to the target. Propellants include both rocket and gun propellants. Propellants are classified based on composition, not use. Table B-2 lists common military propellant chemical compositions. Table B-3 identifies the specific chemical compositions of single and double base propellants that may be treated at the OD Unit.

- Single-base propellant compositions are used in cannons, small arms, and grenades. These compositions contain the propellant nitrocellulose as their chief ingredient. In addition to containing a stabilizer, they may also contain inorganic nitrates, nitro-compounds, and non-explosive materials such as metallic salts, metals, carbohydrates, and dyes.

- Double-base propellant compositions are used in cannons, small arms, mortars, rockets, and jet propulsion units. This term generally applies to compositions containing both nitrocellulose and nitroglycerine. They can also be defined as propellants containing nitrocellulose and liquid organic nitrates that will gelatinize nitrocellulose. Additives are frequently used in addition to a stabilizer.

- Triple-base propellant compositions are used in cannon units. This term is applied to propellants containing three explosive ingredients, with nitro guanidine as the major ingredient and the other two usually nitroglycerine and nitrocellulose.

- Composite propellants contain neither nitrocellulose nor an organic nitrate. They are usually physical mixtures of a fuel such as metallic aluminum, a binder (normally a synthetic rubber that is also a fuel), and an inorganic oxidizing agent such as ammonium perchlorate. Composite propellants are used primarily in rocket assemblies and jet propellant propulsion units.

B.2.1.2 Explosives

Energetic materials are classified into low and high explosives based on the speed of the explosion. High explosives are characterized by their extremely rapid rate of decomposition. When a high explosive is initiated by a blow or shock, it decomposes almost instantaneously, a process called detonation. High explosives are further divisible by their susceptibility to initiation into primary and secondary high explosives. Table B-2 contains general chemical compositions of primary and secondary high explosives.

- Primary or initiating explosives are high explosives generally used in small quantities to detonate larger quantities of high explosives. Primary explosive compositions are mixtures of primary explosives, fuels, oxidizers and other ingredients used to initiate detonation in high explosive charges or ignite propellants or pyrotechnics. In general, propellants are ignited by applying a flame (ignition train), while bursting explosives are ignited by a severe shock (explosive train). The initiating device used to set off a propellant is called a primer, and the device used to initiate the reaction of a main charge or bursting explosive is called a detonator.

- Auxiliary or booster explosives are used to increase the flame or shock of the initiating explosive to ensure that the burster charge performs properly. High explosives used as auxiliary explosives are less sensitive than those used in initiators, primers, and detonators, but are more sensitive than those used as filler charges or bursting explosives.

- Bursting explosives, burster charges, or fillers are high explosive charges that are used alone or as part of the explosive charge in mines, bombs, missiles, and projectiles.

B.2.1.3 Pyrotechnics

B.2.1.4 Energetic Materials Treated at the OD Unit. Pyrotechnics are low explosives used to send signals, to illuminate areas of interest, to simulate other weapons during training, and as ignition elements for certain weapons. Pyrotechnic compositions are considered low explosives because of their low rates of combustion. Examples of pyrotechnics are illuminating flares, signaling flares, smoke generators, tracers, incendiary delays, and photo-flash compounds.

Table B-4 contains a listing of typical military items treated at the OD Unit classified by composition and use. The table includes the chemical formula or the chemical composition for the chemical or chemical compound listed. A variety of uses are listed for many of the explosive compounds.

Table B-2: General Chemical Composition of Military Energetic Materials That May be Treated at the OD Unit (US Army, 1984)

PROPELLANTS[1]

Name	Chemical Formula or Composition
Nitrocellulose	$C_{12}H_{16}(ONO_2)_4O_6$
Nitroglycerine	$C_3H_5N_3O_9$
Nitroguanidine	$CH_4N_4O_2$

[1]These three primary constituents can be used singly or in various combinations along with metals, metallic salts, and organic polymer binders.

PRIMARY EXPLOSIVES[2]

Name	Chemical Formula or Composition
Lead Azide	H_6Pb (71% Pb)
Mercury Fulminate	$C_2HgN_2O_2$ (70.5% Hg)
Diazodinitrophenol (DDNP)	$C_6H_2N_4O_5$
Lead Styphnate	$C_6HN_3O_8Pb$ (44.2% Pb)
Tetracene	$C_2H_8N_{10}O$
Potassium Dinitrobenzofuroxane (KDNBF)	$C_6H_2N_4O_6K$
Lead Mononitroresorcinate (LMNR)	$C_6H_5NO_{4X}Pb$ (57.5% Pb)
Ingredients to Rocket Propellant**:**	
Copper Monobasic Salicylate	$C_{14}H_{12}Cu_2O_8$
Lead Salicylate	$C_{14}H_{10}O_6Pb$
Fuels:	
Lead Thiocyanate	$Pb(SCN)_2$ (64% Pb)
Antimony Sulfide	Sb_2S_5
Calcium Silicide	$CaSi_2$
Oxidizers:	
Potassium Chlorate	$KClO_3$
Ammonium Perchlorate	NH_4ClO_4
Barium Nitrate	N_2O_6Ba
Calcium Resinate	$Ca(C_{44}H_{62}O_4)_2$
Strontium Peroxide	SrO2
Barium Peroxide	BaO2
Strontium Nitrate	$Sr(NO_3)_2$
Potassium Perchlorate	$KClO_4$

[2]Primary compositions include a mixture of primary explosives listed above, fuels, oxidizers, and binders (e.g. paraffin wax).

Table B-2: Continued

BOOSTER AND SECONDARY EXPLOSIVES (High Explosives)

Name	**Chemical Formula or Composition**
Aliphatic Nitrate Esters:	
1,2,4-Butanetriol Trinitrate (BTN)	$C_4H_7N_3O_9$
Diethyleneglycol Dinitrate (DEGN)	$C_4H_8N_2O_7$
Nitroglycerine (NG)	$C_3H_5N_3O_9$
Nitrostarch (NS)	$C_6H_7(OH)_X(ONO2)_Y$ where X - Y = 3
Pentaerythritol Tetranitrate (PETN)	$C_5H_8N_4O_{12}$
Triethylene Glycol Dinitrate (TEGDN)	$C_6H_{12}N_2O_8$
1,1,1-Trimethylethane Trinitrate (TMETN)	$C_5H_9N_3O_9$
Nitrocellulose (NC)	$C_{12}H_{16}(ONO_2)_4O_6$
Nitramines:	
Cyclotetramethylene Tetranitramine (HMX)	$C_4H_8N_8O_8$
Cyclotrimethylene Trinitramine (RDX)	$C_3H_6N_6O_6$
Ethylenedimine Dinitrate (EDDN, Haleite)	$C_2H_6N_4O_4$
Nitroguanidine (NQ)	$CH_4N_4O_2$
2,4,6-Trinitrophenylmethylnitramine (Tetryl)	$C_7H_5N_5O_8$
Ammonium Picrate (Explosive D)	$C_6H_3N_3O_7H_3N$
1,3-Diamino-2,4,6-Trinitrobenzene (DATB)	$C_6H_4N_5O_6$
2,2'4,4’6,6’-Hexanitroazobenzene (HNAB)	$C_{12}H_4N_8O_{12}$
Hexanitrostilbene (HNS)	$C_{14}H_2N_6O_{12}$
1,3,5-Triamino-2,4,6-Trinitrobenzene (TATB)	$C_6H_6N_6O_6$
2,4,6-Trinitrotoluene (TNT)	$C_7H_5N_3O_6$
Ammonium Nitrate	HNO_3H_3N

Table B- 2: Continued

COMPOSITIONS	
Name	**Chemical Formula or Composition**
Binary Mixtures:	
Amatols	[ammonium nitrate + TNT]
Composition A	[RDX + Desensitizer]
Composition B	[RDX + TNT]
Composition C	[RDX + Plasticizer]
Ednatols	[Haleite + TNT]
LX-14	[HMX (95.5%) + Estane 5702-F1]
Octols	[HMX + TNT]
Pentolite	[PETN + TNT]
Picratol	[Ammonium Picrate (52%) + TNT (48%)]
Tetrytols	[TNT + Tetryl]
Tritonal	[TNT (80%) + Flaked Aluminum (20%)]
Ternary Mixtures:	
Amatex 20	[RDX (40%) + TNT (40%) + Ammonium Nitrate (20%)]
Ammonels	[Ammonium Nitrate + Aluminum and TNT, DNT, or RDX]
HBX	High Blast Explosives: [TNT + RDX + AlD2 Wax + Calcium Chloride]
HTA-3	[HMX + TNT + Al Mixture]
Minol-2	[TNT + Ammonium Nitrate + Aluminum]
Torpex	[RDX (41.6%), TNT (39.7%), Al (18.0%) Wax (0.7%)]
Quaternary Mixtures:	
DBX	[TNT (40%), RDX (21%), Ammonium Nitrate (21%), Al (18%)
Plastic Bonded Explosives (PBX)	
Basic Explosive	[RDX, HMX, HNS, or PETN + Polymeric Binder (Polyester, Polyurethane, Nylon, Polystyrene, Rubbers, Nitrocellulose, Teflon)]

PYROTECHNICS
Combination of: Oxidizer-Oxygen or Fluorine; Fuel - Powdered Aluminum or Magnesium; Binding Agents - Resins, Waxes, Plastics, Oils, Retardants; Waterproofing, Color Intensifier

Table B-3: Standard Compositions (%) for Single - or Double-Base Propellants that May be Treated at the OD Unit

	M-1 (a) Single Base	M-3 Single Base	M-14 Single Base	Double Base Common	Double Base Calibers 20, 30, 50	Double Base Mortar Repellant	Double Base Rocket Propellant M-Series	Double Base Rocket Propellant T-Series
Nitrocellulose	**84.2**	**79**	**89.1**	**77 – 81**	**74 – 84**	**52 – 57**	**55 – 58**	**58**
Nitroglycerin				**15 – 19**	**15 – 20**	**40 – 43**	**30 – 40**	**22 – 40**
Barium/Potassium Nitrate				**2.1**	**0.0 – 1.5**	**1.25 – 1.5**		
Potassium Perchlorate							**0.0 – 7.8**	
Graphite				**0.3**	**0.0 – 0.25**			
Dinitrotoluene	**9.9**	**15**	**7.9**					**0.0 – 2.5**
Trinitrotoluene								
Diphenylamine					**0.75**	**0.75**	**1.0 – 8.0**	**1.75 – 8.0**
Diethylphenylamine				**0.6**		**0.0 – 0.6**		
Potassium Sulfate							**0.0 – 1.5**	**0.0 – 1.5**
Tracetin		**5**	**2.0**					
Dibutylphthalate	**4.9**		**1.0**			**3.0**		
Cryolite	**1.0**	**1.0**						

Table B-4: General Chemical Composition of Military Items Treated at the OD Unit

Name	Chemical Formula	Use	Energetic Material Classification	Potential EPA Hazardous Codes
AMATOL	(ammonia nitrate/TNT)	main charge, armor piercing projectiles	Binary Mixtures	D001, D003
AMMONAL	(ammo nitrate/TNT/Al)	main charge, semi-armor piercing bombs	Ternary Mixtures	D001, D003
AMMONIUM NITRATE	NH_4NO_3	main charge, cratering charge	High Explosive	D003
BALLISTITE	(nitrocellulose /nitroglycerin/ diphenylamine/graphite)	propellant, rocket motors	Ternary Mixtures	D001, D003
BARATOL	(TNT/barium nitrate)	main charge	Binary Mixtures	D001, D003,D005
BLACK POWDER	(potassium nitrate/charcoal/sulfur)	propellant, mixtures	Propellant	D001, D003
COMP A	(RDX/wax)	boosters, fuzes	Binary Mixtures	D001, D003
COMP B	(RDX/TNT/wax)	main charge, projectiles, bombs, warheads	Binary Mixtures	D001, D003
COMP C-4	(RDX/oil/polyisobutylene/ diethylhexylsebacate)	demotion charge	Binary Mixtures	D001, D003
CYCLOTRIMETHYLENE TRINITRAMINE (RDX)	$C_3H_6N_6O_6$	mixture, detonators, demo charges	High Explosive	D001, D003
DBX	(ammo nitrate/RDX/Al)	main charge, depth bombs	Quaternary Mixture	D003
DIAZODIN1TROPHENOL (DDNP); (DINOL)	$HOC_6H_3(NO_2)_2N$	blasting caps, detonators	Primary Explosive	D003
DOUBLE BASE SMOKELESS POWDER	(guncotton/nitroglycerin)	propellant	Propellant	D001, D003

Name	Chemical Formula	Use	Energetic Material Classification	Potential EPA Hazardous Codes
EXPLOSIVE D (AMMONIUM PICRATE)	$NH_4C_6H_2N_3O_7$	bursting charge, armor piercing projectiles	High Explosive	D001, D003
GUNCOTTON	(nitrocellulose)	propellant	Propellant; High Explosive	D001, D003
HEXANITE #26	(TNT/HND/Al)	main charges	Ternary Mixtures	D001, D003
HEXITE (HEXANITRO-DIPHENYLAMINE)	$C_{12}H_5N_7O_{12}$	mixtures	High Explosive	D001, D003
HMX	$C_4H_8N_8O_8$	mixtures, boosters	High Explosive	D001, D003
H-6	(RDX/TNT/A1/CaCl)	main charges, naval bombs, depth charges	Binary Mixtures	D001, D003
HTPB (HYDROXY-TERMINATED POLYBUTADIENE)	HO-(C H) –OH	solid fuel propellant	Composite Propellant	D003
LDNR	$PbC_6H_2N_2O_6$	blasting caps	Primary Explosive	D001, D003, D008
LEAD AZIDE	N_6Pb	initiators	Primary Explosive	D001, D003, D008
LEAD STYPHNATE	$C_6H(NO_2)_3(O_2Pb)$	initiators, primers, detonators	Primary Explosive	D001, D003, D008
MANNITOL HEXANITRATE	$C_6H_8(NO_3)_6$	initiators, blasting caps	Secondary Explosive	D003
MERCURY FULMINATE	$HgC_2N_2O_2$	initiators, blasting caps	Primary Explosive	D001, D003, D009
MINOL	(TNT/ammo nitrate/Al)	main charges, bombs, projectiles	Binary Mixtures	D001, D003
NITROGLYCERIN	$C_3H_5(ONO_2)_3$	propellant compositions	Propellants; High Explosive	D001, D003

Name	Chemical Formula	Use	Energetic Material Classification	Potential EPA Hazardous Codes
PENTOLITE	(TNT/PETN)	bursting charges	Binary Mixtures	D001, D003
PETN	$C(CH_2ONO_2)_4$	mixtures, boosters, detonating cord	High Explosive	D001, D003
PICRATOL	(Explosive D/TNT)	main charges	Binary Mixtures	D001, D003
PICRIC ACID #26	$C_6H_2(NO_2)_3OH$	boosters, bombs	Primary Explosive	D001, D002, D003
PICRITE	$CH_4N_4O_2$	propellant	High Explosive	D001, D003
TETRYL	$(NO_2)_3C_6H_2N(NO_2)CH_3$	mixtures, boosters	High Explosive	D001, D003
TNPH	$C_6H_2(NO_2)_3C_2H_5$	mixtures, boosters, (sub for TNT)	High Explosive	D003
TORPEX	(RDX/TNT/Al)	main charges, mines, torpedoes	Ternary Mixtures	D003
TNT	$C_6H_2CH_3(NO_2)_3$	main charges, demo charges, boosters, mixtures	High Explosive	D001, D003
TRITONAL	(TNT/Al)	main charges, bombs	Binary Mixtures	D001, D003
TYPE 88 #26	(ammonium perchlorate/ferro-silicon/ wood meal/crude petroleum)	main charges	High Explosive	D001, D003
TYPE 91 #26	$C_6H_2OCH_3(NO)_3$	main charges	High Explosive	D003
TYPE 92 #26	(TNT/Al)	burster for Japanese bullets	High Explosive	D001, D003
TYPE 98	(trinitroanisol/hexanitro-diphenylamine)	primer, burster charge	High Explosive	D003
TNA	$C_6H_3N_5O_8$	boosters	High Explosive	D003

Name	**Chemical Formula**	**Use**	**Energetic Material Classification**	**Potential EPA Hazardous Codes**
OCTOL	(HMX/TNT)	main charge, shape charges	Binary Mixtures	D001, D003
METHYL PICRATE	$C_6H_2OCN_3(NO_2)_3$	main charge, bombs	High Explosive	D003
POTASSIUM PERCHLORATE	$KClO_4$	pyrotechnic, fireworks	Oxidizer	D001, D003
PHOTO FLASH POWDER	(barium nitrate/potassium perchlorate/Al)	ground burst simulators, photo bombs and projectiles	Pyrotechnics	D001, D003
THERMITE	Fe_2O_32Al	grenades, document destroyers	Pyrotechnics	D003
THERMATE	Fe_2O_3 Al + Ba nitrate	document destroyers	Pyrotechnics	D003, D005
HC SMOKE	ZnO_2C_6Cl Al	screening smoke	Pyrotechnics	D003
TITANIUM TETRACHLORIDE	$TiCl_4$	spotting charges	Pyrotechnics	D003
WHITE PHOSPHORUS	P_4	screening/marking smoke	Pyrotechnics	D001
PLASTICIZED WHITE PHOSPHORUS	P_4 + synthetic rubber	marking smoke	Pyrotechnics	D001

B.2.2 CLASSIFICATION BY MILITARY MUNITION TYPE AND MUNITIONS FAMILIES

B 2.2.1 Classification by Military Munitions Type

A complete military munitions item includes several components. Typical components may include a projectile, a propellant charge, and a primer that ignites the propellant. Other components such as a casing, fuzes, and bursting charge are frequently included. The munitions filler of these components, with few exceptions, contains one single energetic compound or a mixture of energetic compounds as well as non-energetic compounds. The energetic compounds consist of propellants, explosives, and pyrotechnics such as those described above. The non-energetic compounds typically serve as binders and stabilizers. Examples of these additives are ethyl cellulose, graphite, carbon black, calcium carbonate, cellulose acetate, and charcoal.

Munitions are typically classified based on five factors: type, use, filler, storage, and compatibility. Applicable munitions types are listed below:

- Hand Grenades – Hand grenades are small explosive- or chemical-type munitions that are designed to be thrown at short range. All grenades have three main parts: (1) a body, (2) a fuze with a pull ring and safety clip assembly, and (3) a filler. Grenades have metal, plastic, cardboard, or rubber bodies and may contain explosives, white phosphorus, or illumination flares, depending on their intended use.

- Mortars – Mortars range from approximately 1 to 11 ins. in diameter and can be filled with explosives, white phosphorus, or illumination flares. The mortar fuze is located in either the nose or the base.

- Projectiles/Artillery Rounds – Projectiles range from approximately 1 to 16 in. in diameter and from 2 in. to 4 ft in length. Like mortars, projectile fuzes are located in either the nose or the base.

- Rockets – Rockets can range from 1½ to more than 15 inches in diameter, and they can vary from 1 foot to over 9 feet in length. Rockets are propellant-type motors fitted with rocket heads containing high-explosive or chemical agents. The residual propellant may burn violently if subjected to sharp impact, heat, flame, or sparks.

- Missiles – Missiles consist of a warhead, a motor section, and a fuze and they are guided to their target by any number of systems, including radar and video. Missiles rely exclusively on proximity fuzes.

- Bombs – Bombs range from 1 to 3,000 lbs in weight and from 3 to 10 ft in length. Bombs consist of a metal container (the bomb body), a fuze, and a stabilizing device. The bomb holds the explosive or chemical filler.

- Demolition materials. Demolition materials consist of explosives and explosive devices designed for use in demolition and in connection with blasting for military construction.

B.2.2.2 Classification by Munitions Families

Munitions Items Disposition and Action System (MIDAS). MIDAS is a database developed and maintained by the Defense Ammunition Center (DAC) that provides chemical constituent information for munitions. Information available from MIDAS provides item-specific specifications that can be used to characterize items treated in the OD Unit. The MIDAS computerized database includes complete composition information (energetic and non-reactive components) for munitions. The MIDAS database provides information for individual munitions items but does not easily facilitate obtaining statistical summaries (e.g., average values) of the chemical compositions by munitions families.

Munitions/explosives can be grouped into MIDAS families. Only applicable families are listed below:

- High Explosive (HE) Components/Devices: HE detonators, boosters, or bursting charges that are not part of an ammunition item. Typically HE components/devices have a hazard class/division (HC/D) of 1.1 or 1.2. MIDAS Family: HA

- HE Bombs: HE-filled bombs. These items are typically air dropped, and the explosives within the HE bombs are usually tritonal, 2,4,6-trinitrotoluene (TNT), hexahydro-1,3,5-trinitro-8-triazine (HBX), or H-6 HE. MIDAS Family: HB

- HE Cartridges: Complete artillery or Navy gun ammunition with an HE projectile and propellant charge. Examples are 90MM, 3 inch/50 cal., 81MM mortar, 30MM fuzed or unfuzed cartridges, and fuzed 20MM cartridges. MIDAS Family: HC.

- Bulk HE: Bulk high explosives such as TNT, composition A, composition B, composition C-4, PBX, and RDX. MIDAS Family: HE.

- HE Grenades; Hand or rifle grenades that contain HE fillers. MIDAS Family: HG

- HE Improved Conventional Munitions/Cluster Bomb Units (ICM/CBU) and Sub Munitions: Variety of improved conventional munitions types containing sub munitions. Items may be air-dropped cluster bomb units, projectiles, or warheads containing sub munitions such as anti-tank mines, anti-personnel/material grenades, or bomb loaded units (BLUs), and Multiple Launch Rocket System (MLRS) rockets. Missiles: Complete rounds of missile ammunition configured with an explosive or practice warhead, rocket motor, and guidance system. MIDAS Family: HI

- HE Projectiles and Warheads: All projectiles, warheads, mortars or similar items that do not have a cartridge case, propellant, or rocket motor and that contain HE filler. MIDAS Family: HP

- HE Rockets: Complete rounds of rocket ammunition containing warhead, fuze, and rocket motor. MIDAS Family: HR

- HE Torpedoes: Underwater torpedoes that contain HE. MIDAS Family: HT

- Demolition Material: Demolition charges such as TNT, C-4, flexible sheet explosives, cratering charges, shaped charges, and detonating cord. MIDAS Family: HXM

- HE Land Mines: HE-filled land mines emplaced by hand or disbursing devices. This family also includes scatterable mines when they are packed separately from the disbursing unit (e.g., a dispenser, projectile body, or other system). MIDAS Family: HZT

- Large Rocket Motor: Solid propellant Inter-Continental Ballistic Missiles (ICBM), Submarine Launch Ballistic Missiles (SLBM), space launch booster motors or tactical motors greater than 20 inches in diameter. MIDAS Family: HR

- Bulk Propellants and Black Powder: Propellants and black powder in bulk form that are not assembled or configured to an ammunition item. Material is normally packaged in drums or metal-lined wooden or fiber containers. MIDAS Family: PB

- Propellant Charges and Increments: Packaged propelling charges and propellant increments. MIDAS Family: PCB

- Propellant Munitions/Components: Rocket motors, cartridge-actuated devices (CADs), propellant actuated devices (PADs), blank ammunition of more than 20MM, and expelling charges. This family also typically includes HC/D 1.3 components or munitions that do not fit into any other family. MIDAS Family: PD

- Small Caliber Ammunition: Small caliber ammunition cartridges up to 20MM with energetic filler(s). Excluded are fuzed HE or high-explosive incendiary (HEI) loaded 20MM cartridges that are assigned to family HC, and DUMMY small caliber ammunition. MIDAS Family: SAL

- Fuzes: All types of fuzes related to munitions. Examples include artillery ammunition/Navy gun fuzes, bomb fuzes, rocket fuzes, or grenade fuzes packaged separately from the munitions. MIDAS Family: SF

B.2.2.3 Wastes Treated at the OD Unit Classified by Military Munitions Type and Munitions Families

Table B-5 contains a listing of typical military munitions treated at the OD Unit classified by munitions families. The table includes NEW of the WMM and identifies typical donor explosives used in the OD Unit treatment process. Table B-6 provides composition information on a typical treatment event of rocket motors and donor charge information.

Table B-5 Typical Munitions, Classified by MIDAS Family, Used or Treated at OD Unit.

Material Classification	MIDAS Family	MIDAS Family Description	Federal Supply Class Description	Quantity	NEW (Pounds) - 2006
WMM	FP	Pyrotechnics/Illumination/Non-Fragments/Tracers	1370 - Pyrotechnics	308	41.02
WMM	HB	HE Bombs	1325 - Bombs and Components	9	5174.01
WMM	HC	HE Cartridges	1305 - Ammunition, through 30mm Includes Components	369	8.44
WMM	HM	HE Guided Missiles	1337 - Guided Missile and Space Vehicle Explosive Propulsion Units, Solid Fuel	106	641.85
WMM	HR	HE Rockets	1340 - Rockets, Rocket Ammunition, and Rocket Components	148	6807.28
WMM	HT	HE Torpedoes	1356 - Torpedoes and Components, Explosive Includes Warheads; Boosters; Detonators	576	13865.80
WMM	HZT	HE Land Mines	1345 - Land Mines	27	40.50
WMM	PD	Propellant Munitions/Components	1377 - Cartridge and Propellant Actuated Devices	2984	55.31
WMM	SF	Fuzes	1390 - Fuzes and Primers	17	0.69
Donor	HXD	Demolition Materials	1375 - Demolition Materials	5362	4373.05
			Totals	**9906**	**31007.94**

Table B-6 Composition of Specific Propellants Thermally Treated at the OD Unit (also included is the RDX detonator)

Component	Constituent*	Mass or Concentration Weight %	WMM/Donor
Rocket motor (5.0 inch)*	Nitrocellulose Nitroglycerin Diphenylamine Potassium Sulfate	11.8 kg 8.2 kg 0.6 kg 0.3 kg	WMM
Rocket motor (2.7 inch)*	Nitrocellulose Nitroglycerin Diphenylamine Potassium Sulfate	2.0 kg 1.5 kg 0.3 kg 50 grams	WMM
Propellant detonator (not always present)	Barium or Potassium Nitrate Lead Styphnate or DDNP Carbon Calcium Silicide	0.45 – 0.60 gram 0.20 – 0.40 gram 0.01 – 0.10 gram 0.10 gram	WMM
C-4 Detonating Charge (a,b) (size varies)	RDX Wax (polyisobutylenetethlhexyl-sebacate)		Donor Charge
Initial detonator cap (a) (for C-4 charge used in detonation)	Lead Styphnate Lead Azide Trinitrophenylmethylnitramine Mercury Fulminate Diazodinitrophenol (DDNP) Tetracene	0.55 – 2.5 gram 0.05 – 0.26 gram 0.1 – 0.2 gram 0.18 – 0.24 gram 0.12 – 0.28 gram 0.18 – 0.24 gram	Donor Charge
Explosive priming cap (b) (for C-4 charge used in detonation)	Potassium Chloride Antimony Sulfide or Lead Thiocyanate Lead Azide, PETN, or DDNP	0.05 – 0.05 gram	Donor Charge

(a) Primer components (oxidant/fuel) are indicated in Table B-2.
(b) Inerts include diphenylamine, potassium sulfate, and wax, and were not considered.
* May contain up to 2.5% Dinitrotoluene, but does not meet listing criteria and is present only as an appendix VIII hazardous constituent.
NOTE: The C-4 charge and its primary charges used for detonation are not wastes, but are serviceable ordnance used to initiate the reaction.

B.2.3 DESCRIPTION OF WASTE MILITARY MUNITIONS AND POINT OF GENERATION

In 1997, the Military Munitions Rule (MMR), an amendment to the Resource Conservation and Recovery Act (RCRA), was finalized, establishing regulations to identify when conventional and chemical military munitions become hazardous waste subject to RCRA and providing for the safe handling, management, storage, and disposal of WMM. On 1 July 1998 DoD issued its Regulation to the EPA's Munitions Rule Implementation Plan (MRIP). Its purpose is to provide direction and establish an overarching policy for the management of WMM among DoD components. To this end, the policy incorporates requirements of the MMR into well-established DoD business practices to keep intact its proven and uniform munitions management systems. A Designated Disposition Authority (DDA) was established and an evaluation process developed. The DDA evaluation process assigns the authority to designate military munitions as waste to the DDA, thereby introducing only two ways a military munitions becomes a WMM:

- Designation by the DDA or
- By rule (i.e., is a waste by definition under the MR).

A formal process is in place that installations follow to determine disposition of military munitions and is outlined in the DoD Policy (1998). The DDA provides instructions to the requesting installation that will include the date the military munitions will be designated as WMM:

- For munitions that automatically became a waste (e.g., buried unused munitions), the date of the action that made them waste will be used.
- For munitions that become a waste upon removal from storage for treatment or disposal, the disposition instructions will state that the military munitions becomes WMM on the date it is removed from storage for treatment or disposal.
- For damaged or deteriorated munitions, the date the DDA determined the item cannot be put into serviceable condition and cannot be recycled or used for other purposes.
- For all other military munitions, the date the DDA determined them to be WMM.

Based on the MR and MRIP, the point of generation of WMM occurs when the military munitions are removed from storage to be transported to the OD Unit for disposal.

All waste that will be treated at the OD Unit will be transported to the treatment area in the original product container or other appropriate packaging. Propellants are contained within chambers that are generally cylindrical in shape and constructed of aluminum and steel. A primary consideration in the development of propellant, explosive, or pyrotechnic systems is long-term storage stability, which requires compatibility of container and the energetic material.

Receipt of the waste in the product container, combined with the fact that commonly used military propellants are compatible with one another, ensures that incompatible wastes are not mixed. The reactive wastes to be treated at the OD Unit are solid in nature and contain no free liquid.

B.2.4 WASTE CHARACTERISTICS

This section addresses the characteristics of the waste that must be known for proper management of the waste. This information is derived from published sources. Analysis to support the published data is not required because of the limited deviation allowed within the product specifications that manufacturers of military propellants must follow. The waste that is treated at the OD Unit has essentially the same composition as serviceable propellants, but is being disposed of because of shelf-life exceedence, deterioration during storage, or failure to complete exhaust during testing of motors.

B 2.4.1 Use of Acceptable Knowledge to Designate Waste Military Munitions

Characterization of hazardous waste is typically accomplished using acceptable knowledge (AK), related technical information, and/or other written documentation (e.g., an excess-explosives worksheet, LDR paperwork, Material Safety Data Sheets [MSDS]), and may be confirmed using the MIDAS or other appropriate databases. Knowledge of process (KOP) or process knowledge (PK) is a subset of AK, which can be used to meet waste analysis requirements. KOP is described in 20.4.1 NMAC §264.13(a)(2) as data developed under 20.4.1 NMAC, Subpart II, Part 261, and existing published or documented data on the hazardous waste or on hazardous waste generated from similar processes. Hazardous waste components and characteristics are known based on existing or published data. Because the munitions filler of the wastes treated are generated during known and documented formulation processes or are of the original manufacturer's chemical composition, complete with MSDSs or equivalent technical information (e.g., information from the MIDAS database), use of KOP fulfills 20.4.1 NMAC §264.13(a)(2) requirements for these wastes.

Detailed chemical and physical analyses have been performed by the DoD for all military ordnance material. These analyses have been compiled into ordnance material specifications and "Technical Supply Bulletins." Due to the vast amount of knowledge on the composition of ordnance materials that has been assembled for each particular ordnance material, and the dangers involved in deactivating a bomb or explosive, samples of the waste ordnance materials are not routinely obtained and chemically analyzed. Instead, a well-defined knowledge of the constituents used in making the ordnance materials has been compiled. This understanding of the waste constituents is presented in lieu of extremely dangerous pre-detonation sampling and analysis. A chemical analysis would not yield additional information and could pose a risk to sampling and analysis personnel

B 2.4.2 Waste Constituents, Physical and Chemical Properties.

The types of military explosives have remained relatively unchanged since 1945; what have changed are the combinations of the explosives to meet current or emerging applications. Table B-2 contains the listing of general chemical compositions of military energetic materials. This listing was compiled from TM 9-1300-214 *Military Explosives* (US Army, 1984), which provides detailed information on the physical and chemical properties of the military energetic materials. These chemicals are present in waste military munitions/explosives typically treated at the OD Unit. To adequately describe the waste, the following information must be known:

- Presence of free liquids
- Basis for hazard designation
- Waste composition
- Ignition or explosion temperature
- Heat of combustion and/or detonation
- Sensitivity to shock or electrical ignition
- Storage stability (tendency to decompose during storage)
- Compatibility with container or other energetic material
- Solubility characteristics

It must be noted that the unique nature of these materials presents difficulties in development of these data in all instances. In some instances, the parameters are not readily measured because of the instability of the material. For many energetic materials, the particle size, degree of subdivision, compressed density of the material in the ordnance, age, and atmospheric conditions affect the value derived for these parameters. The same material may provide different values for certain parameters for no apparent reason. Thus, the published data presented in this section represent the accepted values for those parameters derived from various tests.

Table B-4 identifies all explosive compounds and other substances that will be used or treated at the OD Unit. As shown in Tables B-2, B-3, and B-4, several explosive materials are used in a variety of combinations to manufacture explosives and propellant devices. All of these explosives are solid materials that do not contain liquids.

The composition of specific propellant devices that have been treated at the OD Unit, and that are expected to require continued treatment, is provided in Tables B-4. Additives to the double-base propellant compositions are also identified in Table B-4. Single-base or composite propellants are not thermally treated at the OD Unit. In addition to the specific formulations for the propellants, Table B-4 identifies the components present in primer compositions or the initial detonating agents associated with these energetic items. The primer is not always treated in conjunction with the propellant. Table B-7 presents data on the physical and chemical characteristics of the constituent used in these propellants. These characteristics describe the characteristics of an explosive chemical. Data on the donor explosive train (that is serviceable ordnance, and not wastes) is also presented in these tables.

Single-base propellants contain nitrocellulose (with 12.5 – 13% N) as the primary constituent. In addition to nitrocellulose, single-base propellants contain organic nitro compounds, stabilizers, and metal salts. The organic nitro compounds commonly employed in single-base systems include trinitrotoluene and dinitrotoluene. Organic nitro compounds are utilized to disperse the nitrocellulose as colloidal particles. Stabilizers are required in the composition due to the tendency of nitrocellulose to decompose during storage, particularly as moisture is absorbed. Decomposition of nitrocellulose is an exothermic reaction that is indicated initially by an acid odor or condition that progresses to emission of red fumes and spontaneous ignition as the propellant becomes unstable. Due to this condition, nitrocellulose-based propellants are stored in bulk, are vigorously monitored for pH changes, and are compounded with stabilizers used to retard decay. Typical stabilizers used to retard this condition include diphenylamine, nitro diphenylamine, diethyl diphenylurea, and petroleum jelly (cordite). As decomposition proceeds, nitrophenylamines, nitroureas, and nitro anilines are formed. This variety of the analogs will be present in waste single-based propellants. However, as the original concentration of the stabilizer seldom exceeds 1.0%, the concentration of those decomposition products will be in the parts per thousand range.

In addition to nitrocellulose fuel, nitro-based dispersion agent, and stabilizer, certain propellants incorporate small quantities of metal compounds and elements. These compounds include potassium sulfate, tin, and graphite that are not characteristically hazardous.

Double-base propellant formulations include both nitrocellulose and nitroglycerin with limited quantities of stabilizers and additives. Nitroglycerin serves as both the gelatinizing agent and a fuel in these compositions. In addition to the nitroglycerin, small quantities of dibutylphthalate, dibutylphthalate, or triacetin are compounded to enhance colloidal suspension of the nitrocellulose. The stabilizing agents for double-base compositions do not differ from the stabilizers common to single-base systems. However, the metallic additives for double-base systems may include barium or potassium nitrate, calcium sulfate, calcium carbonate, or lead stearate in addition to the metallics used in single-base compositions.

The relative concentration of these components in propellants varies depending upon the intended end use. In general, nitrocellulose is the predominant constituent and is present in concentrations of 50 to 70%. Nitroglycerin is the second largest constituent in the propellant composition. These two compounds constitute greater than 95% of the standard military double-base formulations. The addition of inerts and stabilizers provides the balance to greater than 99% of the formulation, with less than 1.0% of the formulation composed of various nitrates or lead stearate.

Composite propellants consist of ammonium nitrate, an inorganic oxidant such as potassium nitrate, and an organic binder. These propellants are heterogeneous solids that may be press formed to the desired shape. Composite formulations are not handled at the 20,000-Pound OD Unit.

Although the term "colloidal suspension" has been applied to propellants, these compositions are completely solid without free liquids. Physically, propellant compositions consist of powders that are incorporated into solid or warlike binders and pressed into strips, cords, and other linear shapes. Although dry nitrocellulose is unstable, incorporation of the binders renders the mixture relatively stable. Propellants, including double-base formulations, are not sensitive to shock and cannot be ignited by ordinary shock or frictional effects. Propellants are sensitive to electric spark only if the material has been finely divided and is present as dust. Thus, propellants present a fire hazard to the degree that a sufficiently strong heat source is available to ignite the composition. Unless finely divided, ignition usually requires either open flame or detonation of a high explosive placed adjacent to the propellant material.

The composition of commonly utilized single-base and double-base propellants is provided in Table B-3. Specific propellants that have been, and will be thermally treated at the 20,000-Pound OD Unit are discussed in a future section. Nitroglycerin has been discussed previously in conjunction with propellants. In pure form, nitroglycerin is a colorless liquid with a molecular weight of 227 that fuses to the solid state at approximately 13°C. The specific gravity of nitroglycerin is 1.5962, and the liquid viscosity is 36 Centipoises at 20°C. Nitroglycerin decomposes with gas evolution at temperatures of 145°C. The published explosion temperature for nitroglycerin is 222°C, with evolution of approximately 368 Kcal/mol of heat and 715 mL of gas per gram of charge. Nitroglycerin is extremely sensitive to shock, being detonated by a 2 kg weight dropped from a height of 16 cm in the Bureau of Mines reactivity tests. For this reason, nitroglycerin is compounded with other energetics or inerts to facilitate handling. In pure form, it may be absorbed through the skin into the circulatory system and causes increased pulse rate and blood pressure.

Nitrocellulose is a mixture of esters formed by the nitration of cellulose with a mixture of sulfuric and nitric acids. As used in military formulations, nitrocellulose contains a minimum of 12.2% nitrogen. Although nitrocellulose is not truly soluble in any solvent, certain alcohols, ketones, and aromatic nitro compounds will disperse nitrocellulose as a colloidal suspension. Water has no solvent action upon nitrocellulose, but is absorbed to between 2 and 3%, with the resultant deterioration to the unstable form. Cellulose nitrate has a specific gravity of 1.65. The explosive temperature for cellulose nitrate is approximately 230°C with evolution of 661 Kcal/mol of heat upon combustion or 272 Kcal/mol of heat upon detonation that is accompanied by evolution of approximately 700 mL of gas per gram charge. Nitrocellulose is extremely sensitive to spark ignition if handled in dry form. The shock sensitivity of nitrocellulose is greater than that of nitroglycerin and is listed as detonation by a 2 kg weight dropped from a height of 9 cm in the Bureau of Mines test.

Three waste characteristics relevant to proper handling and treatment are not addressed in these tables: (1) the presence of free liquids, (2) compatibility of these wastes with the container, and (3) compatibility with other energetic materials. As previously indicated, the energetic compositions used for these military applications contain no free liquid and consist of finely divided powders or wax-like materials compressed to a variety of shapes. These wastes are managed in the original product container, and the materials of the casing were specifically selected at the time of design to be compatible with the energetic material to ensure longevity during storage. Thus, further consideration of these compatibility concerns is not warranted and is prohibitive because of the dangers inherent in any attempt to re-package these materials. Furthermore, these wastes are not re-packaged or stored at the unit. The energetic formulations that are thermally treated at the OD Unit are mutually compatible as demonstrated by the fact that these materials are often blended together in a single formulation or conjointly packaged in a single device. In addition to their mutual compatibility, the energetic materials are not removed for blending purposes and, therefore, mixing of incompatible wastes does not occur. Although some limited data concerning reactivity toward water and other reagents are provided in this section, the wastes treated at the OD Unit are not mixed with any reagents incidentally or to effect treatment. Such data are provided solely for informational purposes.

B 2.4.3 EPA Waste Codes

Energetic materials are chemical compounds or mixtures of chemical compounds composed primarily of carbon, hydrogen, and nitrogen, and in all cases will be reactive. Various external stimuli, such as a blow, shock, electrostatic, or heat, can cause the release of energy contained in the energetic materials. The sensitivity of the energetic waste to external stimuli is the explosive characteristic of reactivity and is the basis for assigning the EPA Hazardous Waste Code D003. For LDR requirements and to aid in identification of constituents that may reside in the environment, underlying characteristic codes are identified and listed in Table B-4.

B.2.4.4 Treatment Effectiveness

Based on BangBox and full scale field testing, the effectiveness of OD treatment is dependent on a number of factors: type of method, type of energetic, and soil interaction (EPA, 2002). In general, OD treatment exceeds 99 percent destruction and removal efficiency (DRE) for energetics. This DRE is due in part to a secondary combustion in the fireball resulting from the detonation as well as ejected material. The detonation of trinitrotoluene (TNT) results in a DRE of 99.9996 percent with the residue consisting of 2,4-dinitrotoluene and soot. Approximately 2 percent of the OD residue was recovered within 225 m of the detonation site. Energetic materials with a higher oxygen content resulted in higher DREs. That is, molecules that contained most of the oxygen required for complete combustion have higher conversion efficiencies. In general, propellants have higher oxygen balances and resulting conversion efficiencies than explosives. The presence of soil interferes with the flow of ambient air into the fireball region of the detonation for OD.

Open detonation results in 97 percent of the carbon in the explosives being converted to carbon dioxide. Comparison between BangBox and full-scale field test data indicate that the conversion of TNT carbon to carbon dioxide is more efficient under the controlled conditions of the BangBox than in large-scale detonations in the field. Specifically, more volatile organic compounds (VOCs) are generated under field conditions than in BangBox Testing. However, semi volatile organic compound (SVOC) generation appears to be very similar under either BangBox or full-scale testing conditions.

In general, OD will render energetic materials nonreactive. (The Bureau of Mines reactivity test classifies energetic concentrations of 30,000 mg/kg or less as not reactive) and results in both solid and gaseous by-products.

B.2.4.5 Fate and Transport Parameters.

Although the treatment efficiency by OD is high (>99%), the detonation of energetic materials produces a wide range of air and surface pollutants, including carbon monoxide, nitrogen oxides, VOCs, acid gases, and particulate matter. These emissions, including undecomposed or partially decomposed energetic materials, may lead to atmospheric pollution or groundwater contamination. Table B-8 and Table B-9 identify propellant compounds and common nitrogen-based explosives and their breakdown products, respectively. The speciation and amounts of these emitted pollutants depend on the identity and amount of energetic material detonated, the detonation order, the detonation mode (air burst, surface detonation, buried detonation), and the munitions type (shell, mine, detonation charge, etc.). Solid by-products include casings from the waste and possibly trace concentrations of incompletely oxidized reactive material. Reaction by-products that are solid will be retained in the depression created by the explosive force (except for ejected components), but the gaseous reaction by-products vent to the atmosphere. These solid by-products will be gathered and visually inspected by an EOD expert, who will determine if re-detonation is necessary. The Permittee shall characterize the debris collected after each detonation in accordance with 40 CFR §261, Subpart C. This will be accomplished by sampling and analysis, MSDS review, or generator knowledge. Based on this characterization, the Permittee shall manage the fragments collected in accordance with 40 CFR §261 as applicable to the waste.

The term “fate and transport” is, in general, referred to as the outcome of a contaminant in the environment as a result of its potential to be transported, transformed (physically, chemically, or biologically), or accumulated in one or more media. The environmental fate and transport of a contaminant is controlled by the compound’s physical and chemical properties and the nature of the media through which the compound is migrating. Specific physicochemical parameters of interest include: 1) molecular weight (g/mole), 2) octanol-water partition coefficient (Kow), 3) water solubility, 4) vapor pressure, 5) Henry’s law constant, and 6) molecular diffusivity in air and water. ERDC (2005) completed research to identify available information and to calculate missing information. This information is being developed for use in various military munitions modules for determining fate and transport.

Table B-10 contains chemical and physical properties and partitioning factors commonly used to describe mobility of chemicals through the air, water, and soil. Information contained in this table was derived from various research documents focused on the fate and transport of energetic materials (ERDC/CERL, 2002; 2005). The chemical and physical properties are important for understanding how a chemical moves in the environment. The molecular weight of a compound is measured in g/mole. Generally, the higher the molecular weight, the less soluble in water. Molecular weight also affects the density of a compound. Water solubility is the measurement of the maximum concentration of a chemical that will dissolve in pure water at a specific temperature, measured in mg/L. Water solubility plays a large role in movement and distribution of a chemical through soil and groundwater. The water solubility temperature is the temperature corresponding to the water solubility value. Water solubility is usually defined at 25 ºC. The vapor pressure of a chemical is the pressure exerted by its vapor, at a given temperature, in equilibrium with the pure compound (liquid or solid). Vapor pressure represents the tendency of a compound to evaporate. High vapor pressures (mm Hg) mean that the compound is more likely to volatilize out of solution. The vapor pressure temperature is the temperature corresponding to the vapor pressure value.

Partitioning factors help predict the behavior of a chemical in the environment. The Henry’s Law constant is a property of a chemical that expresses its partition between the air and water phases. It helps to predict the behavior of an organic compound in the environment and in remediation procedures such as air stripping processes. These values also describe the movement of a chemical from water to air and vice versa. High values mean that the chemical will move more toward the gas phase whereas low values indicate stronger partitioning into the aqueous phase (atm m^3/mole). The octanol-water partitioning coefficient (Kow) is a ratio of the equilibrium concentration of a dissolved substance in a system of two immiscible liquids–water and octanol. After a chemical has been mixed in an octanol and water solution, the system is allowed to reach equilibrium. The two phases will partition and a ratio of the concentration of the chemicals in the octanol and water phases is taken. This ratio provides an indication of chemical accumulation in water. More polar compounds will tend to partition into the aqueous phase, thus have a low Kow. This is also a measurement of the hydrophobicity of an organic. The more hydrophobic, the more the contaminant will adsorb to soil or organics or biomass and have a low solubility (mL/mL). The organic carbon partition coefficient (Koc) describes the partitioning of a chemical between the aqueous phase and organic material, such as that present in soil. The Koc is used as a measure of the tendency for organics to be adsorbed by soil. It is largely independent of soil properties (mL/g).

Energetic compounds in propellant mixtures and explosives exhibit a range of aqueous solubilities (Table B-10). Oxidizers generally are nitramine compounds or inorganic salts that have high aqueous solubilities measured in the parts-per-thousand range (grams per liter, g/L). Stabilizers are aliphatic nitramines that have low to moderate aqueous solubility, in the parts-per-million range (milligrams per liter, mg/L). Burning-rate modifiers cited here are lead-substituted aromatic and aliphatic compounds which are sparingly soluble. Plasticizer and binder compositions are diverse, including the phthalates (aromatic carboxylic acids), and alcohols that contain nitrogen (EGDN, nitroglycerin). Most plasticizers are moderately water-soluble.

Sorption processes involve the association of a solute with a solid at the solid-solution interface. The specific reaction and the rate at which it occurs depend on the nature of the molecule in solution (hydrophobic or hydrophilic; ionic or neutral) and the nature of the surface (organic, mineral, oxide).

Vapor pressure and the Henry’s law constant are two parameters to quantify the volatility of a compound. The pressure of a gas in equilibrium with pure liquid at a known temperature is its vapor pressure. The Henry’s law constant for a compound is the ratio of dissolved gas concentration (solution) divided by gas partial pressure (vapor). Greater volatility from dry surfaces is suggested by larger vapor pressure values. More extensive partitioning from water or moist soil to gas is indicated by greater Henry’s law constant values. Compounds that are volatile have a greater likelihood of photochemical reactions, which will be discussed in the following section. Literature values for vapor pressure and Henry’s law constant are listed in Table B-10.

Volatilization from dry surfaces is an important transport pathway for the following compounds: nitro guanidine, EGDN, and nitroglycerin. Volatility is indicated by large vapor pressures generally greater than 10^{-3} torr (equal to 10^{-3} mm Hg at 0 ºC, or 0.13328 Pascals (SI), or 1.3168 x 10^{-6} atmospheres). Significant partitioning to the atmosphere is indicated by larger Henry’s law constants (greater than 10^{-6} atm•m^2/mol). Partitioning from water or moist soil surfaces to air is an important transport pathway for EGDN, and nitroglycerin.

Photochemical transformations may be one of the most important influences on propellant fate in surface and ground water environments. Many energetic compounds are photosensitive, with absorption maxima in the UV-visible range (240 to 290 nm). Products of photochemical transformations of energetic compounds in aqueous solution can be pink or black in color. The US Army has been developing data on the environmental fate and transport of energetic materials (Brannon and Pennington, 2002; Mirecki et.al. 2006)

Microbe-mediated transformation reactions can reduce some energetic compound concentrations in soil and subsurface environments. Microbes facilitate electron transfer reactions between carbon-rich electron donors and electron acceptors such as oxygen, nitrate, sulfate, or ferric iron to obtain energy. Some energetic compounds can serve as carbon-rich substrates, or are cometabolized with other carbon molecules in the environment. Microbe-mediated transformation reactions can occur in virtually all environments, though the specific reaction mechanism and microbial population affecting the reactions will vary. Extensive research is currently on-going to better understand the various transformation pathways of military munitions in the environment (Mirecki et.al. 2006).

Table B-7 Characteristics of Constituents in Propellants or Explosives Thermally Treated at the OD Unit

	Explosion Temperature (°C)	Heat of Detonation	Heat of Combustion (Kcal/mol)	Gas Volume on Detonating	Impact Sensitivity (cm)	Spark Sensitivity	Storage Stability	Solubility (mg/L)
Nitrocellulose	**230**	**272**	**661**	**700**	**9**	**High**	**Hydrolysis**	**Insoluble Hygroscopic (3%)**
Nitroglycerin	**222**	**337**	**368**	**715**	**16**	**Moderate**	**Stable**	**1600**
RDX	**260**	**285**	**507**	**908**	**32**	**Moderate**	**Stable**	**50**
PETN	**215**	**439**	**600**	**790**	**17**	**Sensitive**	**Stable**	**Unknown**
Lead Azide	**340**	**106**	**183**	**0.3308**	**10**	**Sensitive**	**Stable**	**500**
Lead Styphnate	**282**	**15213**	**585**	**368**	**17**	**Sensitive**	**Stable**	**1000**
Tetryl	**257**	**324**	**839**	**760**	**26**	**Sensitive**	**Stable**	**75**
Mercury Fulminate	**210**	**122**	**267**	**243**	**5**	**Sensitive**	**Stable**	**700**
DDNP	**195**	**172**	**681**	**865**	**10**	**Sensitive**	**Stable**	**Insoluble**
Barium Nitrate	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**Stable**	**8.7×10^4**
Potassium Nitrate	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**Stable**	**1.3×10^4**
Potassium Chlorate	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**Stable**	**7.1×10^4**
Antimony Sulfide	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**Stable**	**1.7**
Lead Thiocyanate	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**Stable**	**500**

Table B- 8: Propellant compounds and their transformation products. (Propellant compounds in bold text, transformation products in normal text) (ERDC/CERL, 2006).

Compound	CAS Registry Number	Acronym
Oxidizers and their Transformation Products		
Nitroguanidine	556-88-7	NQ
Cyanamide	420-04-2	
Guanidine (as hydrochloride)	50-01-1	
Melamine	108-78-1	
n-Nitrosoguanidine	674-81-7	
Ammonium perchlorate	7790-98-9	
Potassium chlorate	3811-04-9	
Potassium perchlorate	7778-74-7	
Stabilizers and their Transformation Products		
Diphenylamine	122-39-4	DPA
N -Nitrosodiphenylamine	86-30-6	NNODPA
2,4-Dinitrodiphenylamine	961-68-2	2,4DNDPA
2-Nitrodiphenylamine	119-75-5	2NDPA
4-Nitrodiphenylamine	836-30-6	4NDPA
Methyl centralite, 1,3-dimethyl-1,3-diphenylurea	611-92-7	
Ethyl centralite 1,3-diethyl-1,3-diphenylurea	85-98-3	
Burning-Rate Modifiers		
Lead salicylate	15748-73-9	
Lead resorcylate	20936-32-7	
Lead stearate	7428-48-0	
Plasticizers		
Dimethyl phthalate	131-11-3	DMP
Diethyl phthalate	84-66-2	DEP
Di-n-butyl phthalate	84-74-2	DNBP
Butylbenzyl phthalate	85-68-7	BBP
Bis(2-ethylhexyl)phthalate	117-81-7	DEHP
Energetic Plasticizers and Binders		
2,4-Dinitrotoluene	121-14-2	2,4DNT
Diethylene glycol dinitrate	693-21-0	DEGDN
Ethylene glycol dinitrate	628-96-6	EGDN
Nitrocellulose	9004-70-0	NC
Nitroglycerin	55-63-0	NG
Note: Shaded cells indicated “no data		.”

Table B- 9: Common Nitrogen-Based Explosives, Co-Contaminants, and Breakdown Products (US Army, 1984).

Compound	Description	Abbreviation	CAS Number
Octahydro-1, 3, 5, 7-tetranitro-1,3,5,7-tetrazocine	Nitramine explosive; also RDX co contaminant	HMX	2691-41-0
Hexahydro-1,3,5-trinitro-1,3,5- triazine	Nitramine explosive; also HMX co contaminant	RDX	121-82-4
1,3,5-Trinitrobenzene	TNT co-contaminant and breakdown product	1,3,5-TNB	99-35-4
1,3-Dinitrobenzene	DNT breakdown product and TNT co contaminant	1,3-DNB	99-65-0
Methyl-2,4,6- trinitrophenylnitramine	Nitramine explosive	Tetryl	479-45-8
Nitrobenzene	DNT co-contaminant	NB	98-95-3
2,4,6-Trinitrotoluene	Nitroaromatic explosive	2,4,6-TNT	118-96-7
4-Amino-2,6-dinitrotoluene	TNT breakdown product	4-Am-DNT	1946-51-0
2-Amino-4,6-dinitrotoluene	TNT breakdown product	2-Am-DNT	355-72-78-2
2,4-Dinitrotoluene	Nitroaromatic explosive/ propellant; also TNT co-contaminant	2,4-DNT	121-14-2
2,6-Dinitrotoluene	Nitroaromatic explosive/ propellant, also TNT co-contaminant	2,6-DNT	606-20-2
2-Nitrotoluene (o-Nitro toluene)	DNT co-contaminant	2-NT	88-72-2
3-Nitrotoluene (m-Nitro toluene)	DNT co-contaminant	3-NT	99-08-1
4-Nitrotoluene (p-Nitro toluene)	DNT co-contaminant	4-NT	99-99-0
Nitroglycerine	Nitrate ester explosive/propellant	NG	55-63-0

Table B- 10: Physical and Chemical Properties of Military Munitions of Concern (ERDC/CERL, 2005)

Constituent	CAS Number	Molecular Weight (g)	Melting Point Deg C	Boiling Point Deg C	Vapor Pressure mm Hg	Vapor Pressure Temp Deg C	Henry's Law Constant (H) atm m^3 /mole	Water Solubility mg/L	Water Solubility Temp Deg C	Log Kow	Log Koc
1,3,5-TNB	99-35-4	213.11	122.5	315	3.20E-06	20	[3.08E-9]	340	20	1.1	[104; 178]
1,3-DNB	99-65-0	168.11	89-90	302.6	2.00E-04	25	4.90E-08	533	25	1.49	[150]
2,4,6-TNT	118-96-7	227.18	80.1	240 (explodes)	1.99E-04	20	4.57E-07	130	20	1.6	1600
2,4-DNT	121-14-2	182.14	71	300	1.47E-04	22	1.30E-07	270	22	1.98	[360]
2,6-DNT	606-20-2	182.14	66	285	5.67E-04	25	9.26E-08	180	20	2.1	19 ; 72
EGDN	628-96-6							5.2 - 5.6	25		
HMX	2691-41-0	296.2	276-287	NR	3.33E-14	25	2.60E-15	6.63	20	0.26 ; .06	0.54
Nitrobenzene	98-95-3	123.11	5.7	210.8	0.245	25	2.40E-05	1.80E +03	25	1.85	30-6 - 370
Nitrocellulose NC	9004-70-0							immiscible			

					Vapor Pressure			Water Solubility			
Constituent	**CAS Number**	**Molecular Weight (g)**	**Melting Point Deg C**	**Boiling Point Deg C**	**mm Hg**	**Temp Deg C**	**Henry's Law Constant (H) atm m^3 /mole**	**mg/L**	**Temp Deg C**	**Log Kow**	**Log Koc**
Nitroglycerin NG	55-63-0	227.09	2.8-13.5	218 (explodes)	2.00E-04	20	[4.30E-08]	1800	25	1.62	180
Nitroguanidine NQ	556-88-7				3.00E-02	25	4.50E-12	Slightly soluble		-0.83	
PETN	78-11-5	316.15	140	180	1.04E-10	25	[1.20E-11]	43	25	1.61	179-1720
RDX	121-82-4	222.26	205-206	decomposes	4.10E-09	NR	[6.30E-08]	59.8	25	0.87	42-167
Tetryl	479-45-8	287.5	130-132	187 (explodes)	4.00E-10	20	[1.00E-11]	75	20	2.4	[406]
Value in brackets reported as estimated; NR = Not Reported; shaded block indicates data not available											

B.3 SELECTION OF WASTE ANALYSIS PARAMETERS

This section addresses the parameters of concern for WMM that will be treated at the OD Unit. The rationale for the selection of these parameters, sampling methods, analytical protocols, and frequency of analysis are described. Parameters and rationale for characterization of waste are discussed below in sections that cover pre-detonation and post detonation, respectively.

HAFB has never been used for the research and development of nuclear, chemical warfare, or other exotic warfare types of weapons. The OD Unit is used solely for the disposal/treatment of conventional waste-ordnance, munitions, incendiaries, propellants, and rocket motors. The only munitions delivered or disposed of at HAFB have been conventional live and training munitions. Therefore, the chemical components and combustion by-products are consistent with typical materials for military munitions items; thus, the emphasis of sampling and analysis for the 20,000-Pound OD Unit will be to search only for the constituents present in these types of wastes.

Because combustion products may be present as residues in the treatment unit or ejected soils, the collection and analysis of samples are required to characterize contaminants and determine the concentrations of compounds in the OD Unit and surrounding media. The nature of the treatment by-products is dependent upon the category of device from which the waste is derived. Propellant constituents will be converted largely to the gaseous products CO_2, CO, H_2O, N_2, and, to some degree, NO_x. Some extremely limited possibility exists that these materials may fail to entirely decompose. Tables B-8 and B-9 identify these compounds.

The nitrate oxidant from primers or detonators will convert to sodium or potassium nitrite ($NaNO_2$, KNO_2). Other oxidants are converted to the oxide. Fuels such as antimony sulfide or thiocyanate are converted to the oxide or sulfate.

The SAP outlined in Permit Attachment H focuses on solid reaction products because of the hazards associated with plume sampling in the vicinity of the treatment zone.

B.3.1 PARAMETERS AND RATIONALE (PRE-DETONATION)

Only WMM will be treated at the OD Unit. This designation is made by DDA. All waste munitions treated at the OD Unit are standard military end items with well-defined physical and chemical characteristics.

Waste analysis will not be performed prior to the treatment of these wastes due to the nature of the waste stream; rather AK will be used. Section B.2.3.1 provides justification for using AK.

Sampling waste energetic items prior to treatment would greatly increase the potential for accidental detonation, with resultant property damage and personal injury, that such efforts are not warranted. The containers that hold these energetic materials (product or waste) are sealed in accordance with exceedingly specific manufacturing specifications designed to prolong storage stability and reduce the potential for unplanned detonation or ignition from impact. For example, nitrocellulose propellant mixtures are hygroscopic to 3 to 4 weight percent if exposed to moist air. The hydrolysis that accompanies exposure of nitrocellulose to air (even at low relative humidity values) renders the material unstable, and evolution of NO_2, or auto combustion occurs. Dismantling of the devices (that would be required for sampling) not only increases hazard by exposure of material but also increases the potential for detonation due to the friction and shock sensitivity of the materials.

Additionally, the composition of these materials is well defined on the basis of published literature and tightly controlled manufacturing specifications. Thus, these materials are analogous to pure discarded commercial products for which sampling would only prove redundant. Prior to treatment of any waste not specifically identified in earlier pages, a complete listing of all ingredients common to that energetic item will be obtained to determine its suitability for treatment in the OD Unit.

The use and handling of these materials is tightly controlled and the device is sealed; therefore, the possibility of mixing unspecified items with the energetic materials does not exist. No other wastes are treated in conjunction with these devices in the OD Unit because joint treatment is specifically prohibited by Technical Orders.

B.3.2 PARAMETERS AND RATIONALE (POST DETONATION)

This section will identify sources of typical munitions constituents and identify analytical methods for detection of these constituents. The purpose of this section is to justify the parameters selected for analysis and provide summary tables of EPA methods and analytes. Detailed sampling and analysis procedures are covered in Attachments G (Closure Plans), H (SAP for soil) and I (environmental protection).

Post treatment analysis of residuals presents less risk to sampling and analytical personnel than attempts to perform predetonation sampling because successful treatment renders the waste non-reactive. Thermal treatment of propellants converts the alkoxynitrates to gaseous products. However, because it is technically impractical to sample evolved gas in the treatment zone, the focus of this plan is the solid residuals that may remain in the pit. This sampling will provide information on the nature and extent of chemical contamination. Permit Attachment H contains a detailed SAP that covers all aspects of post-detonation waste sampling at the OD Unit. Specific topics covered in the SAP include sampling approach and rationale, sampling procedures and methodology, health and safety procedures, sample handling and chain of custody (COC), sample documentation, laboratory procedures, quality assurance/quality control (QA/QC), and data evaluation methods.

B.3.3 PARAMETERS RECOMMENDED FOR ANALYSIS (POST DETONATION)

OD is a thermal treatment process used to remove the hazard characteristic of reactivity. This treatment technology, known as Deactivation, removes the reactivity characteristic of the explosive material by decomposition during the exothermic, supersonic reaction. The most conclusive means of measuring the effectiveness of OD thermal treatment is through a periodic sampling program that can be applied to all potentially affected media. A sampling and analysis program is capable of determining whether any media have been adversely impacted by treatment operations. Potential contaminants in the various media may contain energetic materials and their breakdown products of the PEP treated at the OD Unit and listed in Tables B-

8 and B-9. Metals are found in all military munitions and perchlorates are in solid fuel rockets, mines, torpedo warheads, and fuzes. Based on the PEP treated at the OD Unit, the potential contaminants that will be selected for analysis are listed in Table B-11.

Table B – 11: Parameters Selected for Analysis and Rationale

TEST METHOD	PARAMETERS	CONSTITUENTS	CAS	RATIONALE
	METALS			Metals are found in all military munitions. Certain munitions only contain metals (i.e., incendiaries).
SW6010B		Antimony	7440-36-0	constituent in fuels for propellants
SW6010B		Arsenic	7440-38-2	
SW6010B		Barium	7440-39-3	constituent in oxidizer in propellants
SW6010B		Beryllium	7440-41-7	
SW6010B		Cadmium	7440-43-9	
SW6010B		Chromium	7440-47-3	
SW6010B		Copper	7440-50-8	constituent in rocket propellant
SW6010B		Lead	7439-92-1	constituent of primary explosive
SW6010B		Nickel	7440-02-0	
SW6010B		Selenium	7782-49-2	
SW6010B		Silver	7440-22-4	
SW7471A		Mercury	7439-97-6	constituent of primary explosive
SW6860	PERCHLORATES			DoD munitions, munitions components, and training devices that may have contained perchlorate include the following: Solid fuel rockets, mines, torpedo warheads, smoke-generating compounds, signal flares, parachute flares, thermite type incendiaries, incendiary bombs, fuzes, jet-assisted takeoff devices.
		Ammonium Perchlorate	7790-98-9	
		Potassium Perchlorate	7778-74-7	
SW8095	ENERGETICS			Explosives used in Military Munitions
		1,3,5-TNB	99-35-4	
		1,3-DNB	99-65-0	
		2,4,6-TNT	118-96-7	
		2,4-DNT	121-14-2	
		2,6-DNT	606-20-2	
		2-NT	88-72-2	
		3-NT	99-08-1	
		EGDN	628-96-6	
		HMX	2691-41-0	
		Nitrocellulose NC	9004-70-0	
		Nitroglycerin NG	55-63-0	
		Nitroguanidine NQ	556-88-7	
		PETN	78-11-5	
		RDX	121-82-4	

TEST METHOD	PARAMETERS	CONSTITUENTS	CAS	RATIONALE
		Tetryl	479-45-8	
SW7580	PHOSPHOROUS	White Phosphorus WP	7723-14-0	Used in smoke rounds.

B.4 SUMMARY OF ANALYTICAL METHODS AND SAMPLING FREQUENCY

All waste streams treated at the OD Unit are energetic materials that have been manufactured in accordance with military specifications and strict manufacturing requirements. As such, these waste streams consist of PEP materials that are known. Therefore, as discussed above, no pre-treatment analyses will be performed on the energetic waste streams treated at OD Unit. The nature of OD treatment allows for the complete destruction of the energetic materials. The Permittee shall characterize the debris collected after each detonation in accordance with 40 CFR §261, Subpart C. This will be accomplished by sampling and analysis, MSDS review, or generator knowledge. Based on this characterization, the Permittee shall manage the fragments collected in accordance with 40 CFR §261 as applicable to the waste.

Samples of the solid residuals and underlying soils will be prepared and analyzed according to protocols from the current edition of the EPA Publication SW-846, *Test Methods for Evaluating Solid Waste*, *Physical and Chemical Methods*. Samples will be analyzed for all toxic metals including priority pollutant metals (listed at 20.4.1.500 NMAC Part 264 Appendix IX), explosive residues, and soil moisture. Permit Attachment H, Sampling and Analysis Plan, contains the specific test methods and lists of analytes that will be measured, as well as the rationale for their selection. In addition, details of laboratory protocols and quality assurance/quality control procedures are also discussed in the SAP, Attachment H.

B.4.1 RECOMMENDED ANALYTES AND METHODS

All analytical tests are performed by an EPA certified laboratory and are conducted in accordance with the protocol found in the most recent edition of EPA SW-846. As new methods are developed and become available, they will be used accordingly.

White Phosphorous (WP) (CAS 7723-14-0, P_4) reacts with air and requires special handling for sampling and analysis. Fixed laboratory tests for WP are all based on gas chromatography. The only published method for WP is SW7580, a GC method with a nitrogen-phosphorus detector (NPD). A Gas Chromatography/Mass Spectrometry (GC/MS) method is also available, but is not published. Due to increased regulation of WP by the Drug Enforcement Agency, the standard is currently unavailable. Therefore, analytical capabilities for this compound are very limited. The following tables summarize tests available for the other chemical selected for analysis.

Table B-12. Laboratory Tests for Metals

Method Number	Title
SW6010B	Inductively Coupled Plasma-Atomic Emission Spectrometry (ICP-AES)
SW6020	Inductively Coupled Plasma-Mass Spectrometry (ICP-MS)
SW7000 series	Individual Metals by GFAA
SW7470A/SW7471A	Mercury by Cold Vapor Atomic Absorption (CVAA)

Table B -13 Perchlorate Laboratory Test

Method (Technique)	Applicability	Reporting Limits
SW6860 (IC/MS or IC/MS/MS)	1) Aqueous samples, to include those with high TDS	0.01 µg/L for water; (by IC/MS/MS)
	2) Soil and sludge samples	0.1µg/kg for soil (by IC/MS/MS)

Table B-14. Fixed Laboratory Tests for Nitrogen-Based Explosives, Co-Contaminants, and Breakdown Products

Method No.	Title
SW8330A	Nitro aromatics and Nitramines by High Performance Liquid Chromatography (HPLC)
SW8332	Nitroglycerine by HPLC
SW8095	Explosives by Gas Chromatography (GC)
SW8321A [1)]	Explosives by HPLC/Mass Spectrometry (MS)
EPA 529	Determination of Explosives and Related Compounds in Drinking Water by Solid Phase Extraction and Capillary Column Gas Chromatography/Mass Spectrometry (GC/MS)
(1) This method is typically cited for HPLC/MS of explosives. However, no published version includes explosives	

B.4.2 SAMPLING METHODS

Samples will be collected using appropriate sampling equipment, as recommended in SW-846 or other approved sampling guidance. Specific sampling requirements are provided in Attachments G (Closure Plans), H (SAP for soil) and I (environmental protection). Disposable field equipment will be used where practical to eliminate the potential for cross-contamination. Therefore, maintaining and decontaminating the field equipment for these activities will not be necessary. The sample size will be determined by the amount required for the analytical method(s). Sample containers are immediately sealed after sample collection. Sample seals are used to preserve the integrity of the samples from the time they are collected until they are opened in the laboratory.

All required information is recorded on the sample bottle and COC record including the preservation method and maximum holding time. All sample labels will be marked with the following information using indelible ink: name of the sampler, date and time of collection, sample collection location, and sample identifier that uniquely identifies the sample. The COC record, at a minimum, includes the following information:

- Sample collection location
- Date and time of collection
- Sample type (grab or composite)
- Sample description (media type)
- Analyses to be performed
- Signatures of the personnel involved in the custody of the samples

The samples will be collected in clean containers and preserved, as appropriate, to ensure that their integrity remains intact during transport to the analytical laboratory. Container types, preservation techniques, and holding times for the potential analyte of interest are provided in Attachments G (Closure Plans), H (SAP for soil), and I (environmental protection)

Samples will be delivered to the laboratory as soon as practical. The COC record accompanies the samples. Samples are properly packaged to avoid leakage or breakage during shipment. Sampling devices and containers are cleaned before use. All used non-disposable containers and samplers are washed with warm detergent solution, rinsed at least three times with tap water, rinsed with distilled water, and air dried or wiped dry. All clean samplers, containers, etc., are placed in clean plastic bags and sealed. The cleaned and packaged equipment is stored in an appropriate area away from all new sampling equipment.

B.4.3 FREQUENCY OF SAMPLING

Samples of the treatment residuals and underlying soils will be taken annually to demonstrate the effectiveness of the treatment and to ensure that hazardous wastes are not present. This frequency was selected to ensure effectiveness of treatment. The sampling methodology used to collect representative samples, is explained in detail in the sampling methodologies contained in Attachments G (Closure Plans), H (SAP for soil), and I (environmental protection)

All samples will be compared to the Universal Treatment Standards (UTS) (20.4.1 NMAC §268.48) to ensure conformance with the Land Disposal Restrictions (20.4.1 NMAC Part 268). Non-conforming wastes will receive further treatment prior to disposal.

B.5 WASTE RE-EVALUATION

As stated in Section B.3.1, only WMM will be treated at the OD Unit. This designation is made by DDA. All waste munitions treated at the OD Unit are standard military end items with well-defined physical and chemical characteristics. Acceptable waste is detailed in Section B.1.3. A re-evaluation of waste characterization data will be conducted, as necessary, to ensure that the data are current and up to date, in accordance with 20.4.1 NMAC §264.13(a) (3). Updates of waste characterization information are required when:

- A change occurs in the process or operation generating the hazardous waste
- The hazardous waste received from an off-site facility does not match the waste specified on the accompanying manifest or shipping paper

Waste characterization data (e.g., KOP) for the wastes treated at the OD Unit will be reevaluated annually. This information will be used to determine the appropriateness of current waste management practices and characterization methods.

B.6 SPECIAL PROCEDURE REQUIREMENT

Procedures for receiving wastes generated off site and for managing ignitable and reactive wastes are summarized below. In addition, provisions for ensuring compliance with LDR requirements are presented in this section.

B.6.1 PROCEDURES FOR RECEIVING WASTES GENERATED OFF SITE

HAFB does not accept waste from off-site for treatment at the OD Unit.

B.6.2 PROCEDURES FOR IGNITABLE, REACTIVE, AND INCOMPATIBLE WASTES

Hazardous wastes that exhibit the characteristic of reactivity (D003) are treated at the OD Unit. Incompatible wastes are not managed at the Unit.

B.6.3 PROVISIONS FOR COMPLYING WITH LDR REQUIREMENTS

There are special waste analysis requirements under the LDR program for hazardous waste generators and treatment facilities. Generators of hazardous waste must determine if the waste, at the point of generation, must be treated before it can be land disposed; this determination can be made either by testing the waste or using KOP. Generally, hazardous wastes must meet applicable treatment standards prior to land disposal. These treatment standards are expressed in two ways:

- As constituent concentrations in the waste, either as an extract of the waste (as determined by the Toxicity Characteristic Leaching Procedure (TCLP), or as total waste analysis, or
- As specified treatment technologies.

Wastes that have concentration-based treatment standards must be evaluated to determine if applicable constituent concentration levels have been attained. This can be accomplished by testing the waste, or applying knowledge of the process or materials used to produce the waste (generators only). The TCLP method is generally used to evaluate whether treatment standards expressed as concentrations in the waste extract are met, and total waste analysis methods are used to evaluate whether treatment standards based on total waste concentrations are met. Characteristic wastes that have treatment standards expressed as specified technologies in 20.4.1 NMAC §268.40 must also meet the UTS in 20.4.1 NMAC §268.48 prior to land disposal. Special rules regarding wastes that exhibit a characteristic are also presented in 20.4.1 NMAC

§268.9. In 20.4.1 NMAC §268.9(c), it states that no prohibited waste that exhibits a characteristic under 20.4.1 NMAC, Chapter 2, Part 261, Subpart C may be land disposed unless the waste complies with the treatment standards under 20.4.1 NMAC, Chapter 8, Part 268, Subpart D. In addition, for wastes that exhibit a hazardous characteristic, the generator must determine the underlying hazardous constituents (UHCs), as required in 20.4.1 NMAC §268.9(a). The UHC are reported in Table B-4.

For the reactive hazardous wastes treated at the OD Unit, the specified treatment technology in 20.4.1 NMAC §268.40 is DEACT (deactivation). Deactivation is accomplished by treatment in the OD Unit, which removes the hazardous characteristics of reactivity. OD is not considered by EPA as a method constituting land disposal, and they concluded that the LDR program is not applicable to OD (51 *Federal Register* 40580). OD is a treatments that satisfies the LDR treatment standard for DEACT, but the process itself is not land disposal. Only the remaining residue, if any, resulting from treatment by OD is subject to LDR.

B.7 GLOSSARY

Amatol is a mixture of ammonium nitrate and TNT that is commonly used as a substitute for TNT in bursting charges. The most common mixture of amatol is 80/20 (80% ammonium nitrate and 20% TNT). Because of its ammonium nitrate content, Amatol is highly hygroscopic and must be kept in a waterproof container.

Ammonal is an explosive made up of ammonium nitrate, trinitrotoluene, and aluminum powder mixed in a ratio of roughly 22:67:11. The ammonium nitrate functions as an oxidizer and aluminum as a power enhancer. The mixture is highly hygroscopic. Ammonal burns vigorously when open to the air, but detonates when confined inside some form of casing.

Ammonium nitrate is the least sensitive of military explosives and must be initiated by a booster charge to ensure successful detonation. Ammonium nitrate is commonly used in composite explosives where it is combined with a more sensitive explosive. Ammonium nitrate is highly hygroscopic (readily absorbs moisture) and must be kept in a waterproof container.

Ant materiel is designed to cause deterioration of or damage to selected materiel.

Antipersonnel means designed to kill, wound, or obstruct personnel.

Antitank means designed to be used against tanks.

Arming device is a device designed to perform the electrical and/or mechanical alignment necessary to initiate an explosive train.

Auxiliary or booster explosives are used to increase the flame or shock of the initiating explosive to ensure that the burster charge performs properly. High explosives used as auxiliary explosives are less sensitive than those used in initiators, primers, and detonators, but are more sensitive than those used as filler charges or bursting explosives.

Ballistite is a double-base powder used as a rocket propellant. It is composed of two explosive substances, nitrocellulose and nitroglycerin, blended together with diphenylamine, which acts as a stabilizer. It burns with a considerable amount of flash and smoke, and generates a great volume of gas. Ballistite burns progressively, but at a rate dependent upon the composition and physical characteristics of the powder grain, the temperature of the powder grain before ignition and the pressure during reaction. It is produced in various shapes to fit the rocket motor housing.

Baratol is a slow explosive and is composed of barium nitrate and TNT. TNT is typically 25-33% of the mixture with 1% wax as a binder. The high density of barium nitrate gives baratol a density of at least 2.5.

Black powder is the oldest known explosive material. It is a composite material made from saltpeter (potassium nitrate), charcoal, and sulfur. It is a lower powered explosive and is commonly used in time fuses, igniters, and detonators.

Bombs range in weight from 1 to 3,000 pounds and in length from 3 to 10 feet. Generally, all bombs have the same components--a metal container, a fuze, and a stabilizing device. The metal container, or bomb body, holds the explosive or chemical filler and may consist of one piece or multiple pieces. Bombs use either mechanical or electrical fuzes, typically located in the nose or tail section, either internally or externally. Mechanical fuzes are generally armed by some type of arming vane. The arming vane operates like a propeller to line up all the fuze parts and thus arm the fuze. The fuzes may be configured as impact, proximity, or delay fuzes. Bombs are stabilized during flight by fin or parachute assemblies attached to the rear section of the bomb. These assemblies often detach from the bomb after impact.

Brisance is the speed at which the explosive develops its maximum pressure.

Bursting explosives, burster charges, or fillers - Bursting explosives, burster charges, or fillers are high explosive charges that are used alone or as part of the explosive charge in mines, bombs, missiles, and projectiles.

Caliber is the diameter of a projectile or the diameter of the bore of a gun or launching tube. Caliber is usually expressed in millimeters or inches.

Casing is the fabricated outer part of ordnance designed to hold an explosive charge and the mechanism required to fire this charge.

Composition A is a wax-coated, granular explosive consisting of RDX and plasticizing wax. Composition A is used by the military in land mines and 2.75 and 5 inch rockets. Composition A-3 explosives are made from RDX and wax. Composition A-3 is a wax-coated, granular explosive, consisting of 91% RDX and 9% desensitizing wax. Composition A-3 is not melted or cast. It is pressed into projectiles. It is no hygroscopic and possesses satisfactory stowage properties. Composition A-3 may be white or buff, depending upon the color of the wax used to coat the powdered RDX. Composition A-3 is used as a filler in projectiles that contain a small burster cavity, such as antiaircraft projectiles. It can be used as compressed fillers for medium-caliber projectiles.

Composition B is a composite explosive containing 60% RDX and 39% TNT, and is wax. Because of the high RDX content, Composition B is more sensitive than TNT and is primarily used as the main charge in shaped charges.

Composition B-4 is a composite explosive that is very similar to Composition B with 60% RDX, 39.5% TNT, and 0.5% calcium sulfate. This explosive is used in newer shaped charges and bangalore torpedoes.

Composition C-4 is a composite explosive containing 91% RDX and 9% nonexplosive plasticizers. Composition C-4 is very stable over a wide range of temperatures and is only slightly water soluble. This explosive is used mainly as a bursting charge.

Composition C-3 is a composite explosive containing 91% RDX and 9% wax. The wax coats the RDX particles and acts as a desensitizer, as well as a binder material. Composition C-3 is used as a booster charge in newer charges and torpedoes, as well as in high explosive plastic projectiles.

Cyclotrimethylene trinitramine (RDX) is very sensitive and, like PETN, is one of the most powerful of military explosives. It is often used alone as the base charge in M6 (electric) and M7 (non-electric) blasting caps. RDX can also be desensitized and used for sub-boosters, boosters, bursting charges, and demolition charges. RDX is commonly used in the manufacture of Composition A, B, and C explosives.

dBX is a specially formulated, high density, high energy, detonator sensitive seismic explosive designed exclusively to meet the rigid requirements and environmental extremes associated with geophysical exploration.

Designated Disposition Authority (DDA): The only personnel in the DoD authorized to declare unused military munitions as WMM except in the case of an explosives or munitions emergency, abandoned munitions, or a declaration by the Authorized Military Official (AMO). Each Service has at least one DDA and may elect to have more (e.g., a DDA for a particular program or command). The single manager for conventional ammunition (SMCA) is the single DDA at the DoD level. DDAs are responsible for evaluating munitions that are excess to current requirements or otherwise no longer part of the active inventory for safety; other uses; resource, recovery, and recycling (R3) possibilities; and treatment.

Delay fuze is any impact fuze incorporating a means of delaying its action after contact with the target. Delay fuzes are classified by the length of time of the delay.

Diazodinitrophenol (2-Diazo-4,6-dinitrophenol, DDNP, or Dinol) is widely used as an initiating charge in detonators and caps. DDNP is a yellowish brown powder. It is soluble in acetic acid, acetone, strong hydrochloric acid, and most of the solvents but is insoluble in water. DDNP may be desensitized by immersing it in water, as it does not react in water at normal temperature. DDNP is used with other materials to form priming mixtures, particularly where a high sensitivity to flame or heat is desired. DDNP is often used as an initiating explosive in propellant primer devices.

Dispenser is an item designed to be mounted, but not permanently fixed, on aircraft to carry and eject small ordnance.

Explosive D (Ammonium picrate) is used as a bursting charge for armor-piercing shells and in other types of projectiles that must withstand severe shock and stress before detonating.

Explosive is a substance or mixture of substances that can undergo a rapid chemical change generating large quantities of energy generally accompanied by hot gases.

Fragmentation is the term applied to military munitions indicating that it is primarily intended to produce a fragmentation effect. Also, the breaking up of the confining material of a chemical compound or mechanical mixture when an explosion occurs. Fragments may be complete items, subassemblies, or pieces thereof, or pieces of equipment or buildings containing the items.

Fuze has two definitions: 1. A device with explosive components designed to initiate a train of fire or detonation in ordnance. 2. A nonexplosive device designed to initiate an explosion in ordnance.

Gradiometer is a magnetometer for measuring the rate of change of a magnetic field.

Ground penetrating radar (GPR) is a system that uses pulsed radio waves to penetrate the ground and measure the distance and direction of subsurface targets through radio waves that are reflected back to the system.

Guncotton is a nitrocellulose of high nitrogen content that is employed extensively in the manufacture of single-base propellants. It is also used in electric primers and in electrically initiated detonators. In most propellants, guncotton is blended with pyrocellulose where an increase in nitrogen content is desired. It is sometimes referred to by various names, such as pyropowder, pyrocellulose, or nitrocellulose.

Guided missiles are similar to rockets however; they are guided to their target by various systems. Some are wire-guided, and others are guided by internal or external radar or video. Guided missiles are usually stabilized by fins controlled by internal electronics. Internal proximity fuzes are used in guided missiles, which makes approaching them extremely dangerous. Also, fired guided missiles may still contain residual propellant that could ignite and burn violently.

H-6 is a binary explosive that is a mixture of RDX, TNT, powered aluminum, and D-2 wax with calcium chloride added.

Hand grenades are small explosive- or chemical-type munitions that are designed to be thrown at short range. All grenades have three main parts: a body, a fuze with a pull ring and safety clip assembly, and a filler. Various classes of grenades may be encountered as UXO, including fragmentation, smoke, and illumination grenades. Fragmentation grenades are the most common type of grenade used. They have a metal or plastic body filled with an explosive material. When the filler explodes, the body of the grenade or a metal fragmentation sleeve breaks into small, lethal, high velocity fragments. Other grenades may be made of metal, plastic, cardboard, or rubber and may contain explosives, white phosphorus, chemical agents, or illumination flares, depending on their intended use.

Hexachloroethane (HC) smoke is a mixture of equal amounts of hexachloroethane, zinc oxide, and approximately 7% grained aluminum or aluminum powder. Upon combustion, the mixture produces zinc chloride, which rapidly absorbs moisture from the air to form a grayish white smoke. More humid air results in thicker smoke.

High Melting Explosive (HMX, octogen, cyclotetramethylene-tetranitramine, or 1,3,5,7-tetranitro-1,3,5,7-tetrazocane), is a powerful and relatively insensitive nitro amine high explosive, chemically related to RDX. HMX is the highest-energy solid explosive produced on a large scale in the United States. HMX explodes violently at high temperatures (534°F and above). Because of this property, HMX is used exclusively for military purposes to implode fissionable material in nuclear devices, as a component of plastic-bonded explosives, as a component of rocket propellant, as a high explosive burster charge, in propellants, and in maximum-performance explosives. HMX is a white crystalline solid with a melting point of 281^{o}C. HMX is non-hygroscopic and is practically insoluble in water.

Hydroxyl-terminated polybutadiene (HTPB) is used to bind the fuel and oxidizer into a solid mass for solid rocket motors. It is also used as a hybrid rocket fuel. HTPB is a clear, viscous liquid. The properties cannot be precisely stated, because HTPB is manufactured in various grades to meet specific requirements. HTPB is thus a generic name for a class of compounds.

Illumination is a term applied to ordnance indicating that it is primarily intended to produce light of high intensity. Such ordnance usually contains a flare and may contain a parachute for suspension in the air.

Impact fuze is a fuze in which detonation is initiated by the force of impact and that usually functions instantaneously or after a short delay.

Incendiary is any flammable material that is used as a filler in ordnance intended to destroy a target by fire.

Lead dinitroresorcinate (LDNR) is used in blasting caps. LDNR is capable of detonation or explosive decomposition under ambient conditions.

Lead styphnate (lead 2,4,6-trinitroresorcinate, $C_6HN_3O_8Pb$), whose name is derived from styphnic acid, is a toxic explosive used as a component in primer and detonator mixtures for less sensitive explosives, such as nitroglycerine.

Magnetometer is an instrument for measuring the intensity and direction of magnetic fields.

Mannitol hexanitrite (**nitromannite)** is a powerful explosive. The chemical name is hexanitromannitol, but it is also known by Mannitol hexanitrate (MHN), Nitromannitol, Nitromannite, Nitranitol, or Mannitrin. It is less stable than nitroglycerin, and it is used in detonators. Mannitol hexanitrite is a secondary explosive formed by the nitration of mannitol (Manna Sugar, mannite), a sugar alcohol. The product is used in medicine as a vasodilator, and as an explosive in blasting caps. Its sensitivity is considerably high, particularly at high temperatures (>75°C) where it is even more sensitive than nitroglycerine.

Materiel are all items necessary for the equipment, maintenance, operation, and support of military activities without distinction as to their application for administrative or combat purposes; excludes ships or naval aircraft.

Munition means ordnance or any and all supplies and equipment required to conduct warfare.

Mortars range from approximately 1 inch to 11 inches in diameter and can be filled with explosives, toxic chemicals, white phosphorus, or illumination flares. Mortars generally have thinner metal casing than projectiles, but use the same types of fuzing and stabilization.

Material Potentially Presenting an Explosive Hazard (MPPEH) is material potentially containing explosives or munitions (e.g., munitions containers and packaging material; munitions debris remaining after munitions use, demilitarization, or disposal; and range-related debris); or material potentially containing a high enough concentration of explosives such that the material presents an explosive hazard (e.g., equipment, drainage systems, holding tanks, piping, or ventilation ducts that were associated with munitions production, demilitarization or disposal operations). Excluded from MPPEH are munitions within DoD's established munitions management system and other hazardous items that may present explosion hazards (e.g., gasoline cans, compressed gas cylinders) that are not munitions and are not intended for use as munitions.

Mercury fulminate ($Hg(ONC)_2$) is a primary explosive. It is highly sensitive to friction and shock. It is mainly used in blasting caps. Mercury(II) cyanate, though its formula is identical ($HgC_2N_2O_2$), is a different compound; cyanate and fulminate are isomers.

Military dynamite is a composite explosive that contains 75% cyclotrimethylene trinitramine (RDX), 15% TNT, and 10% desensitizers and plasticizers. Military dynamite is considerably more stable than commercial dynamites due to the absence of nitroglycerin.

Military munitions means all ammunition products and components produced for or used by the armed forces for national defense and security, including ammunition products or components under the control of the Department of Defense, the U.S. Coast Guard, the U.S. Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants, explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including bulk explosives, and chemical warfare agents, chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges, and devices and components of the above.

The term does not include wholly inert items, improvised explosive devices, and nuclear weapons, nuclear devices, and nuclear components, other than non-nuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitization operations under the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) have been completed.

Minol is an is an explosive developed late in World War II as a substitute for TNT and RDX, which were in short supply. It is made by mixing roughly 80% amatol and 20% aluminum powder. It is not as powerful as TNT or RDX.

Munitions Constituents (MC) are any materials originating from unexploded ordnance (UXO), discarded military munitions (DMM), or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.

Munitions debris are remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal.

Net explosive weight (NEW) is the actual weight in pounds of explosive mixtures or compounds, including the trinitrotoluene equivalent of energetic material, which is used in determination of explosive limits and explosive quantity data arcs.

Nitroglycerin is a highly powerful explosive and is comparable to RDX and PETN. It is commonly used as the base material for commercial dynamites. Nitroglycerin is highly sensitive and is affected by extreme temperatures. Due to its sensitivity, nitroglycerin is not typically used as a military explosive.

Octol is a melt-castable, high explosive mixture consisting of HMX and TNT in different weight proportions. Two formulations are commonly used: 70% HMX/30% TNT and 75% HMX/25% TNT.

Open Burn (OB) is an open-air combustion process by which excess, unserviceable, or obsolete munitions are destroyed to eliminate their inherent explosive hazards.

Open Detonation (OD) is an open-air process used for the treatment of excess, unserviceable or obsolete munitions whereby an explosive donor charge initiates the munitions being treated.

Ordnance has two definitions: 1. Military weapons collectively, along with ammunition and the equipment to keep them in good repair. 2. Explosives, chemicals, pyrotechnics, and similar stores, e.g., bombs, guns and ammunition, flares, smoke, napalm.

Pentaerythrite Tetranitrate (PETN) is very sensitive and is one of the most powerful military explosives. PETN is used in boosters, detonating cords, blasting caps, and in composite explosives. PETN is not water soluble.

Pentolite is a mixture of PETN and TNT. The most common mixture of pentolite is 50% PETN and 50% TNT. This explosive is very powerful, has a high detonation rate, and is used in certain shaped charges.

Pictratol is a binary explosive composed of 52% ammonium picrate and 48% TNT; it can be melt-loaded; less sensitive than TNT, it was developed for use in armor-piercing bombs.

Picric acid (2,4,6-trinitrophenol, TNP) is a yellow crystalline solid. Like other highly nitrated compounds (e.g. trinitrotoluene), picric acid is an explosive. Modern safety precautions recommend storing picric acid wet. When picric acid is dry, it is relatively sensitive to shock and friction, so laboratories that use it store it in bottles under a layer of water, rendering it safe. Glass or plastic bottles are required, as picric acid can form metal picrate salts that are even more sensitive and hazardous than the acid.

Potassium perchlorate ($KClO_4$) is a strong oxidizer. It is a colorless, crystalline substance that melts at about 610 °C. It is one of the most common oxidizers used in fireworks, ammunition percussion caps, explosive primers, and is used variously in propellants, flash compositions, stars, and sparklers.

Photo flash powder is used as a ground burst simulator (used to create battle noises and flash effects during training). It produces a high-pitched whistle that lasts 2 to 4 seconds. The detonation produces a flash and loud report.

Picrite (nitro guanidine, 1-Nitroguanidine, $CH_4N_4O_2$, $H_2NC(NH)NHNO_2$) is a white, crystalline solid. It melts at 255°C, decomposes at 250°C, and is not flammable. Picrite has a low sensitive explosive but detonation velocity is high. Picrite is used as an explosive propellant, notably in mixture as the smokeless powder *triple-base* - the nitro guanidine reduces the propellant's flash and flame temperature.

Projected grenades are grenades which are projected from a specially designed gun platform.

Primary or Initiating Explosives - Primary or initiating explosives are high explosives generally used in small quantities to detonate larger quantities of high explosives. Initiating explosives will not burn, but if ignited, they will detonate. In general, propellants are ignited by applying a flame, while bursting explosives are ignited by a severe shock. The initiating device used to set off a propellant is called a primer, and the device used to initiate the reaction of a bursting explosive is called a detonator. Examples of primary explosives are lead azide and mercury fulminate.

Projectile is an object projected by an applied force and continuing in motion by its own inertia, as a bullet, bomb, shell, or grenade. The term is also applied to rockets and to guided missiles.

Propellants – Propellants are low explosive agents such as explosive powder or fuel that provide the energy for propelling ordnance to the target. Propellants include both rocket and gun propellants. In general, propellants are ignited by applying a flame.

Proximity fuze is a fuze wherein primary initiation occurs by remotely sensing the presence, distance, and/or direction of the target through the characteristics of the target itself or its environment.

Pyrotechnics are low explosives used to send signals, to illuminate areas of interest, to simulate other weapons during training, and as ignition elements for certain weapons. Pyrotechnic compositions are considered low explosives because of their low rates of combustion. Examples of pyrotechnics are illuminating flares, signaling flares, smoke generators, tracers, incendiary delays, and photo-flash compounds.

RDX – see Cyclotrimethylene trinitramine.

Rifle grenades look like mortars and range from about 9 to 17 inches in length. They may be filled with high explosives, white phosphorus, riot-control agent, illumination flares, or chemicals that produce colored screening smoke. Rifle grenades are fired from standard infantry rifles. They have an opening at the far end of a tube near the fin assembly that allows the rifle grenade to be placed on the barrel of a rifle. Rifle grenades rely on impact fuzing, which is located on the nose or internally behind the warhead.

Rockets use gas pressure from rapidly burning material (propellant) to transport a payload (warhead) to a desired location. Rockets can range from 1½ to more than 15 inches in diameter, and they can vary from 1 foot to over 9 feet in length. All rockets consist of a warhead section, a motor section, and a fuze. They are unguided after launch and are stabilized during flight by canted nozzles at the base of the motor or fins attached to the motor. The warhead section of the rocket is the portion that produces the intended effect; it can be filled with explosives, toxic chemicals, white phosphorus, sub munitions, riot-control agent, or illumination flares. Fuzes may be located in the nose of the rocket or internally between the warhead and motor. The fuzing on rockets can be impact, time-delay, or proximity fuzing.

Secondary explosives are generally less sensitive to initiation than primary explosives and are typically used in booster and main charge applications. A severe shock is usually required to trigger a reaction. Examples are TNT, cyclo-1,3,5-trimethylene-2,4,6-trinitramine (RDX or cyclonite), HMX, and tetryl.

Self-destruct fuze is a fuze designed to burst a projectile before the end of its flight.

Small arms munitions contain projectiles that are 0.5 inches or less in caliber and no longer than approximately 4 inches. They are fired from various sizes of weapons, such as pistols, carbines, rifles, automatic rifles, shotguns, and machine guns. Generally, the shell casings of small arms munitions are made from brass or steel. Although the hazards associated with these UXO are much less than for other munitions, unexploded small arms munitions may explode if thrown into a fire or struck with a sharp object such as a nail.

Smokeless powder consists of nitrocellulose (**single-base powders**), frequently combined with up to 50 percent nitroglycerin (**double-base powders**), and sometimes nitroglycerin and nitro guanidine (**triple-base**), corned into small spherical balls or extruded into cylinders or flakes using solvents such as ether. Other minor ingredients, such as stabilizers and ballistic modifiers, are also added. Double-base propellants are common in handgun and rifle ammunition. Triple-base propellants are more common in artillery guns. The reason that they are smokeless is that the combustion products are mainly gaseous, compared to around 55% solid products for black powder (potassium carbonate, potassium sulfate etc).

Submunitions include bomblets, grenades, and mines filled with explosives or chemical agents. They may be antipersonnel, antimateriel, antitank, dual-purpose, incendiary, or chemical sub munitions. Submunitions are typically spread over a large area by dispensers, missiles, rockets, or projectiles. Each of these delivery systems disperses the sub munitions while still in flight, scattering the sub munitions over an area. Submunitions are activated in a variety of ways, depending on their intended use. Some are activated by pressure, impact, or movement or disturbance. Others are activated in flight or when they come near metallic objects. Some sub munitions contain a self-destruct fuze as a backup. The self-destruct time can vary from a couple of hours to several days.

Smoke has two meanings: 1. Filling for ordnance such as bombs, projectiles, and grenades. 2. Term applied to ordnance indicating that it is primarily intended to produce smoke of the types or colors specified.

Tetryl is commonly used alone as a booster charge. It can also be used as a bursting or demolition charge and, at times, can be used in composite charges. Tetryl is more powerful and more sensitive than TNT. Tetryl explosives are being replaced with RDX and PETN explosives due to the increased power and shattering effects of these two latter explosives.

Thermate is an incendiary compound used for military applications. Thermate, whose primary component is thermite, also contains sulfur and possibly barium nitrate, both of which increase its thermal effect, create flame in burning, and significantly reduce the ignition temperature.

Thermite grenades are used as incendiary devices to quickly destroy enemy equipment. Additionally, thermite grenades are used by friendly forces to destroy their own items and equipment when there is imminent danger of them being captured. Because of the difficulty in igniting standard iron-thermite, plus the fact that it burns with practically no flame and has a small radius of action, standard thermite is rarely used on its own as an incendiary composition. It is more usually employed with other ingredients added to enhance its incendiary effects.

Titanium tetrachloride (titanium (IV) chloride) is an important intermediate in the production of titanium metal and other titanium compounds. It is an unusual example of a liquid metal halide that is very volatile in air, where it forms opaque clouds of titanium dioxide and hydrogen chloride.

Trinitroaniline (TNA, picramide) is an explosive compound with a detonation velocity of 7,300 m/s.

Trinitrophenol (TNPH) is used in boosters as a substitute for TNT.

Trinitrotoluene (TNT) is the most commonly used military explosive. It is used alone or in conjunction with other explosives for composite explosives. TNT is commonly used for boosters, bursting charges, or demolition charges. TNT is a yellow solid. The explosive yield of TNT is considered the standard measure of strength of bombs and other explosives.

Tritonal is a mixture of 80% TNT and 20% aluminum powder, used in several types of ordnance e.g., air-dropped bombs. The aluminum improves the brisance of the TNT. Tritonal is approximately 18% more powerful than TNT alone.

Unexploded ordnance (UXO) is explosive ordnance that has been primed, fuzed, armed, or otherwise prepared for action, and that has been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard, and that remains unexploded by malfunction, design, or any other cause.

Warhead means that part of a missile, projectile, rocket, or other munition that contains the explosive system, chemical or biological agents, or inert materials intended to inflict damage.

Waste military munitions is an unused munitions that has been abandoned by being disposed of, removed from storage for purposes of disposal or treatment prior to disposal; is deteriorated, leaking, or damaged to the point that it is unserviceable; or has been determined by an authorized military official to be solid waste. Also, a used or fired military munitions that has been removed from its landing spot and then either managed off-range or disposed of on-range.

White phosphorous (WP) is a chemical that when exposed to air, burns spontaneously, producing dense clouds of white smoke. WP bombs and shells are essentially incendiary devices, but can also be used as an offensive anti-personnel flame compound capable of causing serious burns or death. It is used in bombs, artillery shells, and mortar shells which burst into burning flakes of phosphorus upon impact.

B.8 REFERENCES

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EXHIBIT B-1

DoD Explosives Safety Board Memorandum

DEPARTMENT OF DEFENSE EXPLOSIVES SAFETY BOARD
2461 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22331-0600

DDESB-KO

0 3 FEB 2005

MEMORANDUM FOR HEADQUARTERS AIR FORCE SAFETY CENTER
(ATTENTION: SEW)

SUBJECT: Routine Explosives Site Plan Request, Site Existing EOD Disposal Range, Holloman AFB, NM (ACC-Holloman-02-S40)

References: (a) AFSC/SEW Memorandum, 13 December 2004, Subject as above

(b) DoD 6055.9-STD, DoD Ammunition and Explosives Safety Standards, 5 October 2004

The subject site plan, submitted by reference (a), has been reviewed with respect to explosives safety criteria contained in reference (b). Based on the information furnished, site and final safety approvals are granted for an Explosives Ordnance Disposal (EOD) Disposal Range at the north end of base boundary, Holloman AFB, New Mexico. This approval is based on the following:

a. The EOD Disposal Range will be limited to 11,900 lbs of Hazard Division (HD) 1.1 explosive materials. In accordance with reference (a), non-related personnel will be at K328 distance. Personnel necessary for the operations will be withdrawn to 2,400 feet (K105 separation distance) with the pill boxes used for added overhead and frontal protection from fragmenting items.

b. For multiple munitions detonations, the maximum case fragment size shall not exceed 19.3 inches in diameter with a maximum fragment distance of 7,500 feet in accordance with paragraph C9.8.4.2.2.2.2.5.1 and Table C9.T35 of reference (b). For single munitions detonations, the maximum case size shall not exceed 29.4 inches in diameter in accordance with paragraph C9.8.4.2.2.2.2.5.1 and Table C9.T35 of reference (b).

c. Per reference (a):

(1) Concurrent operations between the Test Facility and EOD operations will not be authorized.

(2) All roads and trails within the clear-zone will be closed prior to testing and operations. Only authorized personnel will be permitted to transit these areas to and from working locations.

(3) There are no future construction projects planned for this area.

(4) No explosives operations will be conducted when lightning is within 5 nautical miles. In the event of unexpected lightning activity, operations will cease and all personnel will be evacuated to a minimum public traffic route distance of 750 feet from the disposal range until lightning has cleared and local weather office has been contacted.

(5) Fragmenting munitions will be buried or covered with a minimum of 4 feet of earth cover in all directions.

(6) Air Force accepts the risk of possible damage to the Magnetic Levitation Test Track, Impact Point and its associated support equipment caused by intentional or unintentional firings, detonations, failure of equipment or unexpected characteristics of the test.

A copy of the complete site plan package and this letter of approval must be retained as a permanent record at the installation. Master planning documents and installation drawings must be updated to show the approved clear zones.

Point of contact is Mr. Ernie Natividad at commercial: 703-428-0439; DSN: 328-0439; or E-mail: Ernest.Natividad@ddesb.osd.mil.

William E Wright

WILLIAM E. WRIGHT
Captain, US Navy
Chairman

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ATTACHMENT C

INSPECTION SCHEDULE

HOLLOMAN AIR FORCE BASE
OPEN DETONATION TREATMENT UNIT

Permit No. NM6572124422

ATTACHMENT C
INSPECTION SCHEDULE

INTRODUCTION

The information in this attachment addresses requirements contained in the New Mexico Administrative Code (NMAC), Title 20, Chapter 4, Part 1, Subpart IX (20.4.1.900 NMAC), incorporating Title 40 Code of Federal Regulations (CFR) §§270.14(b)(5) and 20.4.1.500 NMAC, incorporating 40 CFR §§264.15, and 264.602. In accordance with §264.15(a), the 20,000-Pound Open Detonation (OD) Unit is inspected for malfunctions, deterioration, operator errors, and discharges that may cause or lead to a release of hazardous waste constituents to the environment or a threat to human health. The inspection schedules and checklists presented in this Attachment are used by the EOD Team Chief for conducting inspections to ensure the OD Unit and related safety and emergency equipment, security devices, and treatment zones are monitored and checked to prevent, detect, and respond to environmental or human health hazards.

The complexity and special nature of the activities conducted at Holloman Air Force Base (HAFB) result in delegation of responsibility for general inspection requirements among various groups. Corrective action for deficiencies found during these routine inspections, repair and preventive maintenance of various items of equipment, and maintenance of inspection records are also delegated among these various groups. Among the areas covered by the routine inspection and maintenance activities are:

- Fire Control Equipment: fire extinguishers, pump truck equipment (pumps, hoses, horns and sirens, etc.), fire alarms, and self-contained apparatus. In accordance with AFMAN 91-201, *Explosive Safety Standards*, a minimum of two serviceable fire extinguishers, suitable for the hazards involved, are required for immediate use at any location where explosives are being handled. Each explosives-laden vehicle used for transport must be equipped with at least two portable 2A:10BC rated fire extinguishers.

- Emergency Equipment: safety glasses, gloves, hard hat, chemical respirators, etc. Measures for personnel and equipment safety and emergency response will be conducted at the OD Unit in accordance with AFMAN 91-201, *Explosive Safety Standards*, and TO 11A-1-42, G*eneral Instructions for Disposal of Conventional Munitions*.

- Security Equipment: warning signs, perimeter fence, etc. The OD Unit is within a cleared area and is surrounded by a 4-foot high, three-stranded barbed wire fence that restricts access to the unit. In accordance with TO 11A-1-42, G*eneral Instructions for Disposal of Conventional Munitions*, "Danger - Explosive Disposal Range - Keep Out" signs will be posted at entrances and at 300-foot intervals around the perimeter of the disposal range.

- Structures: road surfaces, vegetation-free zones, firebreaks. In accordance with TO 11A-1-42, *General Instructions for Disposal of Conventional Munitions*, all dry grass, leaves, and other combustible materials within a radius of 61 meters (200 feet) and the site will be free of deep cracks in which unburned explosives or agents may lodge.

- Communication Systems: land mobile radios, vehicle radios, etc. In accordance with TO 11A-1-42, *General Instructions for Disposal of Conventional Munitions*, communications equipment will be in good working order prior to commencing any disposal operation.

- Vehicular Equipment: transport vehicles.

C.1 INSPECTION SCHEDULE AND CHECKLISTS [20.4.1.500 NMAC §264.15 (b)(1) and (2)]

In accordance with §264.15(b)(1), an inspection program has been established to routinely inspect all components of the treatment units for malfunctions, deteriorations, signs of contaminant release that indicate potential for migration of hazardous waste constituents to the environment, or the potential for human endangerment. These inspections are performed prior to treatment, after treatment, and at regular intervals during inactivity to permit the use of corrective measures that will minimize such problems.

Vehicles used to transport demolition materials, explosives, and personnel are inspected daily, and inspections documented on Air Force (AF) Form 1800, *Operator's Inspection Guide and Trouble Report.*

In accordance with §264.15(b)(2), Exhibits C-1 and C-2 present~~s~~ the inspection schedules and checklists for inspecting safety and emergency equipment, security devices, treatment zones including loading/unloading areas, clear zone/general areas, firebreak, roads, structural equipment, communications equipment, mobile equipment, and range areas. Also listed is inspection of the clear zones around these units for vegetation. Clearing operations of the natural vegetation and other deficiencies found are addressed based on these inspections.

C.1.1 TYPES OF PROBLEMS [20.4.1.500 NMAC §264.15 (b)(3)]

The inspections schedule and the checklists identify the types of problems (e.g., malfunctions or deteriorations) that are checked during inspections.

C.1.2 FREQUENCY OF INSPECTION [20.4.1.500 NMAC §264.15(b)(4)]

Inspection of all materials, security devices, safety equipment, and communication devices will be performed before each explosive ordnance disposal (EOD) operation. This frequency of inspection will determine equipment deteriorations and malfunctions between inspections.

The inspection schedule used for the OD Unit is provided as Exhibit C-1 and Exhibit C-2. This inspection plan addresses unit-specific structures, emergency equipment, operational equipment, safety equipment, communications systems, transport vehicles, and the treatment zone (including the cleared area).

Prior to detonation on the day of detonation, the EOD Team conducts a physical inspection of all munitions brought for treatment to the OD Unit and compares the inventory list with letter of disposal request to ensure all items are accounted for. Only items identified on the letter of request can be treated; all others will be refused and returned to munitions storage for reschedule.

C.1.3 REMEDIAL ACTION [20.4.1.500 NMAC §264.15(c)]

If inspections reveal that nonemergency maintenance is needed, then HAFB personnel will initiate immediate action(s) to preclude further damage and reduce the need for emergency repairs. If a hazard is imminent, or has already occurred during the course of an inspection, or any time between inspections, then remedial action will immediately be taken. Appropriate authorities will be notified according to the 20,000-Pound OD Unit Site Contingency Plan, Permit Attachment E. In the event of an emergency involving the release of hazardous constituents to the environment, efforts will be directed towards containing the hazard, removing it, and subsequently decontaminating the affected area as outlined in the Site Contingency Plan. The general nature of the remedial action to be taken will be noted on the Inspection Checklist.

C.1.4 INSPECTION RECORDS [20.4.1.500 NMAC §264.15(d)]

The EOD Flight maintains all inspection findings at the OD Unit. The EOD Team and Team Chief use the inspection checklists shown in Exhibits C-1 and C-2 to document the date and time of inspections, the name of the inspector, and corrective actions taken. The completed checklists are maintained as a summary of OD Unit inspections and are maintained at the EOD Flight office for a period of three years in accordance with §264.15(d).

Exhibit C-1 Inspection Schedule and Checklist

11,900 Lb Range Monthly Inspection Checklist

Month: ____________

Area & Equipment	Specific Item	Types of Problems	Frequency of Inspection	SAT	UN-SAT
Safety and Emergency Equipment	Face shields and extra protective eyeglasses	Broken and dirty equipment	Monthly		
	Disposable respirators	Out of stock, not required, filter types for materials being handled	Monthly		
	Fire Extinguishers (Min. of 2)	In need of recharging	Monthly/ After use		
Security Devices	Signs	Illegible	Monthly		
Treatment Zones	Clear Zone/ General Area	Vegetation, burrowing, corrosion, signs of run-on/runoff	Monthly		
	Firebreak	Vegetation, scrap, debris	Monthly		
	Roads	Settlement, holes, ditches	Monthly		
	Perimeter Fence	Broken poles, broken wires	Monthly		
	Detonation Berm	Eroding	Monthly		

Inspector: ______________________ **Date: ______________**

Time Completed: ______________

Exhibit C-1 Inspection Schedule and Checklist (continued)

11,900 Lb Open Detonation Range Checklist

Event #: ____________________

Operation Type: ____________________

Dates: ____________________

Team Chief: ____________________

I, ______________________________, certify that all items/actions required by permit for the 11,900-pound open detonation treatment unit have been completed.

____
(Team Chief Signature)

____
(Management Signature)

Exhibit C-2 Pre- and Post-Detonation Schedule and Checklists

Weather Log

Base Weather Service: ____________________

Name of Person Entering Data: ____________________

Date and Time Data is entered: ____________________

Date of Detonation Event: ____________________

Exact Time of Detonation: ____________________

Record of Weather Data Collected before Detonation

Qualitative description of the Weather (e.g. sunny, warm, rain)	
Temperature	
Wind Speed	
Wind Direction	
Atmospheric Stability	
Precipitation (e.g., no precipitation, light rain, snowing)	
Other Comments	

Pre- and Post- Detonation Checklists

Two Weeks in Advance of Scheduled Detonation

Checklist Items	Name: Date: Time:	Corrective Action
EOD Team Chief calls Test Track to confirm date will not conflict with Track mission. **679-2181**		
EOD Team Chief selects EOD team		
EOD Team Chief conducts briefing with team (including hazards involved with OD, treatment procedures, T.O.s, safety, and transportation procedures)		
EOD Team: • Conducts a range inspection for free standing liquids, unexploded munitions, vegetation, burrowing, and signs of runon/runoff to OD unit		
• Inspects the road to the OD unit for holes, ditches, and settling that could cause problems during the transportation of munitions		
• Identifies items listed for treatment		
• Identifies proper disposal techniques		
• Calculates the total mass being detonated, ensuring total doesn't exceed 11,900 lbs NEW per event		
• Contacts flight munitions custodian to notify of explosive requirements (how much C-4 needed)		
• Ensure that explosives will be on hand prior to scheduled operation		
EOD Team Inspections: • Emergency response equipment • Safety equipment • Security devices • EOD vehicles • Operating equipment		

Note: If it is the first detonation of the quarter, contact 49 CES/CEV and Dave Rizuto at cell: 430-3965, fax: 679-2148 within 24hrs after each detonation to schedule soil sampling.

Pre- and Post- Detonation Checklists

One Week in Advance of Scheduled Detonation

Checklist Items	**Name:** **Date:** **Time:**	**Corrective Action**
EOD Team: • Verifies items that will be treated.		
• Makes sure Munitions has a sufficient supply of explosives for the operation.		
• Checks calculations on the amount of necessary explosives and Net Explosive Weight.		
• Verifies with Test Track Control no conflicts with missions **679-2181**		

Note: If it is the first detonation of the quarter, contact 49 CES/CEV and Dave Rizuto at cell: 430-3965, fax: 679-2148 within 24hrs after each detonation to schedule soil sampling.

Pre- and Post- Detonation Checklists

Day Before Scheduled Detonation

Checklist Items	Name: Date: Time:	Corrective Action
EOD Team Chief • Briefs team on pending operations and team assignments		
EOD Team • Contacts Munitions to draw explosive materials and ensure delivery time of munitions and waste will be met **1500 and 1622**		
• Inspects all necessary equipment to ensure operability		
• Notifies Test Track Control **679-2181**		
• Notifies Base Fire Department **7228/7229**		
• Notifies Base Ambulance Response **3260**		
• Notifies Security Police **7171/3784/5810**		
• Notifies Base Operations Staff **5410/5411**		
• Notifies Base Environmental Coordinator **3931**		
• Contacts base meteorology team to obtain a forecast of predicted weather conditions for the following day and notify them of the operation **3924/3925**		
• Ensure that explosives will be on hand prior to scheduled operation		
EOD Team Inspections: • Emergency response equipment • Safety equipment • Security devices • EOD vehicles • Operating equipment		

Note: If it is the first detonation of the quarter, contact 49 CES/CEV and Dave Rizuto at cell: 430-3965, fax: 679-2148 within 24hrs after each detonation to schedule soil sampling.

Pre- and Post- Detonation Checklists

Day of Detonation

Checklist Items	Name: Date: Time:	Corrective Action
EOD Chief: • Conducts a safety briefing will all team members including review of requirements and procedures for safely transporting explosives		
• Provides arms to personnel who will be transporting explosives and conduct a briefing on the use of the firearms		
• Ensures that radio comm. lines are open with the EOD Team during the drawing and transportation of explosive materials		
• Supervises the munitions loading operations		
• Monitors and identifies deficiencies and refuse treatment if discovered		
• Ensures that all Emergency Equipment (first aid kit, shovels, fire extinguishers, etc.) are on hand or on standby ready to respond		
EOD Team: • Contacts base meteorology team to ensure that all weather conditions meet permit terms (i.e., wind speed, direction, temp., precipitation) **3924/3925**		
• Records weather conditions as shown in the weather log		
• Transports munitions and explosives to OD unit		
• Conducts final inspection of the OD unit		
• Makes radio contact with Test Track Control and EOD ops center		
• Ensures mobile two-way radios are placed in appropriate locations (with team members, track control net, team chief, and safety observer)		

Note: If it is the first detonation of the quarter, contact 49 CES/CEV and Dave Rizuto at cell: 430-3965, fax: 679-2148 within 24hrs after each detonation to schedule soil sampling.

Conducts a physical inspection of all munitions brought for treatment		
Compares inventory list with letter of disposal request to ensure all items are accounted for. Only items identified on the letter of request can be treated-all others will be refused and returned to Munitions storage for reschedule		
Places items in the area for treatment		
Segregates initiation explosives		
Sets up dual-primed firing systems to initiate the main charge		
Checks firing systems in primed positions		
Obtains approval for detonation from the Holloman tower via Test Track Control		

Note: If it is the first detonation of the quarter, contact 49 CES/CEV and Dave Rizuto at cell: 430-3965, fax: 679-2148 within 24hrs after each detonation to schedule soil sampling.

Pre- and Post- Detonation Checklists

Within 72 Hours after Detonation Occurs

Checklist Items	Name: Date: Time:	Corrective Action
EOD Team Chief • Signs required documentation (i.e., expenditure report) within 24 hours of the OD event and place a copy in the facility file		
EOD Team: • Collects any UXO and re-detonates it immediately		
• Collects any metals fragments and remnants		
• Places fragments in a container and handles items as hazardous waste		
• Cleans and inspects all EOD vehicles and other equipment		
• Arranges to backfill depressions and grade area (unless OD event is the last event in the quarter)		
• Prepares EOD report including an inventory list of what items were detonated, Net Explosive Weight, and names of participating EOD personnel		

Note: If it is the first detonation of the quarter, contact 49 CES/CEV and Dave Rizuto at cell: 430-3965, fax: 679-2148 within 24hrs after each detonation to schedule soil sampling.

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ATTACHMENT D

PERSONNEL TRAINING

HOLLOMAN AIR FORCE BASE
OPEN DETONATION TREATMENT UNIT

Permit No. NM6572124422

ATTACHMENT D
PERSONNEL TRAINING

INTRODUCTION

This attachment provides information on the training program for Explosive Ordnance Disposal (EOD) personnel at Holloman Air Force Base (HAFB) in accordance with the requirements of New Mexico Administrative Code, Title 20, Chapter 4, Part 1, Subpart V (20.4.1.500 NMAC), incorporating Title 40 Code of Federal Regulations (CFR) §264.16 and 20.4.1.900 NMAC, incorporating 40 CFR §270.14(b)(12).

The objective of the HAFB training program for EOD personnel is to ensure that operations are conducted in a safe manner and to ensure the facility's compliance with the requirements of §264.16. Facility personnel who handle hazardous wastes must successfully complete a program of classroom instruction and on-the-job-training in order to prepare them to operate and maintain the facility/unit in a manner that ensures the facility's compliance with Resource Conservation and Recovery Act (RCRA) training requirements.

D.1 TRAINING PROGRAM [20.4.1.500 NMAC §264.16 (a)(1)]

All HAFB EOD personnel attend the Naval School Explosive Ordnance Disposal (NAVSCOLEOD) located at Eglin Air Force Base, in Florida. NAVSCOLEOD is a Navy-managed command, jointly staffed by Army, Navy, Air Force, and Marine Corps personnel. Its mission is to train officers and enlisted personnel of the Air Force and other branches of the armed services in the most current procedures for the location, identification, render safe, recovery, technical evaluation, and disposal of conventional surface and underwater ordnance and incorporates hazardous waste management training for the specific wastes that are treated in the unit. This is the single training center for all military personnel in the EOD career field. Senior EOD personnel also support this training with on-the job training and close supervision. All EOD personnel must pass the basic course, and supervisory personnel must pass the EOD Operations Supervisory Course (J5AZN3E871)

Training for EOD personnel includes formal classroom instruction, on-the-job training, and training on written procedures and plans. EOD personnel must meet the requirements in the Officer Classification Directory and Enlisted Classification Directory respectively, and must be assigned to a valid EOD position on a Unit Manning Document to perform EOD duties. Personnel must maintain competency in all aspects of the EOD mission. Completion of the minimum training requirements listed in the 3E8X1 Career Field Education Training Program, Section G; AF EOD Standard Training Package, is required to maintain proficiency. Table D-1 provides a summary of required training for EOD personnel by job title and frequency.

Table D-1 Personnel Training Schedule for HAFB OD Unit

Job Titles					
Required Training	Apprentice Skill Level 3	Journeyman Skill Level 5	Craftsman Skill Level 7	Flight Chief	Frequency
EOD Operations Basic Course (J5ABN3E831) Skill Level 3	X	X	X	X	Initial or as required by AFI32-3001
Hazardous Waste Operations & Emergency Response (HAZWOPER)	X	X	X	X	Initial – 40 hours course Annual – 8 hours course
Skill Level 5 – On the Job Training		X	X	X	Progression Training as required by AFI32-3001
EOD Operations Supervisory Course (J5AZN3E871) Skill Level 7			X	X	Progression Training as required by AFI32-3001
Hazardous Waste Management and RCRA Regulations	X	X	X	X	Initial and Annual

D.1.1 TRAINING PROGRAM DIRECTION [20.4.1.500 NMAC §264.16 (a)(2)]

The HAFB EOD supervisor is responsible for ensuring that assigned personnel receive and successfully complete adequate training in handling potentially hazardous wastes. Training personnel at the NAVSCOLEOD are highly trained career specialists who provide the EOD training for all Department of Defense (DoD) personnel. The EOD and training directors at the EOD school have the training and experience required for their respective positions as required by §264.16(a)(2). In addition, HAFB management requires and ensures all EOD flight members receive initial and annual RCRA training to include a training session dealing with the requirements of the OD Unit Permit to perform operations on the permitted range.

D.1.2 HAZARDOUS WASTE MANAGEMENT AND EMERGENCY PROCEDURES TRAINING [20.4.1.500 NMAC §264.16 (a)(2) and (3)]

All EOD personnel are trained in handling explosive ordnance and potentially hazardous waste and in responding to emergency situations. The training is designed to ensure that personnel are familiar and able to respond effectively to emergencies including emergency procedures set forth in Attachment 1 of the EOD Operating Instruction 32-3001-05, emergency equipment, hazardous waste management, including Contingency Plan implementation. Also training includes procedures for using, inspecting, repairing, and replacing facility emergency and monitoring equipment, emergency communications systems, response to fires or explosions, response to groundwater contamination incidents, and shutdown of operations. All EOD personnel are required to complete initial and annual RCRA training according to HAFB EOD Operating Instruction 32-3001-05.

D.1.3 TRAINING PROGRAM CONTENT AND FREQUENCY [20.4.1.500 NMAC §264.16 (b) and (c)]

The EOD supervisor and Flight Training Program Manager will ensure that all EOD personnel have met the training requirements prior to participating in any detonation operations at the OD Unit. Due to the nature of the operations at the OD Unit, personnel involved in treatment operations are required to have training in the following areas:

- EOD Operations
- Hazardous Waste Management
- Emergency Response

EOD Operations Training

An outline of the NAVSCOLEOD course is provided in Table D-3 at the end of this attachment.

EOD personnel must re-attend the basic EOD course when:

- Assigned 48 months or longer in a non-EOD position (unless advanced EOD training is accomplished during that time).
- There is a 36-month or longer break in service.

Hazardous Waste Management Training

All EOD personnel responsible for management and operations at the OD Unit are required to complete the initial and annual refresher RCRA training program offered at HAFB. Personnel responsible for management and operations at the OD Unit are required to complete the training prior to participating in any detonation operations at the OD Unit. The course outline is provided as follows:

Hazardous Waste (RCRA) Training Outline

A. Introduction to RCRA
B. Definition of Hazardous Waste – Characteristic and Listed wastes
C. Accumulation point managers
D. Container use, marking, labeling, and on-base transportation; and
E. Contingency planning and emergency response

Emergency Response Training

All EOD personnel responsible for operations at the OD Unit are provided training in emergency response as a portion of the Holloman AFB training program. The NAVSCOLEOD training program ensures that personnel receive emergency response training. In addition, EOD Flight unit training and on-the-job training incorporates emergency response training. The emergency response and contingency publications and plans that are included in the EOD training program include:

Emergency Response Training Outline

A. Holloman AFB Emergency Management Plan (Holloman AFB EM Plan 10-2)
B. Civil Engineer Contingency Response Plan (CRP)
C. OD Unit Operating Instruction 32-3001-05
D. AFMAN 10-2503 Emergency Management Operations
E. AFMAN 32-4004 Emergency Response Operations (Being replaced by AFMAN 10-2503)
F. AFMAN 32-4013, Hazardous Material Emergency Planning and Response Guide

Annual reviews and updates are required for EOD, emergency response, and hazardous waste management training portions of the program.

D.1.4 JOB TITLES AND DUTIES [20.4.1.500 NMAC §264.16 (d)(1) and (2)]

In accordance with §§264.16(d)(1) and (2), the EOD office maintains a USAF Career Educational Training Program (CFETP) dated August 2007 depicting job title related to hazardous waste management at the 20,000-Pound Open Detonation (OD) Unit, and a job description for each job title. The job descriptions include hazardous waste management job duties, required skills, qualifications, experience, and educational requirements. Table D-2 provides a list of EOD job title, job descriptions, hazardous waste management duties, required skills, qualifications, and educational and /background requirements outlined in Table D-1 according to §264.16(d).

Table D-2 EOD Personnel

Job Title	Job Description	Skills, Qualifications, Experience and Education	Hazardous Waste Management Duties
EOD Apprentice/ Journeyman	EOD operations at the OD Unit	Skill Level 3/5 - special training in procedures on explosive ordnance.	EOD operations
Craftsman	Responsible for the conduct of personnel and verifies inventory listing	Skill Level 7	EOD team leader or range safety officer
EOD Supervisor/ Flight Chief	Plans, coordinates, and directs all explosive ordnance events and disposal operations.	Skill Level 7/9	EOD supervision

Functional area responsibilities and authorities for EOD operations by EOD units and personnel are set forth in Air Force Instruction 32-3001, Explosive Ordnance Disposal Program, and EOD Operating Instruction 32-3001-05, EOD Disposal (11.9K) Range Procedures.

D.1.5 RELEVANCE OF TRAINING TO JOB POSITION [20.4.1.500 NMAC §264.16 (a)(3) and §270.14(b)(12)]

The EOD training program is designed to ensure personnel is qualified to meet their actual job tasks. EOD personnel must meet the requirements in AFI 36-2105, Officer Classification and AFI 36-2108, Airmen Classification, respectively and as stated in AFI32-3001.

EOD supervisory personnel at HAFB are directly responsible for the proper handling of explosive ordnance. The duties, responsibilities, and qualifications for various positions are maintained at the EOD office. The position description for the EOD supervisor is presented below:

Air Force EOD Supervisor Responsibilities: Directs the operations at the EOD Flight at HAFB and has overall responsibility for the training of EOD personnel. The EOD supervisor provides assistance and guidance on explosive ordnance disposal and management of the Flight.

Duties: The HAFB EOD Supervisor:

- Plans, coordinates, and directs all EOD operations at HAFB
- Interprets regulations and develops necessary operating procedures as required
- Determines requirements for manpower, space, and equipment and initiates actions as needed
- Determines the need for modifications to existing facilities and initiates action to improve economy, efficacy, safety, and physical security of operations.
- Develops appropriate requirements and initiates requests for work.
- Coordinates with the Environmental Flight any changes or modifications of the OD Unit permit
- Maintains personal contacts with local and state government agencies and military commands.
- Assigns work to subordinate employees based on priorities.
- Makes decisions on work problems referred by subordinate supervisors.
- Ensures that workload and project responsibilities are specifically delegated and assigned to subordinates.

D.1.6 TRAINING PROGRAM RECORDS [20.4.1.500 NMAC §264.16 (d) and (e)]

The HAFB EOD Flight office maintains the following training program records for the OD Unit:

- Job title and a written job description for each position at the OD Unit and a list of personnel assigned to each job title.
- Rank, skill, education, and duties of EOD personnel assigned to each position
- Written description of the type and amount of basic and continuing training required for each position.

The Flight Training Program Manager keeps the training and service records for EOD personnel assigned to the flight. Training records, emergency response, and RCRA/OD Unit Permit portions of the program are maintained at the EOD Flight and Natural Resources Element.

Training records on current personnel will be kept until the OD Unit is closed. Training records for former personnel assigned to the OD Unit are kept for at least three years from the date the person last worked at the facility.

Annual reviews and updates are required for EOD, emergency response, and hazardous waste management portions of the program.

References:

Air Force Instruction (AFI) 32-3001, Explosive Ordnance Disposal Program, 8 October 2004.

EOD Operating Instruction 32-3001-05, EOD Disposal (11.9K) Range Procedures, 49th Civil Engineering Squadron

(TO) 11-1-42, *General Instructions for the Disposal of Conventional Munitions*

AFI 36-2105, Officer Classification

AFI 36-2108, Airmen Classification

Table D-3 Career Field Education and Training Plan

I. Explosive Ordnance Disposal (EOD) Specialist/Technician Career Field:

A. Progression in career ladder 3E8X0 B. Duties of Air Force Specialty Codes

II. Participate in USAF Graduate Evaluation Program

III. EOD Flight Management

A. EOD unit management
   (1) Organizational structure
   (2) Functions and responsibilities
B. Inspection system
C. Material deficiency reporting

IV. Applied Principles of Physics

A. Properties of matter
B. Laws of motion
C. Simple machines
D. Measurement systems
   (1) English
   (2) Metric
   (3) Conversion from one system to another

V. Fundamentals of Electricity

A. Demolition circuitry
B. Perform grounding procedures
C. Apply electromagnetic radiation precautions

VI. EOD Tools and Equipment

A. Maintain tools
B. Common hand tools
   (1) Select proper tools
   (2) Use tools properly
C. Special tools and equipment
   (1) Select proper tools
   (2) Use tools properly
D. EOD Mark (MK)-Series tools
   (1) Select proper tools
   (2) Use tools properly

VII. Military Explosives and Propellants

A. Identification
B. Effects
C. Application and use

VIII. Destruction of Explosive Material and Related Hazardous Materials

A. Transportation

B. Firing systems

(1) Electric

(2) Non-Electric

C. Disposal procedures

(1) Routine

(2) Emergency

D. Munitions residue

(1) Inspect

(2) Certify

(3) Disposition

E. Environmental protection

(1) Considerations

(2) Use of U.S. Environmental Protection Agency (EPA) 8700-22 manifest

(3) EPA permits and applications

(4) Identify environmental impacts caused by EOD

(5) Identify EPA regulations and directives pertaining to EOD operations

(6) Determine EPA documentation requirements

(7) Identify responsibilities of interfacing agencies

IX. Render Safe Techniques

A. Immobilize fuses

B. Remove fuses

C. Disable electrical components

D. Disrupt firing trains

E. Use shaped charges and demolition techniques

X. Chemical and Biological Warfare Agents

A. Classification

(1) Types

(2) Physical state

(3) Physiological action

(4) Persistency

B. Use protective clothing and equipment

C. Seal and package leaking munitions

D. Use detection and identification kits

E. Apply first aid/self air procedures

F. Use decontaminants and decontamination equipment

XI. Placed Munitions

A. Land mine and fuses

(1) Location

(2) Identification

(3) Observe safety precautions

(4) Render safe

(5) Perform disposal procedures

B. Booby traps and fuses

(1) Classification

(2) Identification

XII. Projected Munitions, Rockets, and Grenades

A. Projected munitions and their fuses

(1) Observe safety precautions

(2) Identification

(3) Locate

(4) Render safe

(5) Disposal

B. Projected munitions, rockets, and grenades of foreign countries

(1) Observe safety precautions

(2) Identification

(3) Locate

(4) Render safe

(5) Disposal

XIII. Dropped Munitions

A. Bombs and bomb fuses

(1) Observe safety precautions

(2) Identification

(3) Render safe

(4) Disposal

B. Dispensers and payload

(1) Observe safety precautions

(2) Identification

(3) Render safe

(4) Disposal

XIV. Aircraft Weapons Systems and Explosives

A. Aircraft egress/weapons systems

(1) Aircraft/egress

(2) Gun systems

(3) Release and launching systems

(4) Missile/rocket launching systems

(5) Miscellaneous explosive-actuated devices

B. Aircraft explosive devices

(1) Locate

(2) Identify

(3) Observe safety precautions

(4) Render safe

XV. Pyrotechnics

A. Identify
B. Observe safety precautions
C. Render safe
D. Disposal

XVI. Guided Missiles

A. Classification
B. Identification
C. Propulsion Systems
   (1) Identification
   (2) Characteristics
D. Hazardous missile components and propellants
   (1) Identification
   (2) Render safe
   (3) Removal
   (4) Disposal
E. Guided missiles of foreign countries

XVII. Explosive Ordnance Reconnaissance

A. Recognition of terrain changes due to unexploded ordnance (UXO)
B. Locate, mark, and report UXOs
C. Estimate collateral damage
D. Technical intelligence
   (1) Use photographic equipment
   (2) Reporting

XVIII. Access and Recovery

A. Characteristics of soils
B. Effects of weather on soils
C. Methods of gaining access
D. Performing field rigging and improvised hoisting
E. Tie knots, bends, and hitches

XIX. Ranges

A. Decontaminate ranges
   (1) Active
   (2) Inactive
   (3) Excess
B. Proficiency training and demolition ranges
   (1) Establish
   (2) Maintain

XX. Improvised Devices

A. Locate
B. Gain access

C. Identify
D. Interpret radiographs
E. Observe safety precautions
F. Render safe
G. Perform disposal procedures

XXI. Base Recovery after Attack
A. Concept
B. Responsibilities
C. Pre-attack EOD procedures
D. Post-Attack EOD procedures
E. Munitions clearance vehicle Concept of Operations (CONOPS)

XXII. Peace Time Operations
A. Develop plans for range clearance operations
B. Develop plans for ammunition disposal report operations
C. Use of demolition techniques

XXIII. Communications/Electronics
A. Tactical radios
B. Global positioning system
C. Frequency management requirements

XXIV. Render Safe Techniques
A. Immobilize fuses
B. Remove fuses
C. Disable electrical components
D. Disrupt firing trains
E. Use shaped charges and other explosive techniques

XXV. Case Attack Procedures
A. Use Stand-Off Munitions Disruption (SMUD) techniques
B. Use thermal techniques
C. Use shaped charges and other explosive techniques

XXVI. US and Foreign Underwater ordnance
A. Identify
B. Observe safety precautions

XXVII. New EOD Developments

ATTACHMENT E

CONTINGENCY PLAN

HOLLOMAN AIR FORCE BASE
OPEN DETONATION TREATMENT UNIT

Permit No. NM6572124422

ATTACHMENT E
CONTINGENCY PLAN
20,000-POUND OPEN DETONATION UNIT

E.1 INTRODUCTION

This 20,000-Pound Open Detonation (OD) Unit Contingency Plan (Contingency Plan) outlines procedures for responding to an emergency involving hazardous waste at the OD Unit. This Contingency Plan was prepared in accordance with the requirements of 20 New Mexico Administrative Code (NMAC) Title 20, Chapter 4, Part 1, Subpart V (20.4.1.500 NMAC) §264.50 to §264.56.

E.1.1 PURPOSE AND IMPLEMENTATION

The purpose of this OD Unit Contingency Plan is to define responsibilities, ensure coordination of response activities, and minimize hazards to human health or the environment from fire, explosions or any unplanned sudden or non-sudden release of hazardous wastes to the environment.

This Contingency Plan is designed to minimize hazards to human health and the environment from emergencies that may occur as a result of managing hazardous wastes (ordnance materials) at the HAFB OD Unit. The ordnance materials are solids that demonstrate the hazardous characteristics of reactivity. Emergency events that could occur would be an uncontrolled explosion, an accidental fire, or a diesel fuel spill from a vehicle.

This Contingency Plan will be reviewed and, if necessary, amended whenever any of the following occurs:

- The facility permit is revised
- The plan fails in an emergency
- Design or operation of the facility changes significantly such that implementation of the Contingency Plan would be affected
- List of emergency coordinators changes
- List of emergency equipment changes

The overall approach for emergency response at HAFB is through a hierarchy of personnel for responding to emergencies throughout the Base as detailed in the Holloman Emergency Management Plan 10-2 and numerous HAFB plans (i.e., emergency response, evacuation, contingency response). These documents are maintained and available for review at HAFB. The procedures outlined in this Contingency Plan are developed to specifically detail the procedures for an emergency involving hazardous waste at the OD Unit.

Copies of this Contingency Plan, as well as updates, are maintained at the explosive ordnance disposal (EOD) office; with primary and secondary emergency coordinators (identified in Section E.1.4); and security forces, fire departments, and medical facilities responsible for responding to emergencies.

E.1.2 OD UNIT OPERATIONS

Activities at the OD Unit consist of detonation of ordnance materials that are considered to be hazardous wastes due to their exhibiting the characteristics of reactivity (U.S. Environmental Protection Agency [EPA] Hazardous Waste Code D003). As evidenced by the chemical composition information contained in the Waste Classification and Identification section, Attachment B, the ordnance materials contain relatively few hazardous constituents that would persist after detonation, and the constituents are relatively immobile. Consequently, the only immediate threat to human health or the environment as a result of activities at the OD Unit is an uncontrolled explosion, an accidental fire, or a diesel fuel spill from a vehicle.

The primary mission of the OD Unit is to render safe reactive materials at HAFB that have exceeded their shelf life, deteriorated unexpectedly, are damaged, or failed to attain specifications. In the event that an uncontrolled explosion occurred at the OD Unit, the exploded materials would not present a danger to human health or the environment outside the immediate area of the OD Unit. In that event, additional EOD personnel would be dispatched to the OD Unit to render safe any unexploded ordnance material that may be present following an uncontrolled explosion. In case a treatment event at the OD Unit is aborted, the waste will be removed and sent back to the generator.

There is a fire response station located at HAFB. Fires that occur at HAFB are handled by Civil Engineer Squadron (CES) Fire Protection Flight. Additionally, HAFB maintains a Disaster Control Group that can also respond to fire emergencies. For fire emergencies that are extremely large, HAFB has agreements with Alamo West and the cities of Alamogordo and Cloudcroft to use their volunteer fire departments.

In the event of a diesel fuel spill from a vehicle, fire protection personnel will respond. EOD personnel maintain additional spill response supplies and equipment, and are trained in diesel fuel spill response.

E.1.3 COORDINATION AGREEMENTS

HAFB maintains a full spectrum of emergency response services at the installation including a fully equipped fire response station, emergency medical services, and security forces. As there is now only an on-post clinic, the base has arrangements with the Gerald Champion Regional Medical Center. These organizations have been contacted to familiarize responders with operations and contingency planning for the OD Unit.

Although the capabilities of HAFB exceed those of local emergency response services, HAFB has agreements with various outside facilities pursuant to 20.4.1.500 NMAC §264.37. These Mutual Support Agreements (MSAs) have been established between HAFB and local communities for major accidents, hazardous materials incidents, fire protection and rescue, medical care and security/public safety (Exhibit E-1). These agreements are maintained at the

HAFB facility (49th CES Explosive Ordnance Disposal Flight) in accordance with 20.4.1.500 NMAC §264.50 through §264.52(c). These facilities include the local volunteer fire departments in Alamo West and the cities of Alamogordo and Cloudcroft.

E.1.4 EMERGENCY COORDINATORS

The primary Emergency Coordinator (as required by 20.4.1.500 NMAC §264.55) at HAFB is the Commander of the 49th Mission Support Group. The Commander has a detailed knowledge of hazardous waste operations at HAFB, layout and operations at the OD Unit, and the emergency response procedures of the Contingency Plan. The Emergency Coordinator is authorized to commit all resources necessary for emergency response activities.

The secondary Emergency Coordinator at HAFB is the Base Civil Engineer. EOD personnel are the primary support for an emergency situated at the OD Unit. HAFB fire protection and disaster control groups assist in emergency situations at the OD Unit. The Emergency Coordinator is reached by calling the Command Post at 572-7575.

E.1.5 IMPLEMENTATION OF THE CONTINGENCY PLAN

The Contingency Plan will be implemented immediately whenever there is an accidental fire, spill, or uncontrolled explosion that could threaten human health or the environment. Such a fire would be defined as one that had spread outside the boundaries of the OD Unit to an extent that HAFB personnel and equipment could not provide adequate containment.

E.1.5.1 Emergency Response Procedures (20.4.1.500 NMAC §264.56)

During an event not requiring implementation of the OD Unit Contingency Plan, EOD personnel will alert Test Track personnel and the fire protection group via portable radio.

Notification

The EOD team members discovering a potential emergency incident at the OD Unit will notify the Range Safety Officer (RSO). The RSO will activate the internal alarm system to notify or evacuate personnel, if appropriate. In addition, the RSO will notify the Base Fire Chief, CES Asset Management Flight, Natural Resources Element and Medical Services as required.

During an emergency situation that requires implementation of this Contingency Plan, the emergency coordinator would implement the following first level response procedures:

- Activate internal communications systems to alert emergency response personnel
- Identify the character, exact source, amount, and areal extent of the released materials
- Assess possible hazards to human health and the environment (both on-installation and off-installation)
- Take steps to mitigate the spread or reoccurrence of the fire
- Notify appropriate state or local agencies, if needed

- Remove/transport any untreated ordnance material if the emergency occurs while ordnance material is still present at the site

If, based on the assessment of possible hazards, the emergency coordinator determines that the fire could threaten human health or the environment on the installation; he/she would immediately notify the security forces. If evacuation is considered necessary, the emergency coordinator would confer with military police on which areas should be evacuated. If, in the unlikely event that the emergency coordinator determines that the fire could threaten human health or the environment off-installation, he would immediately notify local authorities. If evacuation is considered necessary, the emergency coordinator would confer with local authorities and with security forces on which areas should be evacuated. The Natural Resources Element will notify the National Response Center at 1-800-424-8802 and provide the Center with the following information:

- Name and telephone number of the emergency coordinator making the notification
- Name and address of the facility (Holloman Air Force Base, Alamogordo, New Mexico)
- Time and type of incident (fire)
- Name and quantity of materials involved
- The extent of injuries, if any
- The possible hazards to human health or the environment outside the facility

According to HAFB EODOI 32-3001-05, during an emergency, personnel will evacuate the OD Unit through the south gate toward the range flag or other pre-designated location such as the Test Track area or the ARC building (building 1025) that is located 1.5 miles south east of the OD Unit. The team leader will take accountability of all personnel, and the Range Safety Officer (Senior EOD member) will coordinate with HAFB organizations for assistance.

E.1.6 EMERGENCY RESPONSE EQUIPMENT (20.4.1.500 NMAC §264.32)

HAFB maintains a large inventory of equipment that can be used as emergency response equipment. Although this equipment is not dedicated solely for hazardous waste service, it can be used in response to a fire involving hazardous waste. A listing of the available equipment, number of items, and the locations of the equipment is included in Section E.2.4.9. After use, all durable emergency response equipment must be cleaned, inspected, and fit for its intended use prior to resuming operations at the OD Unit. All non-durable emergency response equipment that is disposed of must be replaced as soon as practicable.

E.1.7 POST EMERGENCY REPORTS [20.4.1.500 NMAC §264.56(j)]

HAFB will note in their operating record the time, date, and details of any incident that requires implementation of the Contingency Plan. Within 15 days after an event requiring implementation of the Contingency Plan, an incident report will be prepared detailing the event and submitted to the Region VI Regional Administrator of the EPA and the NMED as required by 20.4.1.500 NMAC §264.56(j). The report will include the following information:

- Name, address, and telephone number of HAFB
- Date, time, and type of incident (e.g., fire, explosion)
- Name and quantity of material(s) involved
- The extent of injuries, if any
- An assessment of actual or potential hazards to human health or the environment, where applicable
- Estimated quantity and disposition of recovered material that resulted from the incident

Before operations are resumed at the OD Unit, NMED will be notified that the OD Unit is in compliance with 20.4.1.500 NMAC §264.56(h) and (j). The notification will verify that wastes incompatible with the released material are treated until cleanup procedures are completed and that all emergency equipment is cleaned and ready for its intended use.

E.2 CONTINGENCY RESPONSE PLAN

The information contained in the following paragraphs is adopted from the HAFB Emergency Management Plan 10-2. The Plan is divided into six sections that identify:

- Overall mission
- Designated parties and their responsibilities
- Emergency response, control, and countermeasures
- Contingency plan requirements and actions
- Contingency training
- Plan review and update

E.2.1 GENERAL INFORMATION

This Contingency Plan will be reviewed continually and revised if any of the following occur:

- the facility permit is revised
- the plan is inadequate in an emergency
- the procedures herein can be improved
- facility operations change in a way that alters the plan
- the emergency coordinator changes
- the emergency equipment list changes

Amendments to this Contingency Plan can be initiated by any responsible party. Proposed changes may be submitted to the 49th CES as the office with primary responsibilities to represent both EOD personnel and other contingency response personnel. Adopted changes will be provided to all record holders of this permit.

Copies of the Contingency Plan will be available at the 49th CES and the base EOD office.

The facility name, address, owner/operator ID number and permit number are provided below:

Name:	Holloman Air Force Base
Address:	550 Tabosa Avenue, Building 55, HAFB, New Mexico 88330-8458
Owner:	United States Air Force
Operator:	Holloman AFB
EPA ID No:	NM6572124422
Permit No:	NM6572124422-OD

E.2.2 EMERGENCY COORDINATORS

The emergency coordinators will coordinate and direct control and cleanup efforts at the scene in case of an incident involving the transportation, handling, or detonation of explosive waste items. The emergency coordinators can designate other personnel to assist them in the event of an emergency and have the full authority to obtain fire and medical support service should the need arise.

Prior to operations by EOD personnel, the EOD supervisor contacts the following base offices:

- meteorology
- munitions
- medical services
- security forces
- base operations
- 49 CES/CEAN
- fire chief.

Therefore, these organizations are alerted in the event that potential emergencies occur during EOD treatment operations.

The primary OSC for HAFB is the Commander, 49th Mission Support Group. The title and work phone number of the primary OSC and designated alternates are provided below:

Title	Base Phone No.
Commander (MSG)	(575) 572-5541
Base Civil Engineer (CE)	(575) 572-3071
Fire Chief	(575) 572-7228
Assistant Fire Chief on Duty	(575) 572-7288

E.2.3 IMPLEMENTATION

The decision to implement the Contingency Plan for the OD Unit depends upon whether an imminent or actual incident could threaten human health or the environment.

The purpose of this section is to provide guidance to the emergency director in making this decision by providing decision-making criteria.

The Contingency Plan will be implemented in the following situations:

- An unplanned fire or unplanned explosion occurs at the OD Unit such that:
  - the potential for human injury exists
  - toxic fumes that could endanger human health or the environment are released
  - the fire could spread on-site or off-site and possibly ignite other flammable materials or cause heat-induced explosions
  - the use of water and/or chemical fire suppressants could result in contaminated run-off that could endanger human health or the environment
  - an imminent danger exists that an explosion could ignite other hazardous wastes at the facility and possibly results in the release of toxic material
- A spill or unplanned release of hazardous material occurs at the unit such that:
  - The spill could cause the release of toxic liquids or fumes that could endanger human health or the environment
  - The spill cannot be contained in the immediate area resulting in potential off-site soil contamination and/or ground or surface water pollution that could endanger human health or the environment
  - The spilled material inadvertently detonates or is combustible
  - A fire or explosion occurs during transportation of the waste or residuals to or from the unit
- A planned treatment event results in:
  - An imminent release due to damage to the unit beyond damage that is typical to such treatment event
  - Any structure, road surface, or other item is ignited in the vicinity
  - During rupture of a cylinder, the cylinder is released from its securing device

E.2.4 EMERGENCY RESPONSE PROCEDURES

E.2.4.1 Notification [20.4.1.500 NMAC §264.56(a)(1) and (2)]

The EOD team members discovering a potential emergency incident at the OD Unit will notify Fire Protection and the Range Control Supervisor. The Range Control Supervisor will, in turn, notify the OSC or alternate. The OSC or alternate will immediately activate the internal alarm system to notify or evacuate personnel, if appropriate. In addition, the OSC or alternate will notify the Base Fire Chief, Environmental Coordinator, Base Civil Engineer, Chief of Operations, Readiness Flight, Natural Resources Element, Public Affairs, and Medical Services, as required.

The appropriate local agencies with designated response roles will be notified by the OSC if their help is needed. The appropriate state agencies will be notified if their assistance is needed, or the incident requires reporting at this level.

The evacuation routes to be used in the event of an emergency are the OD Unit entrances, provided that the extent of the incident is limited to the immediate vicinity but temporary evacuation is required. Evacuation from the main base area, if required, is designated in the HAFB Emergency Management Plan 10-2.

E.2.4.2 Identification of Hazardous Wastes [20.4.1.500 NMAC §264.56(b)]

The OSC will immediately identify the character, exact source, amount, and extent of the material involved in the unplanned incident. The initial identification method will be by visual inspection of the incident’s effects, spilled material, and location of the release. Plan records, including physical inventories, process and waste log sheets, and biennial reports are available at the EOD Administrative Office to aid in estimating the composition and quantity of released material. EOD personnel at the OD Unit also conduct a physical inventory of all munitions brought for treatment by Munitions Storage Area personnel.

Qualified personnel will sample the released material to verify hazardous material identification, to determine boundaries of contaminated areas and contaminant concentrations, and to verify that proper cleanup activities are completed.

E.2.4.3 Hazard Assessment [20.4.1.500 NMAC §264.56 (c) and (d)]

Possible hazards to the environment and public health will be assessed by the OSC, and the need for local evacuation and notification of local authorities will be determined. In assessing the situation, the OSC will consult with the Natural Resources Element, Bioenvironmental Engineer, and Base Fire Chief. These parties will consider direct and indirect effects of the event on human health, welfare, and natural resources. In assessing the event, the potential for direct and indirect effects will indicate, but not be limited to, fire, explosion, further release occurrence, toxic gases, or injection by run-on and run-off. Action will be taken to control releases and minimize effects during such an emergency if the situation involves the release or potential release of toxic effluent.

The OSC, in conjunction with the noted personnel, will determine whether the OD Unit has had a release that could threaten human health or the environment outside the base. Bioenvironmental Engineering personnel will survey the area and advise the OSC in the establishment of protective boundaries around the contaminated areas.

If a release results in a vapor cloud, several methods are available for assessing the hazards. Portable equipment for direct air monitoring can be used to make a rapid determination of the most volatile organics.

Meteorological data, including wind speed, and direction, temperature, dew point, barometric pressure, and an automatically calculated stability factor are continuously available from HAFB meteorological towers. These data, along with information about the source of an atmospheric release, can be used to predict the direction, extent, and estimated concentration profile of a contaminated release.

If the assessment of the incident indicates that evacuation of areas downwind of the unit may be advisable, the OSC will immediately notify Headquarters Air Combat Command and the appropriate local authorities. The OSC will consult with these officials to help decide whether local areas should be evacuated. The OSC or the Natural Resources Element will immediately notify the National Response Center (using their 24-hour toll free number, 1-800-424-8802).

E.2.4.4 Control Procedures [20.4.1.500 NMAC §264.56(e)]

Potential accidents at the OD Unit can be considered as an unplanned fire/explosion, inadvertent facility damage, or spill material release. Natural disasters such as earthquakes, hurricanes, or tornadoes are not assumed to cause actions that fall into one of these categories. Procedures for responding to these incidents are contained in this Contingency Plan, HAFB Emergency Management Plan 10-2, and Technical Orders 11A-1-60 and 11A-1-42. Prompt action will be taken to control any hazard. If an immediately dangerous explosive item is encountered, all operations in the immediate vicinity will be shut down, personnel evacuated to a safe location, and EOD personnel called to render assistance in eliminating the hazard. Operations will not be resumed until the hazard has been eliminated. In the event that a spill occurs while transporting any of the explosive, reactive wastes or munitions to the OD Unit, the following actions will be taken:

Ordnance Transportation Vehicles

- Explosion. In the event of an explosion, personnel will immediately withdraw to a safe distance and evaluate the situation. NOTE: This does not apply to detonation during transport, which requires immediate implementation of the Emergency Management Plan 10-2. Heavy-bodied trucks have been specifically chosen for this task due to the inherent risk associated with these materials. Transport limits and requirements are specified in EOD technical orders.

- Fire. In the event of a fire involving a transport vehicle with ordnance onboard, an attempt to control the fire with available extinguishers may be permissible if the fire is initially away from the ordnance. If not, personnel will withdraw to a safe distance and advise appropriate authorities.

E.2.4.5 Prevention of Recurrence or Spread of Fires, Explosions, or Releases [20.4.1.500 NMAC §264.56(e) and (g)]

In the event of a fire, explosion, release or spill, the Emergency Coordinator will ensure that the initial response is executed in accordance with the Holloman AFB Emergency Management Plan 10-2. This includes identification and containment of releases following actions to save lives, reduce injuries, and protect the environment; evacuation of nonessential personnel; cordoning off the danger area; performing fire and rescue operations; stopping the release (if possible); and preventing the spread of spilled substance into the environment (storm drains, sewers, natural drainage areas and groundwater). To prevent the recurrence or spread of fires, explosions, or releases, at a minimum, the follow-up actions are as follows:

- Start actions to collect, treat, and dispose of non-explosive waste or other materials as appropriate. This will be a joint operation involving EOD, Fire Protection, and Bioenvironmental Engineering personnel.

- Ensure that EOD, Fire Protection, and Safety personnel investigate the cause of the emergency and provide a technical report to the Commander, 49th Mission Support Group within 72 hours.

- Ensure that proper restoration actions are started as soon as possible after appropriate decontamination procedures for explosives have been completed. This will be a joint operation between Safety and Civil Engineer personnel for Air Force incidents. All decontamination actions will be documented, and the records will be permanently maintained at Air Force EOD, Safety, and Real Property offices.

- Ensure that equipment repaired or replaced as a result of the incident is recertified, as necessary, prior to being returned to service.

E.2.4.6 Storage and Treatment of Released Material [20.4.1.500 NMAC §264.56(g)]

After a detonation event, EOD personnel will collect any released material or debris within 72 hours. No wastes that may be incompatible with the released material is treated, stored, or disposed of until clean-up procedures are completed. OD Unit operations will not resume until hazards are eliminated. The collection, treatment, and disposal of non-explosive waste will be a joint operation involving EOD, Natural Resources Element , Fire Protection, and Bioenvironmental Engineering personnel. The Permittee shall characterize the debris collected after each detonation in accordance with 40 CFR §261, Subpart C. This will be accomplished by sampling and analysis, MSDS review, or generator knowledge. Based on this characterization, the Permittee shall manage the fragments collected in accordance with 40 CFR §261 as applicable to the waste.

E.2.4.7 Post-Emergency Equipment Maintenance [20.4.1.500 NMAC §264.56(h)]

Post-emergency equipment maintenance will be performed in accordance with the HAFB Emergency Management Plan 10-2. After use, all durable emergency response equipment must be cleaned, inspected, and fit for its intended use prior to resuming operations at the OD Unit.

All emergency equipment is cleaned and inspected to ensure it is fit for its intended use before facility operations are resumed. All non-durable emergency response equipment that is disposed of must be replaced as soon as practicable.

E.2.4.8 Container Spills and Leakage

Any container spills or leakage that might occur at the OD Unit will be managed in accordance with the HAFB Emergency Management Plan 10-2.

E.2.4.9 Emergency Equipment

According to HAFB EOD Operating Instruction 32-3001-05, the following equipment will be immediately available during EOD operations:

- First aid kit (NSN-654500-116-1410) or suitable substitute
- Demolition tools and equipment
- Explosives and demolition materials
- Pioneer and hand tools as required
- Fire extinguishers, two 2A 10B/C
- Disposal Range Guide and applicable technical data
- Radio for emergency communications and/or contact with range control – at least two (i.e., hand-held, vehicular, cell phones)
- Range flag
- Specialized EOD tool as required
- Fire extinguisher in vehicles carrying class B/C explosives
- Vehicles with placards

All emergency response and personal protection equipment is routinely inspected and tested to ensure equipment is maintained in good working order. Emergency response equipment is inspected and tested in accordance with the Inspection Schedule and Checklist provided in Attachment C. Inspections are conducted monthly as well as two weeks in advance of scheduled detonation, the day before a scheduled detonation, and the day of detonation. Corrective actions to address deficiencies are immediately implemented and documented on the Inspection Checklist.

Table E-1 provides a comprehensive list of emergency response and personal protection equipment available for use at the OD Unit.

Table E-1 Emergency Response Equipment Available for Use at the HAFB OD Unit

Response Equipment	Description/Capabilities	Location
Firefighting Vehicles	Firefighting vehicles equipped for fire suppression, emergency response and personal protection including self-contained breathing apparatuses (SCBAs). Available for immediate response and transport to emergency incidents.	49 CES Fire Protection Flight
Security Vehicles	Equipped with communications equipment and utilized for transportation of personnel and equipment. Available for immediate response and transport to emergency incidents.	49 Security Forces Squadron
Emergency Medical and First Aid Equipment and Supplies	Equipment for movement of injured personnel (e.g., stretchers, Stokes litter) blankets, emergency first-aid supplies, and medical-grade oxygen in compressed cylinders equipped for personnel use.	49 CES Fire Protection Flight, 49 Medical Group
Self Contained Breathing Apparatus (SCBA)	SCBA equipped with positive pressure mode for use by personnel entering hazardous atmospheres and monitoring instruments.	49 CES Fire Protection Flight
Fire extinguishers	Minimum of two 2A 10B/C fire extinguishers on-site at the OD Unit.	EOD Flight
Radio and communications equipment	Hand-held and vehicle-mounted two-way radios for emergency communications.	EOD Flight; 49 CES, 49 CES Fire Protection Flight, 49 Security Forces Squadron
Emergency response and release clean-up equipment and materials	Personal protective equipment (Tyvek coveralls, nitrile gloves, foot coverings, face shields, and protective eyeglasses) for use by emergency response personnel. Decontamination equipment (portable eyewash, shower, brushes) Clean-up equipment and materials (absorbents, booms, shovels, brooms, drums)	49 CES

Procedures for decontamination of personnel, equipment, or areas are conducted according to the HAFB Emergency Management Plan 10-2. These procedures are designed to render persons, equipment, or areas safe by absorbing, destroying, neutralizing, making harmless, or removing chemical or biological agents, or by removing radioactive material. Immediate decontamination is carried out by individuals upon becoming contaminated, to save life and minimize casualties and may include decontamination of some personal clothing or equipment. Operational decontamination may be carried out by an individual or a unit, restricted to specific parts of operationally essential equipment, material, and/or working areas, in order to minimize contact and transfer hazards and to sustain operations. This may include decontamination of the individual beyond the scope of immediate decontamination, as well as decontamination of mission-essential spares and limited terrain decontamination. Thorough decontamination may be carried out by a unit, with or without external support, to reduce contamination on personnel, equipment, material, and/or working areas to the lowest possible levels, to permit the partial or total removal of individual protective equipment and to maintain operations with minimum degradation. This may include terrain decontamination beyond the scope of operational decontamination.

E.2.4.10 Coordination Requirements

In addition to the Base organizations and personnel assigned to the response effort, provisions have been made for including off-base organizations in the response organization when on-base response resources and expertise are insufficient, and when off-base water, land, or air are adversely affected. Some of the significant off-base response resources that can be incorporated, as needed, include the following.

a. ACC/A7V:

   Major Command office responsible to ensure environmental protection including spill response matters. This office is located at Langley AFB, Virginia and can be reached at DSN 574-9342 or commercial (757) 764-9342.

b. Air Force Civil Engineer Center (AFCEC) Reach Back Center:

   AFCEC is assigned the responsibility to provide technical guidance and assistance to major commands and bases in contingency operations and environmental planning. Technical expertise can be provided to the Air Force OSC on hazardous material identification, control, cleanup, and disposal. The AFCEC Reach Back Center is AFCEC's 24-hour, emergency contact line for emergency notifications, as well as its reach-back and referral information provider for all AFCEC activities. The AFCEC Reach Back Center is located at Tyndall AFB, Florida and can be reached at DSN 523-6995 or commercial (850) 283-6995.

c. State of New Mexico Response Team:

   NMED has developed an Emergency Response Team to respond to spills occurring within the state boundaries. The state OSC will be briefed fully by the HAFB OSC on the spill response. The state OSC will be familiar with the available sources of spill response equipment and materials within New Mexico. The NMED emergency response team phone number is (505) 827-9329.

d. City of Alamogordo Fire Department:

   HAFB has a mutual aid agreement with the city of Alamogordo Fire Department (located about 7 miles east of HAFB to provide assistance in the event it should be needed. The phone number of the Alamogordo Fire Department is (575) 439-4300.

e. White Sands Missile Range:

   HAFB has a mutual aid agreement with the White Sands Missile Range Fire Department located approximately 40 miles west.

f. National:

The following information services are also available to assist in the event of an emergency:

- CHEMTREC® (Chemical Transportation Emergency Center)
- Chemical Hazard Response Information System Manual
- ERIS (Emergency Response Information System)
- OHMTAPS (Oil and Hazardous Materials/Technical Assistance Data System)
- U.S. Air Force Occupational and Environmental Health Laboratory.

E.2.4.11 Evacuation Plan

It is extremely unlikely that emergency operations at the OD Unit would require evacuation of other areas at HAFB since the OD Unit is isolated from any other area or office buildings.

The general base evacuation plan is provided in Appendix 2 to Annex B of the HAFB Emergency Management Plan 10-2.

E.2.4.12 Reporting and Recordkeeping [20.4.1.500 NMAC §264.56 (i)]

The emergency coordinator will notify the Natural Resources Element, who will report pollution incidents as necessary, as follows:

1. All pollution incidents will be reported as soon as practicable, by telephone during duty hours or by message during off-duty hours, to the following agencies:

   a. HQ ACC/A7V

      Defense Switched Network (DSN) 574-9342; commercial (757) 764-9342

   b. Regional Response Center (RRC)

      Environmental Protection Agency
      Region VI First Interstate Bank Tower
      1445 Ross Avenue, Dallas, TX 75202-2733
      (214) 767-2666/2720, or Telex 910-861-4125

2. New Mexico Environment Department (NMED) (505) 827-9329. Verbal notification will be provided to NMED as soon as possible after learning of a discharge, but in no event more than twenty-four (24) hours thereafter. Notification of releases of any amount of any material in such quantity as may with reasonable probability injure or be detrimental to human health, animal or plant life, or property; or may unreasonably interfere with the public welfare or the use of property must be reported to the NMED. This includes chemical, bio-hazardous, petroleum-product, and sewage spills and incidents. In addition to recent spills, the discovery of evidence of previous unauthorized discharges, such as contaminated soil or ground water, will be reported.

3. Major spills or potentially major spills will immediately be reported by telephone and email or facsimile to the RRC (l.b above) and:

National Response Center
Environmental Protection Agency
Nasiff Building
400 7th Street, SW, Washington, DC 20590
1-800-424-8802 or Telex 426-0014

4. Medium-sized spills will be reported to the above agencies as soon as practical.

HAFB will note in their operating record the time, date, and details of any incident that requires implementation of this Contingency Plan. Within 15 days after an event requiring implementation of this Contingency Plan, an incident report detailing the event will be prepared and submitted to the EPA Region VI Regional Administrator and the NMED as required by 20.4.1.500 NMAC §264.56(i). The report will include the following information:

- Name, address, and telephone number of HAFB
- Date, time, and type of incident (e.g., fire, explosion)
- Name and quantity of material(s) involved
- The extent of injuries, if any
- An assessment of actual or potential hazards to human health or the environment, where applicable
- Estimated quantity and disposition of recovered material that resulted from the incident

Before operations are resumed at the OD Unit, NMED and the Regional Administrator will be notified that the OD Unit is in compliance with 20.4.1.500 NMAC §264.56(h) and (i). The notification will verify that wastes incompatible with the released material are treated until cleanup procedures are completed and that all emergency equipment is cleaned and ready for its intended use.

EXHIBIT E-1: Memorandum of Understanding for Off-Installation Emergency Action

NEW MEXICO & HOLLOMAN AFB MEMORANDUM OF UNDERSTANDING FOR OFF-INSTALLATION EMERGENCY ACTIONS INVOLVING EXPLOSIVES AND EXPLOSIVE DEVICES

1. Parties: The parties to this Memorandum of Understanding (MOU) are the Department of Defense (DoD) Explosive Ordnance Disposal (EOD) unit located on Holloman Air Force Base, NM, the Department of Public Safety, Alamogordo, NM, New Mexico State Police, Otero County Sheriff's Office and the New Mexico Environment Department Hazardous and Radioactive Materials Bureau.

2. Background:

a. EOD organizations have personnel specially trained to handle all types of explosives, including improvised explosive devices. Other Federal agencies request assistance from EOD organizations in emergencies involving explosives. These situations call for immediate action to abate the safety threat by treatment in place or removal to a safe location for treatment.

b. US EPA's Military Munitions Rule (MR) (62 FR 6622, Feb. 12, 1997) has made it clear that EOD personnel engaged in an explosives or munitions emergency response are exempt from the generator, transporter, and treatment, storage and disposal unit requirements of the Solid Waste Disposal Act (423 USC Sec 6901, et seq.). The terms of this MOU are governed by the standards established on the MR, whether the MR or the Solid Waste Act is being administered by the federal or state government, in whole or part.

c. Except for providing temporary storage or treatment of explosives in order to provide emergency life-saving assistance to civilian authorities, or to assist law enforcement agencies in accordance with established agreements between DoD and the Federal agency concerned, the DoD is prohibited by law (10 USC 2692) from using DoD installations for the storage or treatment of non-DoD owned hazardous materials.

3. Purpose: This MOU addresses the parties' roles and responsibilities regarding notification responsibilities during emergency response operations, and is intended to:

a. Minimize the risk to public safety from EOD operations.

b. Maximize the efficiency, safety and speed of any explosive treatment or retrieval operation.

c. Establish a framework for mutual assistance and consultation among the parties with respect to EOD explosives or munitions emergency response operations.

4. Scope: This MOU applies to EOD explosive or munitions response operations in the public sector.

5. Definitions:

a. ***Explosives or Munitions Emergency*** - a situation involving the suspected or detected presence of unexploded ordnance, damaged or deteriorated explosives or munitions, an improvised explosive device (IED), other potentially explosive material or device, or other potentially harmful military munitions or devices, that creates an actual or potential imminent threat to human health, including public safety or the environment, including property, as determined by an EOD specialist. Such situations may require immediate and expeditious action as determined by the EOD specialist to control, mitigate or eliminate the threat.

b. ***Explosives or munitions emergency response*** - all immediate response activities by an EOD response specialist to control, mitigate or eliminate the actual or potential threat encountered during an explosive or munitions emergency. An explosives or munitions emergency response may include in place render safe procedures, treatment or destruction of the explosives or munitions and/or transporting those items to another location to be rendered safe, treated or destroyed. Any reasonable delay in the completion of an explosives or munitions emergency response caused by a necessary, unforeseen or uncontrollable circumstance will not terminate the explosives or munitions emergency response. Explosives or munitions emergency response can occur on either private or public lands and are not limited to responses to Resource Conservation and Recovery Act facilities.

c. ***Explosive or munitions emergency response specialist*** - an individual trained in munitions and explosives render safe procedures, handling, transportation and destruction techniques. Explosive and munitions emergency response specialists include DoD EOD and Technical Escort Unit personnel.

d. ***Military munitions*** - all ammunition products and components produced by or used by the US DoD or the US Armed Forces for the National Defense and security, including military munitions under the control of the DoD, Department of Energy (DoE), the National Guard and the US Coast Guard. The term military munitions includes: gaseous, liquid and solid propellants, explosives, pyrotechnics, chemicals and riot control agents, smokes and incendiaries used by DoD components, including bulk explosives and chemical warfare agents, chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition devices and components thereof. Military munitions do not include wholly inert items, improvised explosive devices and nuclear weapons, nuclear devices and nuclear components thereof. However, the term does include non-nuclear components of nuclear devices, managed under the DoE's nuclear weapons program after all sanitized operations as required by the Atomic Energy Act of 1954, as amended, have been completed.

e. ***An EOD response*** - in the public sector is a response to an event that occurs outside of a military installation.

6. Roles and Responsibilities;

a. EOD Organization.

(1) Will have all necessary training and literature to meet EOD mi ssion requirements. The EOD organization will be knowledgeable in explosives and explosive effe ts.

(2) Provide a telephone point of contact for the explosives or munit ons emergency response or EOD technical support to civil authorities.

(3) Provide emergency response military munitions or IED-relate information necessary for civil authorities to complete post-incident reports, conduct investigat ons, and other requirements, as well as meeting other information needs.

(4) While performing explosives or munitions emergency response the EOD organization is not responsible, under any condition, for any environmental remediatio action. As a general rule, however, if the object of the emergency response is a military muniti n, then the DoD EOD Organization retains the responsibility.

b. Agencies Requesting Assistance:

(1) Upon identification of an emergency, contact the cognizant env ironmental regulatory authority regarding emergency notification requirements.

(2) Complete reports/notifications required by the environmental regulatory authority. Request incident information from the responding EOD organization, as n cessary, to complete the required reports.

(3) Responsibility for environmental remediation of any residual c ntamination. If the object of the explosives or munitions emergency response is a non-military item, then the local requesting authorities are responsible for the site remediation.

(4) Request, in writing, the assistance of the Holloman AFB EOD team. The written request is to be addressed to the Commander, 49th Fighter Wing, 490 Firs Street, Suite 1700, Holloman AFB, NM 88330. The document should be accomplished at th time of the actual request; however, the next day following the incident is acceptable.

(5) Complete the Explosive Ordnance Disposal Civil Support Release nd Reimbursement Agreement, (DD Form 1926) which is provided by the responding team. Signa tures of the Department of Public Safety and an authorized representative (i.e., landlord, perso al property owner/lease holder, etc.) must be obtained prior to commencing DoD EOD emergency actions.

c. Environmental Regulatory Authorities:

(1) Provide a telephone point of contact for emergency response calls.

(2) Assist in expediting issuance of emergency permits that may be requir ed.

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7. Duration/Amendment/Withdrawal: This MOU will remain in force and effect until amended or terminated by mutual agreement of the parties. Any party may withdraw from the MOU upon 60-days written notice to the other parties.

8. Coordination of concerned parties:

49 CES/CED Date: 28 MAR 01

John R. Poland
49 CES/CEV Date: 28 Mar 01

49 CES/CC Date: 29 MAR 01

49 FW PA Date: 9 Jul 01

49 SPTG/CC Date: 11/7/01

Marc E. Rogers
49 FW/CC Date: 14/7/01

Peter Maggiore
New Mexico Environment Department Date: 4/4/02

S.A. Tarango
Alamogordo Department of Public Safety Date: 10-17-01

Frank C. Taylor
New Mexico State Police Date: 6-14-02

Otero County Sheriff's Office Date: 10-22-01

ATTACHMENT F

20,000-POUND OPEN DETONATION UNIT MANAGEMENT

HOLLOMAN AIR FORCE BASE
OPEN DETONATION TREATMENT UNIT

Permit No. NM6572124422

ATTACHMENT F
20,000-POUND OPEN DETONATION UNIT MANAGEMENT

INTRODUCTION

This attachment addresses the requirements of Title 20, Chapter 4, Part 1, Subpart V New Mexico Administrative Code (NMAC), (20.4.1.500 NMAC), incorporating Title 40 Code of Federal Regulations (CFR) Part 264, Subpart X and 20.4.1.900 NMAC incorporating 40 CFR §§270.23 and 270.73.

F.1 OPERATIONAL PROCEDURES AND WASTE MANAGEMENT PRACTICES

F.1.1 LOADING/UNLOADING OPERATIONS

Procedures to prevent accidental detonation of the waste are also applicable to spill prevention during pretreatment operations. EOD procedures to prevent accidental detonation are detailed in Air Force Manual (AFMAN) 91-201 - *Explosive Safety Standards*, and Holloman Air Force Base (HAFB) Explosive Ordnance Disposal (EOD) Operating Instruction (EODOI) 32-3001-05. In general, these procedures specify use of no sparking tools, encasement to reduce impact, use of certain clothing materials, and, most importantly, removal of primers and initial detonators from the device. The explosive nature of the waste indicates the greater hazard to be incidental detonation during transfer of waste into the detonation zone. None of the energetic waste contains free liquid.

The Explosives Safety Standards, AFMAN 91-201, will be followed for all loading and unloading operations. The absence of a safety requirement in this manual or in a technical order covering a given item does not necessarily indicate that no safeguards are required. Prompt action will be taken to control any hazard. If an immediately dangerous explosive item is encountered, all operations in the immediate vicinity will be shut down, personnel evacuated to a safe location, and EOD personnel called to render assistance in eliminating the hazard. Operations will not be resumed until the hazard has been eliminated.

AFMAN 91-201, paragraphs 8.27, 8.28 and 8.29, has a detailed description of the methods of loading and unloading the reactive waste to be treated. These are:

- Chock explosives loaded vehicles during loading and unloading operations
- Inspect motor vehicles to determine that a fire extinguisher is available and serviceable, the electric wiring is in good condition, brakes, steering light, horns, etc. are functioning properly, and tires are inflated and serviceable as stated in TO 36-1-191
- Ensure lifting devices on vehicles or handling equipment have a serviceable mechanism designed to prevent sudden dropping of the load in the event of power failure
- Ensure explosives loaded on all types of vehicles and handling equipment are stable and secure before movement. Load stability is required for movements, to include re-warehousing or other activities conducted between one or more storage magazines,

storage pads or other operating locations. For on base movements, explosives containers must be restrained, blocked, braced, tied down or otherwise secured to the vehicle to prevent movement and must not damage explosives or containers. “Secure” means the load is protected by an effective restraining system. Restraining devices may include chains and binders, cargo nets and tie-down straps, sideboards and tailgates, etc

- To the maximum extent possible, position munitions cargo vehicles to permit loading and unloading from each side of the cargo be. Munitions will be accessed from the side closest to the load unless access can only be obtained from one side
- Except as required in the event of an electrical storm, do not leave explosives-laden vehicles unattended unless they are parked in a properly designated area such as the weapons storage area, holding yard, or flight line munitions holding area
- Do not load or unload explosives from a motor vehicle while the engine is running, except under the following conditions:
    - Where the engine is required to provide power to vehicle mechanical handling equipment used in loading and unloading the vehicle
    - Where necessary for emergency operations or timing for exercises simulating execution of emergency plans. In this case, small loads or packages of explosives delivered to aircraft, requiring only momentary unloading time, may be removed from a vehicle while the motor is running
    - Engines of diesel-powered vehicles may continue to run during loading or unloading of explosives except when exposed explosives or hazardous locations are involved
    - Adequate ventilation is provided to prevent unnecessary build-up of exhaust gases
- Do not leave vehicles at aircraft storage locations longer than needed to complete explosives loading or unloading. If a delay occurs, move the vehicle from the location
- Refuel trucks before loading explosives

All vehicles will be inspected before loading. Deficiencies will be corrected at the time of inspection, if such correction is considered necessary for safe delivery to the unloading point. During loading or unloading of vehicles, the brakes must be set and if the vehicle is on a grade, at least one wheel must be chocked.

No explosives or ammunition will be loaded into or unloaded from vehicles while the motor is running unless the motor is required to provide power to vehicle accessories, such as mechanical handling equipment utilized in the loading and unloading of the vehicles.

A holding area will be provided to accept initial deliveries of munitions for disposal and demolition materials. The holding area will be located within the disposal range, but at a suitable distance from disposal sites to preclude uncontrolled destruction of the material by flying fragments, grass fires or burning embers. All dry grass, leaves and combustible material will be removed within a 15 meter (50 foot) radius of the holding area. Munitions to be disposed of, demolition material, and blasting caps be will be separated by a minimum of 7.6 meters (25 feet) within the holding area. After initial delivery to the holding area, munitions for disposal and the necessary demolition material will be delivered to the actual disposal site as required. If a disposal range is not large enough to provide an absolutely safe holding area, munitions will only be delivered to the disposal site in quantities for immediate disposal.

Handling and Preserving Explosives

a. Improper, rough, and careless handling of explosives may result in undue accidents that could result in loss of life, injury, or property damage. The history of accidents that have occurred in the use, handling, shipping, and storing of ammunition shows that in many instances where the cause was determined, the accidents have been due to human error and circumstances that were avoidable.

b. If hazardous conditions present immediate danger to life and property, operations will not be continued until the hazard has been removed.

c. Explosives and ammunition will be handled and transported carefully. Containers will not be tumbled, dragged, thrown, dropped on each other, rolled, walked over, or dropped from tailboards of trucks.

d. Explosive containers should not be opened unnecessarily and should remain sealed until needed.

Procedures to ensure safe handling of these reactive wastes are detailed in AFMAN 91-201, TOs 11A-1-42 and 11A-1-60, and HAFB EODOI 32-3001-05 (Exhibit F-1). All operations are performed by fully trained EOD personnel under the direction of the EOD Supervisor. These personnel are familiar with procedures to be followed for the material being handled.

Only trained personnel under the supervision of an individual who understands the hazards and risks involved in the operation are to handle explosives. This applies to handling explosives and movement of explosives within the immediate vicinity of the operation. The following procedures are followed for handling explosives:

a. Handle detonators, initiators, squibs, and other such electrically or mechanically initiated devices in protective containers. Use containers designed to prevent item-to-item contact. Mark to identify the contents.

b. Do not use bale hooks to handle explosives.

c. Do not use nails to secure covers or make repairs on explosives containers unless there is no hazard to the explosive item or danger of penetrating protective coverings. Exercise special care when using pneumatic or cartridge activated nail guns.

d. Do not tumble, drag, drop, throw, roll, or "walk" munitions. Containers designed with skids may be pushed or pulled for positioning.

e. Do not roll unpalletized conventional high explosive bombs or other explosives authorized by the item technical order unless lugs or other projections have been removed or if they are protected by dunnage rails.

f. Do not use conveyors, chutes, hand trucks, or forklifts in atmospheres and locations where they will create hazards. Interlock and support sections of roller conveyors that are used to move explosives.

g. Do not use boxes containing explosives or munitions to support conveyors.

h. Always consider vehicle and handling equipment type, type of load, and prevailing weather and surface conditions when determining if safe movement is feasible.

i. Restraining devices designed for use with vehicle and handling equipment will be used in accordance with applicable technical orders.

F.1.2 TRANSPORTATION OF EXPLOSIVE WASTES TO THE OD UNIT

The waste energetic items are transported in accordance with AFMAN 91-201, HAFB EODOI 32-3001-05, TOs 11A-1-42 and 11A-1-60, and other relevant orders. Prior to transport, the EOD supervisor briefs all members of the team on hazards associated with specific items, pertinent technical data, TOs, specified treatment procedures, safety precautions, and transport procedures.

These waste munitions are transported to the OD Unit in their original containers or casings, which are designed for long-term stability and thus ensure that no wastes are inadvertently released to the environment prior to treatment. In addition, no free liquids are included among the wastes treated at the OD Unit. Free liquids in waste have a much higher potential of infiltrating into the soil and migrating vertically.

A map showing the explosive waste hauling route from storage to the OD Unit is provided in Attachment A, Figure A-4.

F.1.3 TREATMENT PROCESS

The 20,000-Pound OD Unit provides thermal treatment to waste propellant devices identified as hazardous waste due to reactivity. Certain constituents that may be present in these wastes could potentially pose a risk to those exposed to them. In order to render the wastes non-reactive and eliminate this risk, they are thermally treated. Once the wastes have been successfully treated, they are no longer considered hazardous. Thermal treatment is accomplished by placing the waste within the aboveground cleared OD Unit and detonating it. Open detonation is a thermal treatment process used for the treatment of unserviceable, obsolete, and/or waste munitions whereby an explosive donor charge initiates the munitions to be detonated. Detonation of the energetic materials is a violent chemical reaction within a chemical compound evolving heat and pressure (exothermic redox reaction), which is self-sustaining after the initial activating energy has been applied. The reaction rate is determined by the velocity of the shock wave that moves at supersonic speeds through the explosive, causing decomposition of the explosive material (TM9-1300-214). The detonation process is quasi-instantaneous with temperatures ranging from 800ºK (981º F) to 1000ºK (1341º F) (EPA 2002). The detonation reaction renders the explosive wastes non-reactive. All hazardous explosive wastes treated at the OD Unit have the potential to detonate as described in Attachment B and no highly unstable wastes are treated at OD Unit.

The OD Unit consists of a clear zone approximately 400 feet in diameter (see Figure A-3 of Attachment A), and treatment operations are conducted within a single graded area at the OD Unit, as described in Permit Attachment A. Treatment of the wastes is accomplished according to the Automated Explosive Ordnance Disposal Publication System, T.O. 11A-1-42, T.O. 11A-1-60, AF Man 91-201 or manufacturer's disposal instructions by placing the explosive ordnance within a 100-foot diameter area at the center of the clear zone. The waste is then treated by detonation. Detonation charges that consist of Cyclotrimethylenetrinitramine (RDX) explosives are added to the waste pile in order to detonate the wastes. The force of the explosion often creates a depression in the ground, which is inspected to ensure that the waste has been completely destroyed. Unexploded ordnance (UXO) that may have been ejected from the depression is collected and returned to the depression and exploded again to treat the UXO. Casings and fragments that do not have UXO are collected and containerized. Subsequent detonations are performed at locations surrounding the first depression within the 100-foot diameter detonation area. After a detonation, a bulldozer or similar heavy equipment levels the detonation area, and repairs the berm around the pit as needed. During soil sampling, the detonation depression is not filled in, nor is any dirt work conducted, until the soil samples have been collected. An earthen berm, with a height of approximately 18 inches provides a barrier to prevent surface water run-on and run-off from the area of the OD Unit. A unit drawing of the area, showing dimensions of the OD Unit, is shown in Attachment A, Figure A-3.

Potential contaminants that may be released during thermal treatment are generally limited to trace amounts of explosive compounds or metals. The thermal treatment process generally ensures complete destruction of the wastes. After a detonation, any unexploded fragments of the original ordnance are collected and re-exploded to further ensure that complete destruction of the original waste ordnance has occurred. Larger metallic fragments are picked up after each detonation for proper disposal.

F.1.4 OPERATING PRACTICES

Operational procedures at the OD Unit are governed by Department of the Air Force Publication TO 11A-1-42, and HAFB EODOI 32-3001-05. TO 11A-1-42 provides EOD personnel with instructions for disposal of unserviceable, serviceable excess, or obsolete munitions and explosive items except nuclear or hazardous items. HAFB EODOI 32-3001-05 prescribes and explains procedures while conducting operations at the OD Unit.

TO 11A-1-42 specifies certain atmospheric conditions for OD treatment operations. In summary, these conditions are:

- **Temperature:** general (>55^{o}F); winter (not specified)
- **Wind speed:** general (4 to 15 miles per hour); winter (7 to 15 miles per hour)

- **Precipitation:** no treatments allowed; cloud cover: none or limited
- **Time:** 7:00 am to 5:00 pm (daily)

The climatic conditions at HAFB generally allow detonations to be conducted under conditions specified as "excellent" in TO 11A-1-42.

Personnel who perform operations at the OD Unit are specifically EOD-trained staff members. The total number of EOD personnel is limited to those required to perform the operation.

A minimum of two personnel, one of which is an EOD supervisor, are required for all operations. These personnel are provided both initial training at the Eglin Air Force Base school for ordnance and annual reviews concerning ordnance items and Resource Conservation and Recovery Act (RCRA) requirements. Permit Attachment D outlines the required training.

During all operations, the EOD supervisor operates as the range manager and controls initiation of the thermal treatment. Prior to initiation of the treatment event, all other EOD personnel are required to move and take cover south of the OD Unit outside the danger area.

Several efforts are performed prior to the thermal treatment event. All waste energetic items destined for treatment are inspected, logged, and accounted for prior to removal from stock or other designation as waste. It should be noted that these items become waste primarily through shelf-life exceedance or inequalities noted during inspections of serviceable items. A complete inventory of items to be treated is compiled on the advance disposal request, which requires headquarters approval before treatment can proceed. Additionally, an inventory of items to be treated is recorded on the EOD Report (AF Form 3579). Prior to the scheduled treatment event, the EOD supervisor notifies the following base agencies:

- Meteorological service (for imminent weather conditions)
- 49 MXS Munitions Flight
- Base medical service
- Security forces
- Base operations
- On-site coordinator
- Base environmental coordinator

Upon arrival at the unit, all waste energetic items are inspected and accounted for by comparison with the previously prepared inventory. During transport and operations, all nearby roads are cleared, posted, and maintained free of traffic.

To limit the potential for incidental detonations, all primer and detonating items are removed from the waste energetic items. No attempt is made to remove these items if they are integral parts of the device.

F.1.4.1 Explosive Open Detonation Treatment

The actual treatment is accomplished by placement of the waste items on the ground within the OD Unit and attachment of C-4 (RDX) donor charges to the waste item. An "explosive train" is constructed, and remote control detonation is initiated from the designated clear zone. The donor device consists of a series of components that are referred to as an explosive train once the individual devices are placed in combination. An explosive train consists of a primer, an initial detonating agent, and a high explosive. Explosive train detonation is achieved by step-wise detonation of the components. Detailed munitions disposal procedures are provided in TO 11A-1-42.

F.1.4.2 Standard Operating Practices

EOD has standard operating procedures (SOPs) that define uniform standard procedures, instructions, and safety precautions to be employed during EOD operations conducted at the OD Unit. These SOPs ensure that HAFB will implement the OD activities in a manner protective of human health and the environment.

The HAFB EODOI 32-3001-05 implements AFI 32-3001 and ACC SUP 1 to AFI 32-3001. It prescribes and explains procedures to be followed while conducting operations on the EOD Disposal Range and applies to all members of the 49th Civil Engineer Squadron, EOD Flight. According to this document, the following minimum safety guidelines are followed at the OD Unit:

- The range flag will be flown when explosives are on the range
- The basic and specific safety precautions of the items to be disposed of are briefed to OD Unit personnel
- Ensure all personnel know the type, quantity and location of all explosives (25 ft minimum separation between initiating and other explosives)
- Cap check out and test burns will be conducted 50 ft downwind of other explosives
- Smoking will be allowed only in designated area 50 ft downwind of all explosives
- All matches, lighters, and spark-producing devices will be secured in a designated area
- Personnel will wear gloves when handling bare explosives or propellant and wash hands after each operation
- Personnel are prohibited from carrying explosives or explosive components in pockets or elsewhere on the body
- Radios and cell phones will not be used near electro explosive devices (EEDs) (25 ft for handheld radios/cell phones and 50 ft for vehicle mounted radios at a minimum)
- Remove all rings, watches, and jewelry before handling explosives
- Firing device and/or blasting machine will be controlled by the team chief
- The senior EOD will be the Range Safety Officer

- Track Control will give the final clearance for all detonations

- Misfires, wait 1 hour after expected detonation for non-electric and 30 minutes for electric

- Misfire procedures will be briefed during the wait time (IAW 60A-1-1-31 and MX 22 T.O. if used)

- The blast area will be inspected for unconsumed explosives after each detonation by the team chief and one additional person

The SOPs require specific actions at time intervals listed below prior to and after treatment at the OD Unit:

- Two Weeks in Advance of Scheduled Detonation
- One Week in Advance of Scheduled Detonation
- Day Before Scheduled Detonation
- Day of Detonation
- Within 72 Hours After Detonation Occurs

A checklist that lists specific activities to be performed at the intervals listed above is included in Attachment C, Inspection Schedule.

F.1.4.3 Two Weeks in Advance of Scheduled Detonation

The following procedures are conducted two weeks in advance of the scheduled detonation by the EOD Team Chief and the EOD team.

Two weeks in advance of the scheduled detonation, the EOD Team Chief: selects EOD team and conducts a briefing with team (including hazards involved with OD, treatment procedures, TOs, safety, and transportation procedures). In addition, the EOD Team:

1. Conducts a range inspection for free-standing liquids, unexploded munitions, vegetation, burrowing, and signs of run-on/runoff to OD unit

2. Inspects the road to the OD unit for holes, ditches, and settling that could cause problems during the transportation of munitions

3. Identifies items listed for treatment

4. Identifies proper disposal techniques

5. Calculates the total mass being detonated, ensuring total doesn’t exceed 20,000 lbs Net Explosive Weight (NEW) per event

6. Contacts 49 MXS Munitions Flight custodian to notify of explosive requirements (how much C-4 needed)

7. Ensure that explosives will be on hand prior to scheduled operation

8. Conducts inspections of emergency response equipment, safety equipment, security devices, EOD vehicles, and operating equipment

F.1.4.4 One Week in Advance of Scheduled Detonation

At one week in advance of the scheduled detonation, the EOD Team verifies items that will be treated, makes sure Munitions Flight has a sufficient supply of explosives for the operation, and checks calculations on the amount of necessary explosives and NEW.

F.1.4.5 Day Before Scheduled Detonation

The day before the scheduled detonation, the EOD Team Chief:

1. Briefs team on pending operations and team assignments EOD Team

2. Contacts Munitions Flight to draw explosive materials and ensure delivery time of munitions and waste will be met

3. Inspects all necessary equipment to ensure operability

4. Notifies Base Fire Department

5. Notifies Base Medical Group

6. Notifies Security Forces

7. Notifies Base Operations Staff

8. Notifies Base Environmental Coordinator

9. Contacts base meteorology team to obtain a forecast of predicted weather conditions for the following day and notify them of the operation

10. Ensures that explosives will be on hand prior to scheduled operation

The day before the scheduled detonation, the EOD team inspects:

1. Emergency response equipment

2. Safety equipment

3. Security devices

4. EOD vehicles

5. Operating equipment

F.1.4.6 Day of Detonation

The day of the detonation, the EOD Team Chief:

1. Conducts a safety briefing will all team members including review of requirements and procedures for safely transporting explosives
2. Provides arms to personnel who will be transporting explosives and conducts a briefing on the use of the firearms
3. Ensures that radio communication lines are open with the EOD Team during the drawing and transportation of explosive materials
4. Supervises the munitions loading operations
5. Monitors and identifies deficiencies and refuse treatment if discovered
6. Ensures that all Emergency Equipment (first aid kit, shovels, fire extinguishers, etc.) are on hand or on standby ready to respond

The day of the detonation, the EOD Team will:

1. Contact the 49 OSS Weather Flight or the Test Track weather station to ensure that all weather conditions meet permit terms (i.e., wind speed, direction, temp., precipitation)
2. Records weather conditions as shown in the weather log
3. Coordinate with Munitions Flight personnel the transportation of munitions and explosives to the OD Unit
4. Conducts final inspection of the OD Unit
5. Makes radio contact with Test Track Control and EOD operations center
6. Ensures that mobile two-way radios are placed in appropriate locations (with team members, track control net, team chief, and safety observer)
7. Conducts a physical inspection of all munitions brought for treatment
8. Compares inventory list with letter of disposal request to ensure all items are accounted for. Only items identified on the letter of request can be treated-all others will be refused and returned to Munitions Flight storage for reschedule
9. Places items in the area for treatment
10. Segregates initiation explosives
11. Sets up dual-primed firing systems to initiate the main charge

12. Checks firing systems in primed positions

13. Obtains approval for detonation from the HAFB tower via Test Track Control

F.1.4.7 Within 72 Hours After Detonation Occurs

Within 72 hours after detonation occurs, the EOD Team Chief signs required documentation (i.e., expenditure report) within 24 hours of the OD event and places a copy in the facility file.

The EOD Team will:

1. Collect~~s~~ any UXO and re-detonates it immediately

2. Collect~~s~~ any metals fragments and remnants greater than 2 inches in length

3. Places fragments in a container for proper disposal

4. Clean~~s~~ and inspects all EOD vehicles and other equipment

5. Arrange~~s~~ to backfill depressions and grade area

6. Prepare~~s~~ EOD report including an inventory list of the detonated items, NEW, and names of participating EOD personnel

F.1.5 WASTE STAGING

Wastes to be treated are transported to the OD Unit by 49 MXS Munitions Flight trained personnel. Waste is not stored at the OD Unit and is transported prior to a scheduled treatment event. If the treatment event is aborted due to any reason, the waste is removed and transported back to the generator.

F.1.6 IGNITABLE, REACTIVE, AND INCOMPATIBLE WASTES

In accordance with the requirements of 20.4.1.500 NMAC §264.17(a), EOD personnel take precautions to prevent accidental ignition or reaction of ignitable or reactive waste. The waste is kept separated and protected from sources of ignition or reaction such as open flames, cutting and welding, and hot surfaces. "No Smoking" signs are placed in waste storage and waste handling areas.

Each waste item that is destined for treatment at the OD Unit will be handled in accordance with TOs 11A-1-42 and 11A-1-60. Waste energetic items will not be opened at any time due to the potential for accidental detonation. Post-detonation residues will be inspected to ensure that no untreated waste remains in the OD nit. These measures meet the requirements of 20.4.1.500 NMAC §264.17(b).

The Waste Analysis Plan included as Attachment B provides information on waste characterization (process knowledge, Material Safety Data Sheets, and other technical information) required to document compliance with 20.4.1.500 NMAC §264.17(c).

Incompatible wastes are not handled at the OD Unit. Therefore the requirements of 20.4.1.500 NMAC §264.177 are not applicable. Waste munitions are brought to the OD Unit in their original containers or casings. Containers used for storage of treatment residue (metal fragments) are compatible with the wastes stored.

F.1.7 SECURITY AND ACCESS

The security procedures outlined in this section have been provided by HAFB in compliance with New Mexico Hazardous Waste Management Regulations 20.4.1.500 NMAC §264.14 and 20.4.1.900 NMAC §§270.14(b)(4) and 270.14(b)(19)(viii).

The following sections address security procedures, inspection requirements, preparedness requirements, procedures taken to prevent accidental detonation, prevention of the mixing of incompatible waste, and means to reduce personnel exposure.

F.1.7.1 Security [20.4.1.500 NMAC §264.14(b)(1)]

The primary mission of HAFB is to provide upgrade and continuation training for aircrews assigned to the installation. Additionally, solid base propulsion systems for military devices are tested at the area identified as the Test Track. The general nature of these activities is such that portions of the base facility are under constant surveillance.

In particular, such areas include the Test Track Facility, flight line areas, and the 49 MXS Munitions Flight building. In addition to these surveillance measures, the main base area and any base area adjacent to these secure zones are patrolled at intervals day and night.

Traffic access to HAFB is possible from three routes. These include Highway 70 at the southern boundary of the base; the La Luz gate between Alamogordo and Tularosa; and, through White Sands Missile Range. The main gate is manned by armed guards 24 hours per day, and the other gates are manned and open Monday through Friday from 0600 until 1800 hours. White Sands Missile Range is also under continuous surveillance. These general surveillance practices provide 24-hour surveillance of the OD Unit. Additionally, during explosive open detonation events, constant surveillance of the OD Unit is provided by Test Track personnel and the Security Forces.

F.1.7.2 Barrier and Means to Control Entry [20.4.1.500 NMAC §264.14(b)(2)(i) and (ii)]

The OD Unit is located at the end of a single access road that runs approximately 10 miles along the length of the test track. Entrance to the test track area is strictly controlled by Test Track personnel and the Security Forces. Entrance to the~~se~~ Unit~~s~~ is restricted to authorized visitors on approval of the EOD supervisor. Visitors to the OD Unit must be accompanied by EOD personnel. No visitors are allowed during detonation events. Additionally, the OD Unit is provided with only a single entrance. During detonation events, the area is routinely patrolled to prevent access to the OD Unit.

The OD Unit is a restricted-access area, with the entire area boundary fenced and posted with warning signs at 400 feet intervals.

F.1.7.3 Warning Signs [20.4.1.500 NMAC §264.14(c)]

HAFB has posted warning signs within 100 feet (30.5 meters) of the perimeter of the OD Unit. These signs are printed in English, Spanish, German, and Apache to read as follows (for example, English and Spanish):

"DANGER, NO UNAUTHORIZED PERSONNEL, KEEP OUT"
"PELIGRO, NO PERMITIDA LA ENTRADA SIN AUTORIZACION"

These signs are posted at the road entry point and where the perimeter fence approaches roads or active areas. The gate is marked with a sign which reads, "Danger, Explosives" and is situated to prevent unauthorized access to the active portion of the OD Unit. Monthly security inspections are conducted and recorded by the HAFB Security Forces.

F.1.8 PREPAREDNESS AND PREVENTION [20.4.1.500 NMAC PART 264 SUBPART C]

The following subsections provide information on how operations at the OD Unit comply with the preparedness and prevention requirements of 2.4.1.500 NMAC 264, Subpart C.

F.1.8.1 Required Equipment [20.4.1.500 NMAC §264.32]

In accordance with the requirements of 20.4.1.500 NMAC §264.32, the OD Unit is equipped with or has access to internal communication equipment, fire extinguishers, and fire control and decontamination equipment. Emergency equipment available for use at the OD Unit is discussed in this section and listed in the Contingency Plan included as Attachment E.

F.1.8.2 Internal Communications [20.4.1.500 NMAC §264.32(a)]

Personnel that enter the treatment zone for inspection of operations are provided with hand-held two-way radios. Radio contact with Track Control is maintained at all times while in the restricted area.

F.1.8.3 External Communications [20.4.1.500 NMAC §264.32(b)]

External communications capabilities are provided through the base operator. Communications systems include Defense Switched Network (DSN), Base Telephone System (BTS), and the Qwest System.

F.1.8.4 Emergency Equipment [20.4.1.500 NMAC §264.32(c)]

Emergency equipment available at the OD Unit during operations includes fire extinguishers, two-way radios, and personnel protective equipment such as gloves and respirators. A list of available equipment is presented in the Contingency Plan included as Attachment E.

F.1.8.5 Water for Fire Control [20.4.1.500 NMAC §264.32(d)]

Due to the isolated location of the OD Unit, water for fire control is not available at this unit. However, HAFB fire department trucks are on call during treatment operations and are available for emergency response. The fire trucks can respond within minutes and provide water at adequate pressure and volume to fight any fires that may occur.

F.1.8.6 Testing and Maintenance of Equipment [20.4.1.500 NMAC §264.33]

Communications, fire protection, spill control, and decontamination equipment associated with the OD Unit are tested and maintained according to the inspection schedule detailed in Attachment D.

F.1.8.7 Access to Communication or Alarm Systems [20.4.1.500 NMAC §264.34]

Personnel performing treatment operations at the OD Unit have immediate access to an emergency communication device, either directly or through visual or voice contact with another individual, in accordance with 20.4.1.500 NMAC §264.34. In the event of an emergency, two-way radios and cellular phones allow personnel to contact the EOD office or the HAFB Fire Department.

F.1.8.8 Aisle Space Requirements [20.4.1.500 NMAC §264.35]

The OD unit is a vacant area that allows unobstructed movement of personnel, fire-protection equipment, and decontamination equipment to any area of the unit in the event of an emergency.

F.1.8.9 Support Agreements with Outside Agencies [20.4.1.500 NMAC §264.35]

Information on support agreements with outside agencies, as required by 20.4.1.500 NMAC §264.35 is presented in the Contingency Plan included as Attachment E.

F.1.8.10 Preventive Procedures, Structures, and Equipment [20.4.1.900 NMAC §270.14(b)(8)]

In accordance with 20.4.1.900 NMAC §270.14(B)(8), a description of preventive procedures, structures, and equipment at the OD Unit is presented below.

Wastes are loaded or unloaded by properly trained Munitions Flight or EOD personnel using appropriate equipment, such as forklifts or other heavy equipment. The vehicles are driven to the locations where detonation will occur, and the wastes unloaded. Procedures to prevent incidental detonation of the waste are also applicable to spill prevention during pretreatment operations. EOD procedures to prevent accidental detonation are detailed in Air Force Publications TOs 11A-1-42 and 11A-1-60. In general, these procedures specify the use of non-sparking tools, encasement to reduce impact, use of certain clothing materials, and, most importantly, removal of primers and initial detonators from the device. The explosive nature of the waste indicates the greater hazard to be incidental detonation during transfer of waste into the detonation zone. None of the energetic waste contains free liquid.

An earthen berm that is at least 2 feet in height surrounding the OD Unit prevents surface water run-on to the unit and run-off to other areas of the facility or environment. Typically, surface water from precipitation in the area of the OD Unit is either lost to evaporation, transpiration, or infiltration. In 2006, the White Sands National Monument (WSNM) was closed to the public due to flooding. This flooding was not a result of run-on from arroyos; it resulted from rising ground water due to unusually high regional precipitation. The HAFB OD Unit is 11.2 miles from the northern boundary of WSNM. The OD Unit is not located within the 100-year floodplain (Figure A-5). The unit is situated on relatively flat, basin-floor upland, approximately 1000 feet north of and 27 feet in elevation above the Allen Draw channel. The intermittent streambeds (very old arroyo channels) in the vicinity of the OD Unit discharge westward to the flats and dune fields of the Salt Creek/Salt Lake drainage 10 to 11 miles north. There are no surface water resources in the vicinity of the OD Unit.

The OD Unit has the following stormwater protective measures in place:

- The terrain of the Unit naturally forms stormwater retention locations at the north eastern and south eastern boundaries. Stormwater flows away from the detonation pit and the unit boundaries into these locations
- There is an earthen berm around the entire facility. This berm is approximately eighteen inches high and one foot wide. At the northern entrance, the berm extends inward approximately ten feet on both the eastern and western sides
- The morphology of the dirt in the site naturally allows the soil to retain a high degree of water.

In addition to these protective measures, the entire area drains into White Sands Missile Range (WSMR), where the ground water is of extremely poor quality and very high salinity. With respect to the local topology, the OD Unit is on a slightly elevated mesa. Sheet flow associated with an extremely heavy rainfall will travel around the ODU via an arroyo (Allen Draw) located to the south of the OD Unit.

The OD Unit will be incorporated into the Holloman 2008 NPDES MSGP SWPPP. The inspection criteria for the site will call for a visual inspection of the berm to ensure that its integrity has been maintained. No further stormwater protective measures are required.

F.1.9 Operating Record

As required by 20.4.1.500 NMAC §264.73, HAFB will keep a written open detonation operating record of OD Unit activities at the EOD administrative office. The following records will be maintained at the HAFB EOD Office:

- A description and the quantity of each hazardous waste received, as listed in Tables B-2 through B-6, Attachment B, Waste Analysis Plan

- Operating log that describes the type and quantity of hazardous waste treated in the OD Unit and the date the waste was detonated

- Records and results of waste analyses performed as specified in 20.4.1.500 NMAC §264.13
- Reports of any incidents that required the activation of the Contingency Plan
- Inspection logs for the last three years
- Records of monitoring, testing, analytical data, and any corrective actions taken to prevent or mitigate releases of hazardous waste to the environment
- Training records for EOD personnel
- Disposal requests and Land Disposal Restriction Certifications for hazardous waste transported to a permitted facility
- Correspondence and other documents from governmental agencies that affect the OD Unit

F.1.9.1 Additional Reports

In compliance with 20.4.1.500 NMAC §§264.56(j) and 265.56(j), any release, fire, explosion, or other unusual occurrence that results in implementation of the Contingency Plan will be noted in the OD Unit operating record and reported in writing within 15 days to NMED.

F.1.9.2 Biennial Report

In accordance with 20.4.1.500 NMAC §264.75, a biennial report on OD treatment activities will be prepared and submitted to the Secretary of the NMED. The report will be prepared and submitted to cover facility activities at the OD Unit during the previous calendar year. The EPA identification number, name, and address of the facility will be included in the report. A description and the quantity of each RCRA-regulated explosive hazardous waste treated at the OD Unit will be listed. The method of treatment and disposal for each RCRA-regulated explosive hazardous waste will be described.

F.1.10 WASTE MINIMIZATION AND ALTERNATIVE TECHNOLOGIES

F.1.10.1 Waste Minimization [§262.41(a)(6-7) and §264.75(h) and (i)]

HAFB employs a comprehensive, base-wide strategy to prevent pollution and safeguard the installation's environment. The Pollution Prevention (P2) Program focuses on eliminating and/or reducing dependence on hazardous materials, reducing hazardous and solid waste streams, and reusing generated wastes. The program encompasses Affirmative Procurement, Compliance Through Pollution Prevention (CTP2) Environmental Action Committee, Recycling Program, Composting Program, Household Chemical Reuse Program, Green Zia Program, P2 Regional Partnering Program, Pollution Prevention (P2) Bulletin and Training. The HAFB Pollution Prevention Management Action Plan contains the following information:

- The HAFB policy statement that outlines goals, objectives, and/or methods for source reduction and recycling of hazardous waste at HAFB
- Personnel training, outreach, and incentive programs designed to identify and implement source reduction and recycling opportunities
- Source reduction and/or recycling measures implemented in the last five years or planned for the near future
- Capital expenditures and operating costs devoted to source reduction and recycling of hazardous waste
- Factors that have prevented implementation of source reduction and/or recycling;
- Information on source reduction and/or recycling received (e.g., local government, trade associations, suppliers)
- An investigation of additional waste minimization efforts which could be implemented including an analysis of the potential for reducing the quantity and toxicity of each waste stream through production reformulation, recycling, and all other appropriate means, and an assessment of the technical feasibility, and potential waste reduction for each option
- Process flow charts detailing all hazardous wastes generated at HAFB, by quantity and type and by building/area
- A written determination that demonstrates the need to use those processes which produce a particular explosive waste due to a lack of alternative processes, available technology, or available alternative processes that would produce less volume of hazardous waste

The decision on the applicability of waste minimization technologies is based on munition-specific safety, technical, and cost factors. Currently, HAFB conducts routine shrapnel collection operations at the OD Unit as a resource recovery and recycling measure.

F.1.10.2 Alternative Technologies

The current alternatives to OD treatment for the waste munitions at HAFB can be characterized as follows:

- Disassembly of munitions items to reduce the gross weight subject to further treatment
- Removal of the inert portions of munitions items prior to treatment or conversely the removal of energetic prior to subsequent treatment. This approach may also involve the application of disassembly technologies
- Thermal treatment at a deactivation furnace or energetic waste incinerator (EWI)

The available alternatives, however, do not provide a universal substitute for OD treatment at this time. These current technologies all have significant safety, technical, and cost factors, which limit their applicability on a munitions-specific and site-specific basis. The configuration of some munitions items does not facilitate the disassembly and/or removal of inert portions prior to treatment. The type and energetic content of munitions can also limit the use of deactivation furnaces and incinerators.

The use of alternative technologies to OD will be considered whenever technically and economically practical, and worker safety is not jeopardized.

The Munitions Items Disposition Action System (MIDAS) Program provides a central source of demilitarization and disposal information for munitions items and can be used to identify alternatives to OD treatment. The five areas for demilitarization technologies currently under development by the U.S. Army, Navy, Air Force, Marine Corps, and private industry worldwide derived from the MIDAS Program are:

- Destructive technologies (e.g., contained burn unit with filters, and pyrotechnic incinerators)
- Disassembly technologies (e.g., advanced munitions cutting and disassembly technologies)
- Resource recovery and recycling (e.g., use of energetic material derived fuels in boilers, propellant conversion to fertilizer)
- Removal technologies (e.g., high pressure water washout of large rocket motors)
- Waste stream treatment technologies (e.g., hydrothermal processing of energetic materials)

These technologies, however, are still in the development phase and not available as technically and economically practical alternatives to routine OD operations at HAFB.

Because of the simplicity of the process and the large throughput per event, OD is currently the safest of the technologies. The primary physical hazard when dealing with energetic wastes is bodily injury or death from spontaneous combustion or detonation of the waste items. The most effective way of mitigating this hazard is to minimize exposure to and handling of the energetic wastes. OD requires, by far, the least exposure to and the least handling of the energetic wastes. While the efficiency of the OD process can be somewhat dictated by skilled stacking of the energetic wastes and donor and by choosing optimal weather conditions, OD emits a predetermined and unalterable quantity of effluents to the air, water, and land. Although, alternative technologies allow some control over the final disposition of the process effluents to the air, water, and land, this control may result in a trade-off of one type of effluent or risk for another. OD is the preferred method for cost effective demilitarization of many items and remains a safe, reliable, cost effective and environmentally acceptable method for select munitions demilitarization, and should remain as a future U.S. demilitarization capability.

F.1.11 HEALTH AND SAFETY PLAN [§270.14(b)(8)(v)]

OD Unit operations are conducted according to AFMAN 91-201, Section 1 - Safety and Accident Prevention of TO 11A-1-42, and HAFB EODOI 32-3001-05 in order to prevent undue exposure of personnel to hazardous waste. Exhibit F-2 shows excerpts concerning Health and Safety Plan.

F.1.12 NOISE CONSIDERATIONS [§270.23(e)]

The OD Unit is located in a uninhabited and undeveloped area approximately 5 miles from residential areas and 15.9 miles from the closest recreational areas of WSNM, therefore noise impacts are not expected. In accordance with TO 11A-1-42, EOD supervisory personnel are required to be thoroughly familiar with the influence of weather conditions on disposal operations. The EOD Team operating the OD Unit is responsible for contacting base meteorology team or the Test Track weather station the day of detonation events to ensure that all weather conditions meet permit terms (i.e., wind speed, direction, temperature, precipitation) and the Weather Log is completed prior to detonation events (see Attachment C). Wind speed will not be less than 3 miles per hour and will not exceed 15 miles per hour.

Groundwater monitoring wells are located at a sufficient distance from the OD Unit to prevent damage to them as a result of detonation of waste (see Attachment A, Figure A-3).

References:

Air Force Manual (AFMAN) 91-201 - *Explosive Safety Standards*

Evaluation of Alternative Technologies to Open Detonation for Treatment of Energetic Wastes at the Naval Air Weapons Station, China Lake, California, January 2004

Holloman Air Force Base (HAFB) Explosive Ordnance Disposal (EOD) Operating Instruction (EODOI) 32-3001-05.
Munition Items Disposition Action System (MIDAS) https://midas.dac.army.mil/

OB/OD Treatment Effectiveness, Alternative Technologies and Waste Minimization, Tooele Army Depot

Technical Order 11A-1-42 *General Instructions for Disposal of Conventional Munitions*

Technical Order 11A-1-60 *General Instructions Inspections of Reusable Munitions Containers and Scrap Material Generated from Items Exposed to, or Containing Explosives*

EXHIBIT F-1

EOD Operating Instruction 32-3001-05

BY ORDER OF THE COMMANDER **EOD OPERATING INSTRUCTION 32-3001-05**
49TH CIVIL ENGINEER SQUADRON (ACC)

Operations

EOD DISPOSAL (11.9K) RANGE PROCEDURES

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

ACCESSIBILTY: Publications and forms are available on the e-Publishing website at www.e-publishing.af.mil

RELEASABILITY: There are no releasability restrictions on this publication.

OPR: 49 CES/CED

Certified by: SMSgt Roderick B. A. Baltazar
Pages: 8

Supersedes:

This Explosive Ordnance Disposal (EOD) Operating Instruction (EODOI) implements AFI 32-3001 and ACC SUP 1 to AFI 32-3001. It prescribes and explains procedures while conducting operations on the EOD Disposal Range. It applies to all members of the 49th Civil Engineer Squadron, EOD Flight.

1. RESPONSIBILITIES. It is the responsibility of flight members to comply with this OI. Furthermore, the following individuals/activities are tasked as follows.

1.1. Management. Ensure flight members receive initial and annual RCRA training to perform operations on the permitted range.

1.2. Senior EOD Technician. The senior EOD Technician present is responsible for the conduct of personnel involved in the operation.

2. EOD DISPOSAL RANGE EXPLOSIVE LIMITS. The Holloman AFB permitted disposal range facility is environmentally cleared for 20K lbs NEW of 1.1; however, the explosive limit during any one single detonation will not exceed 11.9K lbs NEW of 1.1 as determined by DDESB (3 Feb 05 certification). This value includes the total NEW of the items to be disposed plus the value of the added demolition charge.

3. PERSONNEL LIMITS. Personnel limits are based on the type of operations being conducted. At no time will the number of personnel exceed the number that can be effectively and safely controlled or supervised. A one-to-five ratio (EOD Techs-to-observers), at a minimum, must be maintained at all times.

3.1. Minimum. Two EOD Technicians, at least one 7-level or two 5-levels.

3.2. Casuals. Will be permitted to ride in vehicles transporting explosives as long as the passenger capacity of the vehicle is not exceeded.

3.3. Vehicles. No personal vehicles will be authorized within the locked gates of the range. If personal vehicles are used for transportation to the range, they will be left at the ARC building.

4. MINIMUM EQUIPMENT REQUIREMENTS.

4.1. Demolition tools and equipment.

4.2. Explosives and demolition materials.

4.3. First Aid Kit.

4.4. Fire extinguishers, two 2A 10B/C.

4.5. Pioneer and hand tools as required.

4.6. Disposal Range Guide and applicable technical data.

4.7. Radio, at least two.

4.8. Range flag.

4.9. Specialized EOD tools as required.

4.10. Vehicle with placards.

5. LOCATION. The EOD disposal treatment facility is located on Holloman AFB on the northern end of the Test Track Area, MGRS grid coordinates 13S CS 91456 55523

6. SAFETY

6.1. Observe applicable safety precautions outlined in AFMAN 91-201, T.O. 11A-1-42, T.O. 11A-1-66, T.O. 60A-1-1-22, T.O. 60A-1-1-31 and any other applicable T.O. dealing with the operation or specific ordnance items involved.

6.2. Brief and observe safety precautions listed in applicable publications.

7. ENVIRONMENTAL

7.1. Adhere to guidance directed by the Open Detonation Treatment Unit permit. This information is maintained in the EOD Operations Section.

8. EMERGENCY PROCEDURES. In the event of a fire or accident/incident, follow procedures outlined in the Attachment 1.

9. OPERATIONS.

NOTE: Tasks in 9.1 may not be accomplished for Emergency Disposal operations.

NOTE: EOD personnel may not accept custody or accountability for munitions for the sole purpose of treatment by burning or detonation. Instead, the accountable officer for the munitions to be treated must retain custody and accountability until treatment is complete.

NOTE: Inert items will not be treated.

NOTE: Electrical initiation is required on the disposal range to allow for positive control.

NOTE: Vehicle used for transporting explosive materials must be equipped IAW AFMAN 91-201 and inspected.

9.1. PRE-OPERATION PROCEDURES:

9.1.1. Conduct a range inspection IAW permit requirements (Operations Monthly Inspection).

9.1.2. Contact Track Control to schedule range use and clearance. The 11.9K range will not be utilized simultaneously with a High Speed Test Track mission or during a White Sands Missile Range test where the cordon impedes the disposal range or airspace.

9.1.3. Check items listed with technical data to ensure proper disposal and calculate the total NEW.

9.1.4. Notify the flight munitions custodian of explosive requirements to ensure items are on hand or will be prior to operation. Schedule for munitions pull within required amount of time.

9.1.5. Assign a team and brief on pending operation.

9.1.6. Draw and inspect required equipment to ensure operability. Ensure placards and required equipment are available in the vehicle.

9.2. SCHEDULED OPERATION PROCEDURES:

9.2.1. Range Calls. On the day of the operation, EOD team chief will ensure all range notifications are accomplished IAW Attachment 2.

9.2.2. Ensure teams dispatched to draw explosive materials have and maintain communications with the EOD Operations Center. Team Chief will make contact with EOD Operations Center and Track Control prior to arrival at disposal range. EOD Range Safety Officer will also monitor radio communications on Test Track Channel and assist as required.

9.2.3. Conduct safety briefing to team members IAW Attachment 3.

9.2.4. Inspect the pit prior to operation.

9.2.5. Segregate initiation explosives and prepare firing set-up.

9.2.6. Ammunition Disposal Requests: A physical inventory will be conducted of all munitions brought for treatment by Munitions Storage Area (MSA) personnel. Compare inventory listing with letter of request to ensure all items are accounted for. Only items identified on the letter of request can be treated; all others will be refused and returned to MSA for reschedule. Team chief will refuse treatment if any deficiencies are noted.

9.2.7. Once inventory is completed, team members may place items in the pit for treatment.

9.2.8. Coordinate road closure (Range Road 9, Track Road 50, Tula Peak Road and any camera pad access roads) with Track Control, as required.

9.2.9. Team members will set up dual primed firing systems to initiate the main charge.

9.2.10. Team chief will check each primed position and withdraw to the safe area.

9.2.11. Initiate firing train only after obtaining approval from the Holloman Tower via Test Track Control.

9.2.12. Once detonation is evident, the team chief will make a long-range reconnaissance of the surrounding area to determine the presence of possible kick-outs and/or possible fires. The team chief will dispatch two team members down range to inspect the shot. Once the site is determined clear, remaining team members can return to the detonation site.

9.3. POST OPERATION PROCEDURES:

9.3.1. Notify the airfield control tower when operation is complete, as required.

9.3.2. Gather and remove trash and residue. Large pieces of scrap metal must be collected.

9.3.3. Notify EOD Operations of completion.

9.3.4. First Detonation of Every Quarter. Make immediate arrangements for soil sampling IAW established EPA permit requirements.

9.3.4.1. EOD Operations must monitor soil sampling schedule established by the EPA permit requirements, THEN arrange for immediate filling of detonation hole.

9.3.5. Team Chief shall make arrangements for immediate filling of detonation hole if no soil sampling is needed.

9.3.6. Team chief will ensure that AF Form 2005, Issue/Turn-In Request, is properly filled out and turned in to supply/munitions personnel for processing within 24 hours following operation. Team chief will complete the required EOD report.

9.3.7. Operation is terminated once documentation and 11.9K Activities Log is updated with the Operations.

9.3.8. All equipment and vehicles used must be cleaned and returned to ready status.

ANDRA B. CLAPSADDLE, Lt Col, USAF
Commander, 49 CES

Attachments
1. Range safety briefing guideline.
2. Emergency procedures.
3. Range calls.

49 FW / SEW
Review Date: 20 Jun 07
Signature:

49 FW / SEW
Review Date: 28 NOV 07
Signature:

49 FW / SEW
Review Date: 25 NOV 08
Signature:

ATTACHMENT 1

EMERGENCY PROCEDURES

A2.1. Emergencies. Emergencies consist of fire, accidental detonation, personal injury, and any other situation deemed hazardous by the team chief.

A2.2. In the event of an emergency.

A2.2.1. All personnel will meet at the range flag or other pre-designated meeting location.

A2.2.2. The team chief will take accountability for all personnel.

A2.2.3. The Range Safety Officer will contact the necessary agency for assistance (fire dept, ambulance, etc.).

A2.2.4. First Aid will be rendered by all SABC-trained personnel, if necessary.

A2.3. Lightning. If lightning approaches within 5 nautical miles during an explosive operation, all operations will cease immediately and all personnel will evacuate to a safe area. After the lightning has dissipated, the team chief and one additional person will proceed down range and ensure the safety of the operation site.

ATTACHMENT 2

RANGE CALLS

A3.1. Range calls. The following offices/agencies will be notified prior to any explosive operation on the 11.9K Disposal Range.

A3.1.1. 49 CES Commander, ext 2-3071.

A3.1.2. 49 FW Command Post, ext 2-7575.

A3.1.3. Fire Department, ext 2-7228.

A3.1.4. Ambulance Response, ex 2-3260

A3.1.5. LE Desk, ext 2-7171.

A3.1.6. Track Control, 679-2105.

A3.1.7. Base Operations, ext 2-5410.

A3.1.8. Explosive Safety, ext 2-3793.

A3.1.9. Tower Captain, ext 2-7307.

A3.1.10. 49 FW Public Affairs, ext 2-5406.

A3.1.11. Holloman Weather, ext 2-3924.

ATTACHMENT 3

RANGE SAFETY BRIEFING GUIDELINES

A1.1. Guidelines. These guidelines will be followed at a minimum when giving a safety briefing on the11.9K disposal range.

A1.1.1. The range flag will be flown when explosives are on the range.

A1.1.2. Brief the basic and specific safety precautions of the items to be disposed of.

A1.1.3. Ensure all personnel know the type, quantity and location of all explosives (25' minimum separation between initiating and other explosives).

A1.1.4. Cap check out and test burns will be conducted 50 ft downwind of other explosives.

A1.1.5. Smoking will be allowed only in designated area 50' downwind of all explosives.

A1.1.6. All matches, lighters and spark-producing devices will be secured in a designated area.

A1.1.7. Wear gloves when handling bare explosives or propellant and wash hands after each operation.

A1.1.8. Do not carry explosives or explosive components in pockets or elsewhere on the body.

A1.1.9. Radios and cell phones will not be used with near EED's (25 ft for handheld and 50 ft for vehicle mounted at a minimum).

A1.1.10. Remove all rings watches and jewelry before handling explosives.

A1.1.11. Firing device and/or blasting machine will be controlled by the team chief.

A1.1.12. The senior EOD will be the Range Safety Officer.

A1.1.13. Track Control will give the final clearance for all detonations.

A1.1.14. Misfires, wait 1hour after expected detonation for Non-electric and 30 min for electric

A1.1.15. Misfire procedures will be briefed during the wait time (IAW 60A-1-1-31 and MX 22 T.O. if used).

A1.1.16. The blast area will be inspected for unconsumed explosives after each detonation by the team chief and one additional person.

EXHIBIT F-2

Health and Safety Plan Information

References:

AF MAN 10-100 - Airman's Manual

AF MAN 91-201 – Explosives Safety Standards

EODOI 32-3001-05 – EOD Disposal (11.9K) Range Procedures

Explosives Safety General Instructions - It is Air Force policy consistent with operational requirements to:

- Provide the maximum possible protection to personnel and property, both inside and outside the installation, from the damaging effects of potential accidents involving ammunition and explosives (AE).
- Expose the minimum number of people to the minimum amount of AE for the minimum amount of time consistent with safe and efficient operations. This maxim is known as the cardinal principle of explosives safety.
- Ammunition and explosives safety standards herein should be considered minimum standards. Greater protection should be provided when practicable.
- Observe explosives safety practices during all operations that include the use of live explosives.
- Comply with DoD and Air Force explosives safety and environmental standards.

EOD Operations

- **EOD Procedures -** Performance of EOD procedures requires a minimum of two EOD qualified people (one worker and one for safety back-up and to detect errors in procedures). If deployed on a mission where performance of EOD procedures is likely, deploy a minimum of two EOD-qualified people. One EOD-qualified person (with an appropriate safety backup capable of rescue actions) can provide site assessments, evaluations, and other on-site analysis as long as no procedures are performed and ordnance or explosives are not disturbed.
- **Casuals -** Casuals are persons not normally part of an explosives operation but have duties that require their presence, such as quality assurance, medical, safety or inspection personnel.
- **Emergency Medical Support -** When conducting live explosive operations, (e.g., EOD operations, range clearance, or other demolition and munitions destruction) emergency medical support must be available within 30 minutes while the operations are being performed. The medical support must be analogous to the expected trauma resulting from an accident. For minor injuries, the EOD team will have a first aid kit available.
- **Visitors -** Visitors are non-essential personnel with limited access. Stop operations when visitors are present.

- **Explosives Limits** - Design explosives operations to ensure minimum exposure of personnel to explosives in compliance with the cardinal principle (see paragraph 1.1.2). Only the explosives needed to ensure a safe and efficient work flow will be present in an operating location when operations are being conducted; this should normally be limited to a one day supply. Supervisors are responsible for enforcing explosives limits.

Housekeeping - The following are minimum precautions:

- Non-explosives Waste Materials.
- Do not commingle non-explosives waste materials (e.g., oily rags, combustible scrap, wood, paper, and flammable packing materials) with explosives residue.
- Place non-explosives waste materials in approved, properly marked containers.
- Place non-explosives waste material containers outside of explosives facilities, except for containers required at work locations during operations.
- Empty non-explosives waste material containers at working locations as often as needed, but at least once each workday or shift.
- Contact the base environmental management office for additional guidance for hazardous materials.

Ground Safety and Health Programs - Occupational Safety and Health requirements are listed in AFOSHSTD 91-501, Air Force Occupational, Safety and Health Standard. AF Form 55, Employee Safety and Health Record is used to document completion of requirements for each EOD team member.

EOD Flights must participate in the following health and safety programs:

- Environmental Management System, Hazardous Communication (HAZCOM).
- Respiratory Protection Program.
- Blood Borne Pathogen (BBP) - With use of established control procedures (use of personal protective equipment (PPE) and good hygiene); normal home-station EOD duties do not warrant participation in the BBP program.
  - If local or deployed special EOD missions create a high potential for exposure to BBP, then EOD flights will coordinate with Bioenvironmental Engineering and Public Health flights to determine whether enrollment in this program is appropriate. Refer to Title 29 Code of Federal Regulations (CFR), Part 1910, subpart Z, Standard 910-1030, *Blood borne Pathogens* (29 CFR 1910-1030), for requirements on training and a written exposure control plan (see also the sample guides in the EOD Mortuary Support CONOP).
  - As-Low-As-Reasonably-Achievable (ALARA).
  - Hearing conservation.

Smoking - AFOSH 91-100, *Aircraft Flight Line - Ground Operations and Activities*, Chapter 1, governs smoking on the flight line. For all other explosives locations, the following requirements apply:

- Allow smoking in an explosives storage area or operating location only in specifically designated locations, where "authorized smoking areas" signs are posted.
- In an explosives storage area or operating location containing exposed explosives, include a notice that flame-producing devices must be turned over to the entry controller or placed in a container provided.
- Requirements for Designated Smoking Locations.
- Do not place within 50 feet of any explosives locations (to include conveyances or material handling equipment loaded with explosives items).
- Persons wearing clothing contaminated with flammables, explosives or other hazardous materials are not allowed in designated smoking areas.
- Do not smoke in, on, or within 50 feet of any conveyance or material handling equipment loaded with explosives items.

Handling of Explosives - This paragraph applies to the handling of explosives and movement of explosives within the immediate vicinity of an explosives operation.

- Only trained personnel under the supervision of an individual who understands the hazards and risks involved in the operation are to handle explosives.
- Handle detonators, initiators, squibs, and other such electrically or mechanically initiated devices in protective containers during storage, transportation, and inspection. Use containers designed to prevent item-to-item contact. Mark to identify the contents.
- Do not use bale hooks to handle explosives.
- Do not use nails to secure covers or make repairs on explosives containers unless there is no hazard to the explosive item or danger of penetrating protective coverings. Exercise special care when using pneumatic- or cartridge-activated nail guns (see AFI 21-201, *Conventional Munitions Maintenance Management*).
- Do not tumble, drag, drop, throw, roll, or "walk" munitions. Containers designed with skids may be pushed or pulled for positioning.
- Do not roll un-palletized conventional high explosive bombs or other explosives unless authorized by the item TO and lugs or other projections have been removed or if they are protected by dunnage rails.
- Always consider vehicle and handling equipment type, type of load, and prevailing weather and surface conditions when determining if safe movement is feasible.
- Restraining devices designed for use with vehicle and handling equipment will be used in accordance with applicable TOs.
- Do not move explosives rapidly across any non-conductive surface.

Static Grounding

- **Static Electricity -** Static electricity is created when two different materials come in contact and then are separated again; this includes when the two materials are rubbed against each other. Separated charges accumulate on the two materials, creating a voltage potential that can be discharged when either of the materials is moved close to an uncharged or grounded object. This discharge can cause a mishap if it occurs through, or in the presence of, a hazardous substance susceptible to electrostatic initiation. For this reason, precautions shall be taken against performing unnecessary actions that lead to the buildup of static voltages, actions shall be taken to avoid the prolonged storage of static voltages on personnel or equipment, and actions shall be taken to discharge static voltages in a safe and controlled manner during operations involving explosives.
- **Methods to Reduce the Hazards of Static Electricity -** Personnel can minimize the possibility and severity of both the buildup and discharge of hazardous static electric potentials by observing the following guidance.
- Whenever possible, personnel should avoid using rags or wearing outer garments made of materials which have high static-generating characteristics (e.g., 100% polyester, nylon, rayon, silk, wool, etc.). Wool socks, glove inserts, and caps as well as undergarments of synthetic fabrics are less of a hazard than outer garments such as jackets or pants.
- **Warning–**do not transmit or key radios within 25 feet from the hazardous waste when using a hand held radio, 10 feet when using a cellular telephone, and 100 feet when using a vehicle radio. It may cause a detonation.
- **Safe Separation Distance (SSD) -** The SSD is the calculated distance from an emitter beyond which the radiated power density from that emitter has decreased to a level which is too low to couple enough energy into an electro explosive device (EED) to initiate detonation. Measurement of the SSD may take into account the vertical difference in height between the emitter and the EED or weapon meant to be protected.
- **Cellular telephones** - The SSD for all cellular telephones is 10 ft from all EEDs, regardless of configuration. This guidance assumes all cellular phones are in compliance with Title 47 CFR 22.905 which defines the allowable frequency range for cellular phones as 824 MHz to 849 MHz and Title 47 CFR 22.913 which requires a maximum EIRP of 7 Watts. (Ref: AF MAN 91-201, Paragraph 9.30.4.1).

NOTE: At HAFB, use of cell phones is prohibited in the bermed area.

Transportation of Explosives

- Take precautions to ensure minimum exposure of people and property during all phases of transportation. The time munitions and explosives are in the transportation mode must be limited to the absolute minimum necessary to complete the task.
- **Explosives Movement Routes on Base -** Designate the safest possible primary and alternate explosives movement routes to cover all phases of movement. Avoid built-up

areas and key, mission-oriented facilities and equipment to the maximum extent possible.

- **Motor Vehicle Inspection -** Prior to use, inspect motor vehicles used to transport explosives according to AFMAN 91-201 to determine that:
    - Fire extinguishers are available, filled, and in good working order.
    - Electric wiring is in good condition and properly attached.
    - Chassis, motor, pan, and underside of body is reasonably free of oil, grease, and fuel.
    - Fuel tank and feed lines are secure and not leaking.
    - Brakes, steering, lights, horn and windshield wipers are functioning properly.
    - Tires are properly inflated and serviceable IAW T.O. 36-1-191.

Load Protection and Stability.

- Fasten safety chains between towing vehicles and trailers carrying explosives when lunette and pintle fastenings are used. Safety chains are not required when using specifically designed breakaway control safety features prescribed by the pertinent T.O.
- Ensure explosives loaded on all types of vehicles and handling equipment are stable and secure before movement. For on base movements, explosives containers must be restrained, blocked, braced, tied down or otherwise secured to the vehicle to prevent movement and must not damage explosives or containers. “Secure” means the load is protected by an effective restraining system. Restraining devices may include chains and binders, cargo nets and tie-down straps, sideboards and tailgates, etc.
- Consider vehicle and handling equipment type, type of load, and the prevailing weather and road conditions when determining if safe transport is feasible. This guidance pertains to munitions storage area as well as applicable flight line operations.

Loading and Unloading.

- Chock explosives loaded vehicles during loading or unloading.
- To the maximum extent possible, position munitions cargo vehicles to permit loading and unloading from each side of the cargo bed. Munitions will be accessed from the side closest to the load unless access can only be obtained from one side.
- Do not load or unload explosives from a motor vehicle while the engine is running, except under the following conditions:
    - Where the engine is required to provide power to vehicle mechanical handling equipment used in loading and unloading the vehicle.
    - Engines of diesel-powered vehicles may continue to run during loading or unloading of explosives except when exposed explosives or hazardous locations are involved.
    - Adequate ventilation is provided to prevent unnecessary build-up of exhaust gases.

- Refuel trucks before loading explosives.

Maintenance of Vehicles Carrying Explosives.

- Only operator inspection and maintenance normally related to the operation of a vehicle will be done on explosives-laden vehicles. Such maintenance includes servicing with fuel, oil, air, lubrication and water, changing tires, fuses, hoses and drive belts, etc.
- No maintenance will be done on an explosives-loaded vehicle or trailer that would increase the probability of fire or would require the use of heat-producing equipment.
- No restrictions are imposed on tractor maintenance when the tractor is separated by at least 100 feet from an explosives-loaded trailer.
- When tires are being changed, the vehicle or trailer must not be elevated so as to shift the load or place an excessive strain on the tie downs.
- Vehicles used for transporting explosive materials must be equipped as stated in AFMAN 91-201.

Firefighting, Emergency Planning and Fire Prevention Equipment

- **Fire Extinguishers - U**nless otherwise directed by the Base Fire Chief, provide a minimum of two serviceable fire extinguishers, suitable for the hazards involved, for immediate use at any location where AE is being handled.
- Disposal Range Guide and applicable technical data.
- A minimum of two Land Mobile Radios.
- Range flag.
- Specialized EOD tools as needed.
- Provide each explosives-laden vehicle used for transport with at least two portable 2A-10B/C rated extinguishers.
- Vehicle with placards
- **Areas Used for Intentional Detonations -** Check environmental compliance and Resource Conservation and Recovery Act (RCRA) requirements and permits for this operation.

Contingencies, Combat Operations, Military Operations Other Than War, and Associated Training

Contingencies are emergencies involving military forces caused by natural disasters, terrorists, subversives, or by required military operations. Due to the uncertainty of the situation, contingencies require plans, rapid response, and special procedures to ensure the safety and readiness of personnel, installations, and equipment.

ATTACHMENT G

CLOSURE AND POST-CLOSURE PLAN

HOLLOMAN AIR FORCE BASE
OPEN DETONATION TREATMENT UNIT

Permit No. NM6572124422

This Attachment outlines the activities necessary to close the 20,000-Pound Open Detonation (OD) Treatment Unit at Holloman Air Force Base (HAFB). Per the New Mexico Environment Department (NMED) Hazardou Waste Bureau's (HWB's) guidance given to HAFB on 9 January 2015, the amended closure plan titled *Amended Expanded Closure Plan OD20K 20,000-Pound Open Detonation Unit* that was submitted to the NMED on 22 October 2014 is included in this section.

This Closure Plan was prepared in accordance with New Mexico Hazardous Waste Management Regulations in Title 20, Chapter 4, Part 1, Subpart V of the New Mexico Administrative Code (20.4.1.500 NMAC), incorporating Title 40 Code of Federal Regulations (CFR) §§264.110 through 264.115, Subpart B and 20.4.1.900 NMAC, incorporating 40 CFR §§270.14(b)(13) and 270.14(b)(15) through (18). A copy of the Closure Plan will be kept on file at HAFB until final closure of the unit is completed and certified in accordance with 20.4.1.500 NMAC, incorporating 40 CFR §264.115.

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FINAL

AMENDED EXPANDED CLOSURE PLAN

OD20K 20,000-POUND OPEN DETONATION UNIT

HOLLOMAN AIR FORCE BASE
NEW MEXICO
RCRA PERMIT No. NM6572124422

Performance Based Remediation
Contract Number: FA8903-13-C-0008

Prepared for:

AIR FORCE CIVIL ENGINEER CENTER
2261 Hughes Ave., Suite 163
Joint Base San Antonio Lackland AFB, Texas 78236-9853

October 2014

Prepared by:

FPM Remediations, Inc.
584 Phoenix Drive
Rome, NY 13441

URS **Group, Inc.**
7720 N 16th Street, Suite 100
Phoenix, AZ 85020-4493

OD20K 20,000-Pound Open Detonation Unit

Amended Expanded Closure Plan

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Site:

OD20K 20,000-Pound Open Detonation Unit
Holloman Air Force Base
New Mexico

Author: ______________________________
Ivana Raicevic

Title: Site Lead
Date: ______________________________

Submitted to:

Mr. John E Kieling, Chief
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303

Reviewer: ______________________________
Maureen Whalen CG, CPG, PMP

Title: Project Manager
Date: ______________________________

Prepared for:

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Title: Holloman AFB Environmental Chief
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Prepared by:

FPM Remediations, Inc. (FPM)
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October 2014

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LIST OF ABBREVIATIONS AND ACRONYMS

AFB	Air Force Base
CFR	Code of Federal Regulations
DGI	Data Gap Investigation
DLA	Defense Logistics Agency
DRMO	Defense Reutilization and Marketing Office
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
FPM	FPM Remediations, Inc.
HASP	Health and Safety Plan
HHRA	Human Health Risk Assessment
MCL	Maximum Contaminant Level
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
NOD	Notice of Deficiency
OD	Open Detonation
PE	Professional Engineer
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RSL	Regional Screening Level
RTC	Response to Comments
SAP	Sampling and Analysis Plan
SLERA	Screening Level Ecological Risk Assessment
SSL	Soil Screening Level
TDS	Total Dissolved Solids
UFP-QAPP	Uniform Federal Policy-Quality Assurance Project Plan
U.S.	United States
USEPA	United States Environmental Protection Agency
UXO	Unexploded Ordnance

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1.0 INTRODUCTION AND BACKGROUND

Holloman Air Force Base (AFB) operated an Open Detonation (OD) unit for the destruction of ordnance, munitions, incendiaries, and propellants from 1996 through March 2011. The OD20K 20,000-Pound OD Unit was operated under New Mexico Environment Department (NMED) Permit Number (No.) NM6572124422, issued in 1997, and updated in 1998 (NMED, 1998). Permit Attachment F, Closure and Post-Closure Care Plans, prescribes the general requirements for OD20K closure. The Expanded Closure and Post-Closure Care Plan for the OD20K 20,000-Pound OD Unit was developed to expand upon the permit requirements and standards and provided a specific plan of action for the OD20K closure (NationView, 2012). It was designed to parallel the specific Sections of Attachment F of the Permit, augmenting the general text as appropriate with specific processes, standards, and requirements. The Expanded Closure and Post-Closure Care Plan was approved by NMED in March 2012.

Since soil and groundwater sampling events, performed in August 2012 in accordance with the Expanded Closure and Post-Closure Care Plan (NationView, 2012), resulted in closure standard exceedances, this Amended Expanded Closure Plan was developed to include additional tasks that will either confirm that additional sampling is not necessary (based on new background soil sampling and confirmation samples) or provide enough data for performing both a Risk Assessment for OD20K 20,000-Pound OD Unit and delineation of the extent of the contamination. Based on the results of the Risk Assessment, the necessary corrective action for this site will be determined. Holloman AFB officially notified NMED regarding the closure standards exceedances via certified letter on 13 August 2014.

This Amended Expanded Closure Plan includes Sections 1, 2, and 6 from the Expanded Closure and Post-Closure Care Plan (NationView, 2012). These sections were modified, where appropriate, to account for activities already performed and to include both Data Gap Investigation (DGI) for soil and groundwater and removal of the perchlorate-contaminated soil, if required. As in the Expanded Closure and Post-Closure Care Plan, each paragraph or group of paragraphs under each subheading in Permit Attachment F is referenced and then followed by text that clarifies the intent of the requirement and describes how Holloman AFB already met or will meet the requirement.

In addition, the 29 August 2011 Notice of Deficiency (NOD) on the Expanded Closure and Post-Closure Care Plan and 22 September 2011 Responses to Comments (RTCs), as well as 15 December 2011 Second NOD and the 12 January 2012 RTCs are included as **Attachments 1 – 4** to this Amended Expanded Closure Plan.

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2.0 CLOSURE PLAN

2.1 Closure Performance Standard

The Permit states:

> "This closure plan is designed to ensure that the 20,000-Pound OD Unit will not require further maintenance and controls, will minimize and eliminate threats to human health and the environment, will prevent the escape of hazardous wastes, hazardous constituents, or waste decomposition products to soils, surface waters, groundwater or the atmosphere, and will comply with all relevant closure requirements. To achieve this standard, measures taken during the active life as well as those that will be conducted during closure have been formulated specifically to address these criteria."

This Amended Expanded Closure Plan details the work to close the site.

2.2 Summary of Activities Conducted During Active Life

This section clarifies the permit text in Attachment F under the heading "Summary of Activities Conducted during Active Life."

Sampling was performed throughout the active life of the OD unit in accordance with the Sampling and Analysis Plan (SAP), Permit Attachment J. Sampling reports were prepared and submitted to NMED.

Between treatment events, the OD unit was re-graded, as required.

2.3 Summary of Closure Activities

Text under the heading, "Summary of Closure Activities," in Permit Attachment F summarizes the closure process. Each of the specific tasks and requirements are discussed and detailed in this Amended Expanded Closure Plan.

2.4 Partial and Final Closure Activities

Text under the heading, "Partial and Final Closure Activities" in the Permit Attachment F states: "There will be no partial closure of the OD treatment unit." No clarification of the permit text is needed. The OD20K 20,000-Pound OD Unit will be permanently closed.

2.5 Maximum Waste Inventory

Permit Attachment F, Maximum Waste Inventory, requires that "no waste munitions will be present at the site upon initiation of closure activities." The last treatment event at the OD20K occurred on March 3, 2011. Waste munitions are not stored at the site. Holloman AFB notified NMED regarding the beginning of closure activities via certified letter on March 3, 2011. The letter is included in this plan as **Attachment 5**.

2.6 Inventory, Removal, Disposal, and Decontamination of Equipment

Text under heading "Inventory, Removal, Disposal, and Decontamination of Equipment," in the Permit Attachment F presents general steps to achieve the closure standard and requires that appropriate Personal Protective Equipment be worn during each of the steps. The steps (site reconnaissance, removal of scrap materials and debris, closure sampling and analysis, risk-based screening, corrective action, surface grading, and closure certification) are discussed in detail in subsequent sections of the Permit Attachment F.

Decontamination of sampling equipment is addressed in the Amended SAP for the Closure of the OD20K 20,000-Pound OD Unit (included as **Appendix A** to this Amended Expanded Closure Plan).

For the closure inspection and soil and groundwater sampling activities performed in August 2012, health and safety practices adhered to the Basewide Health and Safety plan (HASP) (Bhate, 2003b). *For the DGI activities, health and safety practices will follow the site-specific HASP provided in **Appendix B** of this Amended Expanded Closure Plan.*

2.6.1 Site Reconnaissance

This section clarifies the permit text in Attachment F under the heading "Site Reconnaissance."

A pre-final visual site inspection (as required by Attachment F of the Permit) was performed in April 2012 to determine whether any surficial debris, scrap, or other substances were present at the OD20K 20,000-Pound OD Unit that requires removal in order for the closure to proceed. Identified debris included metal fragments and remnants. The pre-final inspection was documented using photographs and notes in a bound, water-resistant field logbook. The results of pre-final inspection will be provided in the Closure Report.

2.6.2 Removal of Scrap Materials and Debris

This section clarifies the permit text in Attachment F under the heading "Removal of Scrap Materials and Debris."

Permit requirements for debris removal for site closure are as follows:

- Permit Module III, Section F, Inspection Schedules and Procedures (Page 4 of 7): "All UXO [unexploded ordnance] metal casings, other metal casings, and fragments shall be placed in appropriate containers, and handled as RCRA [Resource Conservation and Recovery Act] hazardous waste. Recovered lead fragments shall also be containerized and handled as hazardous waste."
- Permit Attachment A, Waste Analysis Plan, Summary of Analytical Methods and Sampling Frequency (Page 21 of 22): "Samples of solid residuals […] will be prepared and analyzed according to protocols from the EPA [Environmental Protection Agency] Publication: SW-846, Test Methods for Evaluating Solid Waste, Third Edition. Samples will be analyzed for all toxic metals, including priority pollutant metals (listed in New Mexico Hazardous Waste Management Regulations 20 NMAC [New Mexico Administrative Code] 4.1, Subpart V, 40 CFR [Code of Federal Regulations] §264 Appendix IX), explosive residues, and soil moisture. Permit Attachment J, Sampling and Analysis Plan, contains the specific test methods and lists of analytes that will be measured, as well as the rationale for their selection."
- Permit Attachment J, Sampling and Analysis Plan: This portion of the permit does not identify specific tests or analytes for debris and metal fragments.

The removal of debris occurred in April 2012 in accordance with the NMED-approved Expanded Closure and Post-Closure Care Plan (NationView, 2012). In accordance with past practice, the debris and metal fragments were collected by Holloman AFB Explosive Ordnance Demolition (EOD) personnel and delivered to the Defense Logistics Agency (DLA) Disposition

Services (formerly the Defense Reutilization and Marketing Office [DRMO]) for disposal. The results of the removal of debris will be provided in the Closure Report.

2.6.3 Closure Sampling and Analysis

This section clarifies the permit text in Attachment F under the heading "Closure Sampling and Analysis."

For closure, a records review was conducted to determine whether additional analyses are warranted to characterize the site according to the materials historically treated at the site. The records review performed two functions: 1) identified chemicals managed at the treatment unit (i.e., the chemical constituents of concern) and 2) identified potential chemical releases at the treatment unit.

A record of wastes brought in from 1996 through 2011 and detonated at OD20K was reviewed by a New Mexico Registered Professional Engineer (PE) and documented in a 2011 Memorandum and List of Materials Destroyed (**Appendix C**). The PE findings are also included in **Appendix C**. The list of chemical constituents of concern in the Amended SAP (**Appendix A**) for closure sampling performed in 2012 accurately reflects the review findings. Institutional knowledge and records do not indicate any spills or releases of oils or hazardous materials occurred at the Permitted Unit during the operating period.

The closure soil and groundwater sampling was performed in August 2012 in accordance with the NMED-approved Expanded Closure and Post-Closure Care Plan (NationView, 2012). Soil and ground water were analyzed for the following parameters (see the Amended SAP, **Appendix A,** for details):

- Metals (see full list in Amended SAP [**Appendix A**])
- Explosives (see full list in Amended SAP [**Appendix A**])
- Perchlorate
- Nitrate
- Phosphorus

Soil sampling was conducted to compare soil concentrations of identified analytes to the NMED Soil Screening Levels (SSLs) and United States Environmental Protection Agency (USEPA) Regional Screening Levels (RSLs) (as appropriate) for residential soil. The Amended SAP (**Appendix A**) details the 2012 methodology used for collecting and analyzing soil and groundwater samples, and the standards to which they were compared.

The August 2012 analytical results showed that concentrations of perchlorate in soils at four locations exceeded NMED SSLs and that perchlorate, nitrate and Total Dissolved Solids (TDS) concentrations in groundwater exceeded the corresponding USEPA Maximum Contaminant Levels (MCLs)**.** Since perchlorate background concentration in soil is not available, it is not possible to identify whether August 2012 perchlorate concentrations in soil are representative of background. *As a result, DGI will include the following initial tasks:*

- *Determination of background perchlorate concentration in soil - since perchlorate background concentration in soil is not available, it is not possible to identify whether August 2012 perchlorate concentrations in soil are representative of background. As a result, ten background soil samples will be collected at a distance between 500 and 1000* *feet from the boundary of the OD20K 20,000-Pound OD Unit in areas unaffected by historical treatment operations and analyzed for perchlorate. The perchlorate background concentration will be calculated following the statistical methodology described in Permit Attachment J Sampling and Analysis Plan.*

- *Additional determination of background concentrations of metals in soil - 2012 analytical results showed that concentrations of some metals in soils exceeded their respective site-specific background concentrations obtained from OD20K Background Study performed in 1997 (Holloman AFB, 1997). This was based on comparison of maximum detected site concentrations to the background reference values. Since OD20K Background Study included collection of only six soil samples in the vicinity of OD20K, two-sample hypothesis test was not used to determine if OD20K metal concentrations were elevated compared with background (the minimum number of samples for two-sample test is 8). Therefore, ten background soil samples that will be collected and analyzed for perchlorate during the DGI (the first bullet above) will also be analyzed for full list of metals (**Appendix A**, Section 1.4). This will allow the use of two-sample test for comparison of two distributions, the site data and background data, and the conclusion whether the clean closure of OD20K is achievable. The background concentrations of metals will be calculated following the statistical methodology described in Permit Attachment J Sampling and Analysis Plan.*
- *Verification of perchlorate concentrations in soil – four locations where 2012 sampling event showed exceedances for perchlorate will be sampled during the DGI to determine if soil analytical results are similar to 2012 sampling results.*
- *Verification of perchlorate and nitrate concentrations in groundwater - all four existing monitoring wells will be sampled during the DGI to determine if groundwater analytical results are similar to 2012 sampling results.*

Based on results of these initial tasks the DGI might include the following tasks:

- *If the result of background soil sampling for perchlorate shows that both 2012 and DGI perchlorate concentrations in soil are not elevated compared with background, it will be concluded that the perchlorate site concentrations are representative of background and additional soil sampling for perchlorate will not be performed.*
- *If perchlorate concentrations in soil are elevated compared with background then four soil samples from the surface interval 0-1 foot will be collected at a 20 feet step-out of each of the four 2012 soil sampling locations that exceeded NMED SSL. If the concentrations of perchlorate in soil exceed the residential SSL at the 20 feet step-out sampling locations, then additional soil samples will be collected at locations determined by stepping out an additional 10 feet from the perchlorate exceedance location. Based on soil sampling results, the perchlorate contamination in soil will be delineated and Human Health and Ecological Risk Assessment will be performed (see **Section 2.8**).*
- *If the DGI groundwater sampling results confirm the 2012 results, then five additional monitoring wells will be installed to a depth of approximately 50 feet in the vicinity of monitoring well HAFB-EOD-MW02 where 2012 groundwater sampling resulted in perchlorate and nitrate concentrations above the applicable screening levels. Based on groundwater sampling results, the perchlorate and nitrite contamination in groundwater*

will be delineated and Human Health and Ecological Risk Assessment will be performed (see ***Section 2.8****).*

*Details of these tasks are provided in Amended SAP (****Appendix A****).*

2.7 Background Comparison and Risk-Based Screening

This section clarifies the permit text in Attachment F under the heading "Background comparison and Risk-Based Screening."

Residential SSLs established in NMED's New Mexico Environment Department, Risk Assessment Guidance for Site Investigations and Remediation (NMED, 2012) were used as the action levels for 2012 detections in soil. If NMED did not have an SSL for a particular parameter in soil, it was compared to its respective USEPA RSL (USEPA, 2014). Groundwater results were compared to USEPA MCLs (for drinking water) (USEPA, 2014) and New Mexico Water Quality Control Commission (NMWQCC) groundwater protection standards (NMWQCC, 2002). The lower of the available standards was used. *The same action levels will be used for DGI soil and groundwater sampling described in* ***Section 2.6.3*** *of this Amended Expanded Closure Plan.*

Since action levels for particular analytes were exceeded during the 2012 sampling events, Holloman AFB officially notified NMED regarding the 2012 soil and groundwater sampling results as well as the planned DGI. The letter also summarized Holloman AFB's proposed course of action (e.g., risk-based closure, further remediation, etc.).

2.8 Corrective Action

This section clarifies the permit text in Attachment F under the heading "Corrective Action."

Human Health and Screening Level Ecological Risk Assessments will be performed upon completion of all sampling events if an exceedance of a standard for closure is identified through the evaluation of existing conditions. The risk assessments will be performed only for the parameter(s) that exceed a standard for closure. If either risk assessment for soil identifies an unacceptable risk, the removal of contaminated soil will be performed. If risk assessment for groundwater identifies an unacceptable risk, the site will move to a post-closure care permit.

2.8.1 Human Health Risk Assessment

The primary goal of a Human Health Risk Assessment (HHRA) is to provide an assessment of the potential human health risks associated with a site in the absence of any potential future remedial actions, considering current land use, as well as any potential future uses of the installation. HHRA for OD20K will be performed in accordance with NMED's Risk Assessment Guidance for Site Investigations and Remediation (NMED, 2012). Key attributes of this guidance include default values for generic SSLs where site-specific information is unavailable, and the identification of parameters for which site-specific information is needed for the development of site-specific SSLs. In general the HHRA will contain a detailed discussion of each of the following items:

- *Characterization of the environmental setting, including current and future land uses;*
- *Identification of the exposure pathways;*
- *Exposure assessment;*

- *Determination of Target Risk and Hazard Levels;*
- *Analysis of model assumptions;*
- *Development of data quality objectives;*
- *Identification of Contaminants of Potential Concern (COPCs);*
- *Development of preliminary Conceptual Site Model (CSM);*
- *Determination of exposure intervals; and*
- *Comparison of COPC maximum concentrations with SSLs based on the complete exposure pathway analysis identified by the preliminary CSM and assessing total risk/hazard from all constituents.*

2.8.2 Screening Level Ecological Risk Assessment

The primary goal of a Screening Level Ecological Risk Assessment (SLERA) is to evaluate the potential adverse effects that chemical contamination has on the plants and animals that make up ecosystems. The SLERA will be performed in accordance with NMED's Risk Assessment Guidance for Site Investigations and Remediation (NMED, 2012) and will contain a detailed discussion of each of the following items:

- *Characterization of the environmental setting, including current and future land uses.*
- *Identification of known or likely chemical stressors (chemicals of potential ecological concern, COPECs).*
- *Identification of the fate and transport pathways that are complete.*
- *Identification of the assessment endpoints that should be used to assess impact of the receptors; what is the environmental value to be protected.*
- *Identification of the complete exposure pathways and exposure routes.*
- *Species likely to be impacted and selection of representative receptors.*

2.8.3 Corrective Action for Soil

If either risk assessment for the perchlorate in soil identifies an unacceptable risk, the perchlorate-contaminated soil will be excavated in an area or areas with unacceptable levels of contamination. Soils will initially be excavated by heavy equipment to depth raging from surface to one foot below ground surface. Following removal of the estimated volume of perchlorate-contaminated soil, the excavated area will be sampled to determine if remaining soils are above or below the NMED SSL for perchlorate. Confirmation samples will be collected along the side walls and on the bottom of the excavated area.

If laboratory analysis indicates that remaining soils are above the NMED SSL for perchlorate, additional excavation and sampling will take place. Vertical expansion will occur in 6-inch lifts over the area or areas with the exceedance until the standards are met. Sidewall expansion will continue 5 ft beyond a sidewall exceedance for the 20 ft interval or intervals that failed to meet cleanup standards and match the excavation depth adjacent to the exceedance until the standards are met. Backfilling excavated areas will not be initiated until laboratory analytical results have determined that remaining soils are below the NMED SSL for perchlorate.

The excavated soil will be placed in appropriate roll-off containers (lined and covered, if necessary) and stored at the Holloman AFB Defense Reutilization and Maintenance Organization facility prior to shipment to an authorized disposal facility using an authorized transporter.

Following removal of contaminated soil and confirmation sampling, the excavations will be backfilled with clean fill material and compacted with a vibratory compactor, backhoe, or other appropriate methods.

2.8.4 Corrective Action for Groundwater

If the risk assessment for the perchlorate and/or nitrite in groundwater identifies an unacceptable risk, the clean closure of OD20K cannot be achieved since contamination cannot be remediated during this event; therefore, the site will move to a post-closure care permit.

2.9 Surface Grading

This section clarifies the permit text in Attachment F under the heading "Surface Grading."

The OD20K 20,000-Pound OD Unit will be graded as required in the permit and follow natural contours. Natural reestablishment of vegetation that relies on natural plant succession will be allowed.

2.10 Decontamination

This section clarifies the permit text in Attachment F under the heading "Decontamination."

The equipment used for 2012 sampling events was decontaminated in August 2012 in accordance with Holloman AFB Standard Operating Procedure No. 2, Sampling Equipment Decontamination included in the Basewide Quality Assurance Project Plan (QAPP) (Bhate, 2003b).

*For DGI drilling activities and soil removal (if any) and soil/groundwater sampling, all field equipment will be properly decontaminated in accordance with FPM Remediations, Inc. (FPM) Standard Operating Procedure No. 4, Equipment and Personnel Decontamination included in the site-specific Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP) (**Appendix D**), prior to use and in between sampling to eliminate cross-contamination of soil samples and minimize contamination leaving the site.*

2.11 Schedule for Closure

This section clarifies the permit text in Attachment F under the heading "Schedule for Closure." If corrective action for groundwater is not required based on the DGI results, the schedule for closure will follow activities listed in **Table 2-1** including submittal of this Amended Expanded Closure Plan, its subsequent review and probable approval by NMED, removal of perchlorate-contaminated soil if necessary, and Site Closure Report. Already performed closure activities such as site reconnaissance, removal of debris, and closure soil and groundwater sampling are also listed in this table. If contamination cannot be remediated during this event, then the site will move to a post-closure care permit.

Table 2-1 Proposed Closure Schedule if Correction Action for Groundwater is not Required

Closure Activity	***Closure Period***
Received and treated final volume of waste	*March 3, 2011*
HAFB notified NMED of intent to close	*March 30, 2011*
Expanded Closure and Post-Closure Plan submitted to NMED for review and approval	*July 18, 2011*
NMED review and approval period	*July 18 to August 29, 2011*
Expanded Closure and Post-Closure Plan (revised to address NMED comments) submitted to NMED for approval	*February 2012*
NMED approval	*March 2012*
Site reconnaissance (Pre-Final Inspection)	*April 2012*
Removal of Debris	*April 2012*
Soil and groundwater sampling and analysis and sampling equipment decontamination	*August 2012*
Amended Expanded Closure Plan submitted to NMED for review and approval (includes data gap investigation – confirmation soil and groundwater sampling, and if needed soil sampling for perchlorate, soil removal, and installment of 5 additional groundwater monitoring wells)	*October 2014*
NMED review and approval period (the rest of the schedule will adjust based on NMED review times)	*October 2014 to January 2015*
Amended Expanded Closure Plan (revised to address NMED comments) submitted to NMED for approval	*February 2015*
NMED approval	*March 2015*
Soil and Groundwater Data Gap Field Investigation	*April 2015*

Closure Activity	***Closure Period***
Risk Based Screening	*June 2015*
Removal of perchlorate-contaminated soil if risk assessment for the perchlorate in soil identifies an unacceptable risk	*July-August 2015*
Well Abandonment	*September 2015*
Site Closure Report submitted to NMED for review and approval	*October 2015*
NMED review and approval period	*October 2015 to January, 2016*
Site Closure Report revised to address NMED comments) submitted to NMED for approval	*February, 2016*
NMED approval	*March, 2016*

2.12 Certificate of Closure

This section clarifies the permit text in Attachment F under the heading "Certification of Closure."

Upon completion of either DGI or corrective action implementation (depending on DGI results), Holloman AFB will submit by registered mail a Closure Report for the treatment unit to the NMED for review and approval. The Closure Report will document that the treatment unit has been closed in compliance with the Permit and the approved Amended Expanded Closure Plan. A certification will be included with the Report that is signed by Holloman AFB representative and by an independent New Mexico licensed PE (see 40 CFR §264.115).

The Report will contain:

1. A summary of all closure activities conducted, including at a minimum:
    a. Results of all investigations;
    b. Waste management;
    c. Decontamination and removal activities; and
    d. Sampling activities.
2. A discussion of any variance from the activities previously approved in this Amended Expanded Closure Plan and the reason for the variance;
3. A detailed presentation of sampling results, including:
    a. Sample identification;
    b. Sample location;
    c. Laboratory analytical data;
    d. Detection limit for each analyte;

   e. Field and analytical laboratory quality control data;
   f. Identification of analytical procedures; and
   g. Identification of analytical laboratory.

4. A discussion of data validation;
5. The location of supporting documentation, including:
   a. Field logbooks;
   b. Laboratory sample analysis reports;
   c. Quality assurance /Quality Control documentation;
   d. Chain-of-custody forms; and
   e. Waste manifest(s).
6. The location of storage or disposal of hazardous and mixed waste and solid waste resulting from closure activities; and
7. A copy of the Human Health and Ecological Risk Assessments, if a risk assessment is necessary.

The closure process will not be considered complete until the NMED approves the Closure Report and Closure Certification.

2.13 Other Activities

This section clarifies the permit text in Attachment F under the heading “Other Activities.”

In addition, to the closure activities specified in earlier paragraphs, other tasks will be performed to ensure that the closure activities satisfy the closure performance standard. These tasks include periodic re-grading and maintenance to retard erosion and run-on/run-off, and continued posting and security measures to be undertaken as part of the planned base general maintenance activities.

3.0 REFERENCES

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ATTACHMENT H

SAMPING AND ANALYSIS PLAN

HOLLOMAN AIR FORCE BASE
OPEN DETONATION TREATMENT UNIT

Permit No. NM6572124422

This attachment describes the procedures used to for characterization, monitoring, and closure sampling for the 20,000-Pound Open Detonation (OD) Treatment Unit at Holloman Air Force Base (HAFB). In accordance with guidance given by the New Mexico Environment Department (NMED) Hazardou Waste Bureau's (HWB's) on 9 January 2015, the following amended Sampling and Analysis Plan (SAP) titled *Amended Sampling and Analysis Plan OD20K 20,000-Pound Open Detonation Unit* submitted to the NMED on 22 October 2014 is included in this section.

The SAP addresses the applicable waste analysis requirements in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1, Subpart V (20.4.1.500 NMAC), incorporating Title 40 Code of Federal Regulations (CFR) §§264.13 and 264.602, 20.4.1.900 NMAC, incorporating 40 CFR §270.14(b), and 20.4.1.800 NMAC, incorporating 40 CFR Part 268.

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AMENDED SAMPLING AND ANALYSIS PLAN

OD20K 20,000-POUND OPEN DETONATION UNIT

HOLLOMAN AIR FORCE BASE
NEW MEXICO
RCRA PERMIT No. NM6572124422

Performance Based Remediation
Contract Number: FA8903-13-C-0008

Prepared for:

AIR FORCE CIVIL ENGINEER CENTER
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LIST OF ABBREVIATIONS AND ACRONYMS

20K	20,000 Pound
AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
Bhate	Bhate Environmental Associates, Inc.
CES/CEAN	Civil Engineering Squadron/Environmental Flight
DGI	Data Gap Investigation
DLA	Defense Logistics Agency
DQCR	Data Quality Control Report
DRMO	Defense Reutilization and Marketing Office
EDD	Electronic Data Deliverable
EOD	Explosive Ordnance Disposal
ERPIMS	Environmental Restoration Program Information Management System
ESRI	Environmental Systems Research Institute
FPM	FPM Remediations, Inc.
GIS	Geographical Information System
GPS	Global Positioning System
HASP	Health and Safety Plan
IDW	Investigation-Derived Waste
LIMS	Laboratory Information Management System
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NDMA	N-nitrosodimethylamine
NEW	Net Explosive Weight
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
OD	Open Detonation
OSHA	Occupational Safety and Health Administration
PETN	Pentaerythritol tetranitrate
PPE	Personal Protective Equipment
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
SSL	Soil Screening Level
TB	trip blank
TDS	Total Dissolved Solids

LIST OF ABBREVIATIONS AND ACRONYMS (continued)

TNT	2,4,6-Trinitrotoluene
UFP-QAPP	Uniform Federal Policy-Quality Assurance Project Plan
U.S.	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
UXO	Unexploded Ordnance

1.0 INTRODUCTION AND BACKGROUND

Closure soil and groundwater sampling at the OD20K 20,000 Open Detonation (OD) Unit at Holloman Air Force Base (AFB), New Mexico was performed in August 2012 by NationVew in accordance with the Sampling and Analysis Plan (SAP), an Appendix A to the Expanded Closure and Post-Closure Care Plan (NationView, 2012). The closure sampling was required by New Mexico Environment Department (NMED) Permit No. NM6572124422. The general requirements for the OD20K 20,000 OD Unit closure are prescribed in Permit Attachment F, Closure and Post-Closure Care Plans. As part of the Permit, Attachment J, SAP, quarterly sampling throughout the operating life of the unit was required. Results of quarterly sampling from the first quarter of 2003 through the first quarter of 2011 as well as permit conditions were used for development of the original SAP.

Since soil and groundwater sampling events resulted in closure standard exceedances, this Amended SAP was developed by FPM Remediations, Inc. (FPM) under Air Force Civil Engineer Center (AFCEC) Contract FA8903-13-C-0008 to include additional tasks that will either confirm that additional sampling is not necessary (based on new background soil sampling and/or confirmation samples) or provide enough data for performing both a Risk Assessment for OD20K 20,000-Pound OD Unit and delineation of the extent of the contamination.

Holloman AFB operated an OD20K 20,000-Pound OD Unit for the destruction of explosive ordnance from February 1997 through March 2011. It was operated under NMED Hazardous Waste Facility Permit No. NM6572124422, issued February 3, 1997. In addition to detailed procedures that were followed during the closure sampling events and analysis performed in 2012, this Amended SAP provides the detailed sampling and analysis requirements for additional soil and groundwater sampling at OD20K 20,000-Pound OD Unit.

1.1 Amended SAP Organization

This Amended SAP will serve as the primary working document for the Data Gap Investigation (DGI) closure sampling for the OD20K. The Amended SAP is organized as follows:

- **Section 1** presents a summary of the closure approach, project objectives, and description and history of operation of the OD20K 20,000-Pound OD Unit.
- **Section 2** presents the detailed SAP for the closure soil and groundwater sampling performed in 2012, as well as the specific data quality objectives, sampling procedures, sample analysis, and related sample Quality Assurance/Quality Control (QA/QC) measures that were employed during the conduct of the investigation.
- **Section 3** presents the detailed Amended SAP for DGI soil and groundwater sampling, as well as the specific data quality objectives, sampling procedures, sample analysis, and related sample QA/QC measures to be employed during the conduct of the DGI.
- **Section 4** describes the data management plan that was used or will be used to support the SAP and the Amended SAP, respectfully.
- **Section 5** describes the health and safety requirements that were or will be followed during the sampling effort.
- **Section 5** identifies the full reference information for the documents cited throughout this Amended SAP.

The figures and tables referenced throughout this Amended SAP are included under separate tabs following the text.

1.2 Project Objectives

The primary project objectives are to:

- Collect data to demonstrate site conditions at the time of closure.
- Collect data to compare results to background reference values, NMED residential Soil Screening Levels (SSLs) and/or United States Environmental Protection Agency (USEPA) Regional Screening Levels (RSLs) to demonstrate clean closure, and
- Collect the proper data to support closure of the OD20K 20,000-Pound OD Unit.

1.3 Facility Description and Operational History

1.3.1 Holloman Air Force Base

Holloman AFB is located on approximately 50,700 acres of land in Otero County, south-central New Mexico. Holloman AFB lands are situated in the northern Chihuahuan Desert in the region known as the Tularosa Basin that is bounded to the east and west by the Sacramento and San Andres Mountains, respectively. Holloman AFB is located adjacent to White Sands Missile Range, and White Sands National Monument is located west of the Base. Regional water supplies are derived from Bonita Lake, located approximately 60 miles north of the Base and the Boles, Douglas, and San Andres Well Fields located 14 miles to the southeast.

The nearest population center to Holloman AFB is the city of Alamogordo, located approximately 7 miles to the east. Regional metropolitan centers include El Paso, Texas, located 75 miles south- southwest, Las Cruces, New Mexico, located 65 miles to the southwest, and Albuquerque, New Mexico, located 210 miles north of the facility. The primary transportation route for the facility is Highway 70 that traverses the southern boundary of the Base in a northeasterly direction. The OD20K 20,000-Pound OD Unit is located adjacent to the northern boundary of Holloman AFB. The area to the north is part of the White Sands Missile Range.

Holloman AFB was initiated as a temporary facility developed to provide gunnery and bomber training to aircrews during the Second World War. The Base mission was altered in the post-war years to the development of pilotless aircraft, guided missiles, and associated equipment. In the late 1950s the Base was transferred to the Air Force Systems Command and designated as the AF Missile Development Center. On January 1, 1971, the Base mission expanded to provide lead-in fighter training for the 479th Tactical Training Wing and its components.

1.3.2 Open Detonation Unit Operational Description and History

As a result of the Air Combat Command readiness requirements and the 46th Test Group activities, a variety of ordnance, munitions, incendiaries, and propellants become waste because of exceedance of shelf-life, unanticipated deterioration, or failure to attain specifications that render the device non-serviceable. These waste explosives are considered characteristically hazardous under the Resource Conservation and Recovery Act (RCRA) due to reactivity (D003).

The OD20K 20,000-Pound OD Unit derives its name from the relevant operating procedures for this treatment activity. The Net Explosive Weight (NEW) of solid propellant rocket motors that were treated in the trench was limited to 20,000 pounds (i.e., 20,000 pounds per treatment event). This total did not include the mass of the casings, other associated containment devices, and detonating charges. Although the precise number of treatment occurrences during any year varied, discrete treatment events occurred at typical frequencies of at least one event per month, giving a total of 420,000 pounds NEW per calendar year. More specific information on ordnance constituents, the OD20K 20,000-Pound OD Unit, and operating procedures is provided in other attachments to the Permit.

The OD20K 20,000-Pound OD Unit consists of a clear zone approximately 400 feet in diameter. Treatment of the wastes was accomplished by placing the explosive ordnance on top of the ground within a 100-foot diameter area at the center of the clear zone. The waste was then treated by detonation. The force of the explosion often created a depression in the ground, which was inspected to ensure that the waste was completely destroyed. Unexploded ordnance (UXO) that may have been ejected from the depression was collected and returned to the depression and exploded again to treat the UXO. Casings and fragments that did not contain UXO were collected and containerized. Subsequent detonations were performed at locations surrounding the first depression within the 100-foot diameter detonation area. When the detonation area was covered with depressions, a bulldozer smoothed out the site, filling in the depressions. For post-detonation soil sampling, the last detonation depression is not filled in, nor is any dirt work conducted, until the soil samples have been collected.

A berm, with minimum height of 2 feet, exists at the south end of the OD20K 20,000-Pound OD Unit to prevent carryover of fragments towards the test track area.

All waste that was treated at the OD20K 20,000-Pound OD Unit was transported to the treatment area in the original product container or other appropriate packaging. Wastes to be treated were not stored at the treatment unit, but were delivered shortly before treatment.

Receipt of the waste in the product container, combined with the fact that commonly used military propellants are compatible with one another, and ensured that incompatible wastes were not mixed. The reactive wastes treated at the OD20K 20,000-Pound OD Unit were solid in nature and contained no free liquid.

The OD20K 20,000- Pound OD Unit was used solely for the disposal/treatment of conventional waste-ordnance, munitions, incendiaries, propellants, and rocket motors. The only munitions delivered or disposed of at OD20K have been conventional live and training munitions. Therefore, the chemical components and combustion by-products are consistent with typical materials for military munitions items.

1.4 Historical Sampling

Samples were collected from the OD20K 20,000-Pound OD Unit quarterly throughout the life of the unit. Samples were collected and analyzed for the following parameters:

1. Explosive compounds (by USEPA Method 8330, unless otherwise noted):

   HMX (cyclotetramethylenetetranitramine; octahydro-1,3,5,7-tetranitro-1,3,5,7- tetrazocine),

   RDX (cyclotrimethylenenitramine; Hexahydro-1,3,5-trinitro-1,3,5-triazine),

   1,3,5-Trinitrobenzene,

   1,3-Dinitrobenzene,

   Tetryl,

Nitrobenzene,

2,4-Dinitrotoluene,

2,6-Dinitrotoluene,

TNT (2,4,6-Trinitrotoluene),

PETN (Pentaerythritol tetranitrate),

2-Amino-4,6-dinitrotoluene,

4-Amino-2,6-dinitrotoluene,

2-Nitrotoluene,

3-Nitrotoluene,

4-Nitrotoluene, and

Nitroglycerin.

2. Metals (by USEPA Method 6010, unless otherwise noted):

   Antimony,

   Arsenic,

   Barium,

   Beryllium,

   Cadmium,

   Chromium,

   Copper,

   Lead,

   Mercury (Method 7471 2012 sampling, 7471B DGI),

   Nickel,

   Selenium, and

   Silver.

3. Soil Moisture (American Society for Testing and Materials [ASTM]-D-2216).

The historic quarterly data were compared to August 2009 NMED SSLs. Exceedances of the NMED residential SSLs were found for two explosives (nitroglycerin and RDX):

One nitroglycerin concentration (16 milligrams per kilogram [mg/kg] in April 2009) exceeded the current SSL of 6.11 mg/kg, but did not exceed the SSL existing at that time (347 mg/kg). Therefore, no corrective actions, as required by the Permit, were required or taken.

One nitroglycerin exceedance (8 mg/kg) was identified in March 2011. In accordance with the Permit, Attachment J, Data Evaluation, Page 33 and 34, the area was resampled after the exceedance was identified. The resampling result (18 mg/kg) confirmed an exceedance.

RDX exceeded the NMED SSL of 44.2 mg/kg in January 2006 with a concentration of 57 mg/kg. The OD unit has been re-graded, leveled, and bulldozed and used for treatment significantly since January 2006.

Figures 1 and **2** show the location of historic quarterly samples collected and the areas where residential SSLs were exceeded for nitroglycerin and RDX, respectively.

Quarterly data from the first quarter of 2003 through the first quarter of 2011 did not identify any exceedances of residential SSLs for any toxic metals or any other explosive compounds.

1.5 Sample Analysis Rationale

This section addresses the parameters of concern for wastes that were treated at the OD20K 20,000-Pound OD Unit. The rationale for the selection of these parameters, sampling methods, analytical protocols, and frequency of analysis are described.

The only munitions disposed of at OD20K 20,000-Pound OD Unit have been conventional live and training munitions. Therefore, the chemical components and combustion by-products are consistent with typical materials for military munitions items; thus, the emphasis of sampling and analysis for the OD20K 20,000-Pound OD Unit is on constituents present in these types of wastes.

The nature of the treatment by-products was dependent upon the category of device from which the waste was derived. Propellant constituents were converted largely to the gaseous products CO2, CO, H2O, N2, and, to some degree, NOx. Some extremely limited possibility existed that these materials may fail to entirely decompose.

The nitrate oxidant from primers or detonators would have converted to sodium or potassium nitrite (NaNO2, KNO2). Other oxidants were converted to the oxide. Fuels such as antimony sulfide or thiocyanate were converted to the oxide or sulfate.

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2.0 PREVIOUS INVESTIGATION SUMMARY

This section presents the summary of the closure soil and groundwater sampling performed in 2012. The Section includes:

- Pre-Sampling Events
- Closure Sampling Strategy
- Sample Analysis

The closure sampling had three primary objectives. The first goal was to characterize the site at the time of closure. The second objective was to demonstrate that the concentrations of residual materials remaining at the site did not exceed NMED residential SSLs. The third goal of the sampling was to evaluate the groundwater condition in the immediate area surrounding the treatment unit.

Soil and groundwater sampling procedure utilized industry standard methods to ensure sample quality and provide a platform for efficient collection. Sample analysis included field screening methods and offsite analysis to provide an efficient means of identifying subsurface conditions.

2.1 Pre-Sampling Events

The following operations occurred prior to closure soil and groundwater sampling events in 2012: a pre-final inspection, debris removal, site security measures, and facility manager notification of the intended operations. The Project Manager coordinated project requests for Base installation support services through the 49th Civil Engineering Squadron/Environmental Flight (CES/CEAN). The results of these activities will be provided in the Closure Report.

2.1.1 Preparation Meeting

Prior to the start of activities, a preparation meeting and site walk-through of the OD20K 20,000-Pound OD Unit was conducted with the Contract Officer Representative, Holloman AFB personnel, and NationView Site Manager, to inspect site conditions for site/equipment access, security measures, equipment staging and decontamination area(s), potential site hazards, and emergency evacuation routes. Also the project procedures were reviewed in accordance with the schedule and planned activities.

Site security at the OD20K 20,000-Pound OD Unit was addressed as outlined in the Basewide Health and Safety Plan (HASP) (Bhate Environmental Associates, Inc. [Bhate], 203b) during all sampling activities.

2.1.2 Pre-Final Inspection

A pre-final visual site inspection (as required by the Permit Attachment F) was performed to determine whether any surficial debris, scrap, or other substances remained in the OD20K that requires removal in order for the closure to proceed. Identified debris included metal fragments and remnants.

The pre-final inspection was documented using photographs and notes in a bound, water-resistant field logbook.

2.1.3 Removal of Scrap Materials and Debris

The pre-final inspection was followed by the debris removal performed in accordance to the Permit, Module III, Section F, Inspection Schedules and Procedures (Page 4 of 7), "All UXO metal casings, other metal casings, and fragments shall be placed in appropriate containers, and handled as RCRA hazardous waste. Recovered lead fragments shall also be containerized and handled as hazardous waste."

In accordance with past practice, the debris and metal fragments were collected by Holloman AFB Explosive Ordnance Demolition (EOD) personnel and delivered to the Defense Logistics Agency (DLA) Disposition Services (formerly the Defense Reutilization and Marketing Office [DRMO]) for disposal.

2.1.4 Final Inspection

A final inspection was performed to confirm that all surficial fragments debris have been removed. The final inspection was documented using photographs and notes in the field logbook.

2.2 Closure Sampling Strategy

2.2.1 Risk Screening Methodology

2.2.1.1 Soil

The residential SSLs established in NMED's Risk Assessment Guidance for Site Investigations and Remediation (NMED, 2012) were used as the action levels for detections in soil. If NMED did not have an SSL for a particular parameter in soil, it was compared to its respective USEPA RSL (USEPA, 2014). **Table 1** shows the soil parameters and their appropriate standard (SSL or RSL).

2.2.1.2 Groundwater

Groundwater results were compared to USEPA Maximum Contaminant Levels (MCLs) (for drinking water) (USEPA, 2014) and New Mexico Water Quality Control Commission (NMWQCC) groundwater protection standards (NMWQCC, 2002). The lower of the available standards was used. **Table 2** shows the available standards.

2.2.2 Sampling Location Design and Rationale

2.2.2.1 Soil

Representative soil samples were collected from the OD20K 20,000-Pound OD Unit and analyzed to determine the residual concentrations of toxic metals, explosive compounds, and perchlorate. Because abundant data has been gathered during prior quarterly sampling events, and because it was important to verify that the entire area of the OD20K 20,000-Pound OD Unit as adequately sampled, a non- stratified sampling approach was used. Therefore, a geostatistical approach was used to determine the placement and numbers of samples for closure. This approach accounted for the spacing of previous samples and identified areas where additional sampling is required.

Figure 3 shows the sampling locations identified by the geostatistical analysis of historical data. Soil sample locations were selected for analysis of explosives, metals, nitrate, perchlorate, and phosphorus. Because no samples were previously analyzed for perchlorate, additional soil sample locations were selected for analysis of perchlorate only.

Table 3 provides the coordinates, sample identification, and analyses for all sample locations.

2.2.2.2 Groundwater

Representative water samples were collected from the four groundwater monitoring wells around the OD20K 20,000-Pound OD Unit. The samples were analyzed to determine the concentrations of toxic metals, explosive compounds, perchlorate, nitrate, and phosphorus. See **Table 2** for a full list of analytes.

Figure 4 shows the groundwater monitoring well locations around OD20K 20,000-Pound OD Unit as surveyed in 1993 at the time of installation (Labat-Anderson, 2003).

2.2.3 Sampling Procedures

2.2.3.1 Soil

A hand auger was used to collect soil from the surface interval (0-1 foot) at each of the selected locations. Specific sampling procedures and technologies used during the project are described in the following references:

- Final Basewide Quality Assurance Project Plan (QAPP) (Bhate, 2003a) and
- Holloman AFB Standard Operating Procedures (SOPs) from Appendix A of the Holloman Basewide QAPP.

The specific Holloman AFB SOPs used for this sampling event are listed below:

- Holloman AFB SOP-1: Documentation, Sample Handling, Chain-of Custody, and Shipping;
- Holloman AFB SOP-2: Sampling Equipment Documentation;
- Holloman AFB SOP-5: Soil Sampling for Chemical Analysis; and
- Holloman AFB SOP-9: Field Management of Investigation-Derived Waste (IDW).

A Global Positioning System (GPS) device, with an accuracy of +/- 1.0 foot, was used to locate the sample locations. The GPS coordinates of the sample location were recorded in the field documentation. All horizontal coordinates were referenced to the State Plane Coordinate System, New Mexico Central.

2.2.3.2 Groundwater

The groundwater monitoring wells were installed in 1993 and were developed at the time of installation (Labat-Anderson, 2003). Therefore, the wells needed to be developed and the integrity of the wells needed to be determined prior to sampling.

Groundwater monitoring wells were developed, and the process documented, in accordance with the Holloman AFB Basewide QAPP (Bhate, 2003a) and NationView SOP No.10, Subsurface Water Investigation (NationView, 2009) to the greatest extent possible (i.e., some deviation from the development procedure were required due to the age and inactivity of the wells). Monitoring well development took place by over- pumping each well until at least five well volumes were removed, and the turbidity, pH, specific conductivity, and temperature were stabilized by +/- 10 percent for at least 3 consecutive readings.

One set of groundwater samples was collected from the four monitoring wells for the parameters shown in **Table 2**. Groundwater samples were collected in accordance with NationView SOP No.10, using low-flow sampling techniques using a peristaltic or submersible pump and new dedicated polyethylene tubing. The tubing was placed at mid-screen and purged until field parameters were stabilized. The groundwater samples were collected from mid-screen interval.

The samples were labeled, handled, and prepared for shipment in accordance with Holloman AFB SOP No.1 of the Holloman Basewide QAPP (Bhate, 2003a). The samples were placed on ice and shipped under strict chain-of-custody to the laboratory.

2.2.4 Documentation

Documentation, sample handling, chain-of-custody, and shipping were managed in accordance with Holloman SOP No. 1 of the Holloman AFB Basewide QAPP (Bhate, 2003a).

Sampling personnel used a bound field logbook with moisture resistant pages to record pertinent sampling information with waterproof ink in addition to any forms provided in, or specified by applicable SOPs. The logbook identified project name, project number, project manager and telephone number, and principal street address or geographic location of the site. Daily field activities and sampling information were entered in the log book on dated, initialed, and serially-numbered pages. Corrections were made to entries by initialed and dated line-out deletions. A diagonal line was drawn across the remaining blank space of the last page of each day’s entry. Each day’s entry was signed and dated by the author.

The date and time of sample preparation, collection, and personnel who conducted sampling was recorded with the sample identification number in the field log book and on the chain-of-custody form. The names of visitors and any other persons on site were recorded in the field log book. Sampling personnel recorded the ambient weather conditions and other conditions at the sampling location that may affect sample collection, the apparent representativeness of the sample, or sample analysis.

Sample nomenclature and labeling requirements are described in Section 4.2.1 of this Amended SAP.

2.2.5 Decontamination

Sampling equipment was decontaminated as described in Holloman AFB SOP No.2 of the Holloman AFB Basewide QAPP (Bhate, 2003a).

2.2.6 Management of Investigation-Derived Waste

IDW generated during this project included used Personal Protective Equipment (PPE), decontamination fluids and solids (e.g., paper towels, rags, etc.), and groundwater monitoring well development and purge water.

IDW was managed and characterized in accordance with Holloman AFB SOP No. 9 of the Holloman AFB Basewide QAPP (Bhate, 2003a). Whenever possible, waste minimization techniques were used to reduce the amount of IDW.

Excess soils from the hand auger remained at the respective sample location.

2.3 Sample Analysis

This section describes the objectives and procedures associated with the analytical program. The analytical strategies for the OD20K 20,000-Pound OD Unit have been designed with historical data and activities in mind.

2.3.1 Data Quality Objectives

The analytical methods selected for metals and explosives are prescribed by the Permit. The analytical method selected for perchlorate was selected based on its ability to provide reliable results and be comparable to standards identified in **Tables 2** and **3**.

Analytical chemistry data were reviewed according to the Holloman AFB Basewide QAPP (Bhate, 2003a).

Qualifiers were applied to data that fails to satisfy the acceptance criteria as detailed in Holloman AFB Basewide QAPP (Bhate, 2003a). Unless otherwise noted, all data validated using the methods noted above will be considered suitable for use in meeting the objectives of this study.

2.3.2 Laboratory Analytical Methods

The soil samples were analyzed as follows:

- Metals by USEPA Method 6010C (except mercury by USEPA Method 7471A)
- Explosives by USEPA Method 8330 (except N-nitrosodimethylamine (NDMA) by USEPA Method 8270C-SIM)
- Perchlorate by USEPA Method 6850
- Nitrate by USEPA Method 300
- Phosphorus by USEPA Method 365.3
- Soil Moisture by USEPA Method 3550

The groundwater samples were analyzed as follows:

- Metals by USEPA Method 6010C (except mercury by USEPA Method 7470A)
- Explosives by USEPA Method 8330 (except NDMA by USEPA Method 8270C-SIM)
- Perchlorate by USEPA Method 6850
- Nitrate by USEPA Method 300
- Phosphorus by USEPA Method 365.3
- Total Dissolved Solids (TDS) by Method 2540C

The analytical requirements, including preparation methods, analytical methods, and various QA/QC parameters, for soil and groundwater samples are summarized in the Holloman AFB Basewide QAPP (Bhate, 2003a) in:

- **Table 3-1** (Project Data Quality Objectives),
- **Table 13-1** (Extraction and Digestion Procedures), and
- **Table 13-2** (Analytical Procedures)

Sample containers, preservatives, and holding times for the analytes specific to the closure sampling are shown in **Tables 4** and **5**, for soil and groundwater samples, respectively. Permit

Attachment J, Table J-6, designates soil sample container, preservative, and holding time requirements. However, the sample container, preservative, and holding times shown in **Table 4**, which are specified by Test America-Denver and based on current technology and methodologies, were used.

Samples selected for laboratory analysis were labeled, handled, and prepared for shipment in accordance with Holloman AFB SOP-1 of the Holloman AFB Basewide QAPP (Bhate, 2003a). The samples were be placed on ice and shipped under strict chain-of-custody to:

TestAmerica-Denver

4955 Yarrow Street

Arvada, CO 80002

Tel: 303.736.0134

The laboratory provided Level IV laboratory deliverables which consist of an analytical report with results and QA/QC summaries. Internal QC results, not included as part of the Level II package, will be retained on file at the offsite laboratory.

Standard turnaround time of 14 business days was achieved for all results.

3.0 SAMPLING AND ANALYSIS PLAN FOR DGI SOIL AND GROUNDWATER SAMPLING

3.1 Purpose of DGI Soil and Groundwater Sampling

The purpose of additional soil and groundwater sampling is to fill known data gaps and if necessary, to delineate the extent of contamination. DGI will include the following initial tasks:

- Determination of background perchlorate concentration in soil - since perchlorate background concentration in soil is not available, it is not possible to identify whether August 2012 perchlorate concentrations in soil are representative of background. As a result, ten background soil samples will be collected at a distance between 500 and 1000 feet from the boundary of the OD20K 20,000-Pound OD Unit in areas unaffected by historical treatment operations and analyzed for perchlorate. The perchlorate background concentration will be calculated following the statistical methodology described in Permit Attachment J Sampling and Analysis Plan.
- Additional determination of background concentrations of metals in soil - 2012 analytical results showed that concentrations of some metals in soils exceeded their respective site-specific background concentrations obtained from OD20K Background Study performed in 1997 (Holloman AFB, 1997). This was based on comparison of maximum detected site concentrations to the background reference values. Since OD20K Background Study included collection of only six soil samples in the vicinity of OD20K, two-sample hypothesis test was not used to determine if OD20K metal concentrations were elevated compared with background (the minimum number of samples for two-sample test is 8). Therefore, ten background soil samples that will be collected and analyzed for perchlorate during the DGI (the first bullet above) will also be analyzed for full list of metals (Section 1.4). This will allow the use of two-sample test for comparison of two distributions, the site data and background data, and the conclusion whether the clean closure of OD20K is achievable. The background concentrations of metals will be calculated following the statistical methodology described in Permit Attachment J Sampling and Analysis Plan.
- Verification of perchlorate concentrations in soil – four locations where 2012 sampling event showed exceedances for perchlorate will be sampled during the DGI to determine if soil analytical results are similar to 2012 sampling results.
- Verification of perchlorate and nitrate concentrations in groundwater - all four existing monitoring wells will be sampled during the DGI to determine if groundwater analytical results are similar to 2012 sampling results.

Based on results of these initial tasks the DGI might include the following tasks:

- If the result of background soil sampling for perchlorate shows that both 2012 and DGI perchlorate concentrations in soil are not elevated compared with background, it will be concluded that the perchlorate site concentrations are representative of background and additional soil sampling for perchlorate will not be performed.
- If perchlorate concentrations in soil are elevated compared with background then four soil samples from the surface interval 0-1 foot will be collected at a 20 feet step-out of each of the four 2012 soil sampling locations that exceeded NMED SSL. If the

concentrations of perchlorate in soil exceed the residential SSL at the 20 feet step-out sampling locations, then additional soil samples will be collected at locations determined by stepping out an additional 10 feet from the perchlorate exceedance location. Based on soil sampling results, the perchlorate contamination in soil will be delineated and Human Health and Ecological Risk Assessment will be performed (see **Section 2.8** in Amended Expanded Closure plan).

- If the DGI groundwater sampling results confirm the 2012 results, then five additional monitoring wells will be installed to a depth of approximately 50 feet in the vicinity of monitoring well HAFB-EOD-MW02 where 2012 groundwater sampling resulted in perchlorate and nitrate concentrations above the applicable screening levels. Based on groundwater sampling results, the perchlorate and nitrite contamination in groundwater will be delineated and Human Health and Ecological Risk Assessment will be performed (see **Section 2.8** in Amended Expanded Closure plan).

3.2 Data Gap Investigation Soil and Groundwater Sampling Strategy

3.2.1 Risk Screening Methodology

3.2.1.1 Soil

The residential SSL for perchlorate, (54.8 mg/kg) established in NMED's Risk Assessment Guidance for Site Investigations and Remediation (NMED, 2012) will be used as the action level for detections in soil. Project action limits and laboratory specific detection quantitation limits are provided in FPM's site-specific Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP) Worksheet #15 (**Appendix D** to Amended Expanded Closure Plan).

3.2.1.2 Groundwater

Groundwater sampling results for perchlorate and nitrate will be compared to USEPA MCLs (USEPA, 2014) (for drinking water) for perchlorate and nitrate (the standard for perchlorate is not provided in NMWQCC groundwater protection standards, while the standard for nitrate in NMWQCC is the same as the USEPA MCL for nitrate). Project action limits and laboratory specific detection quantitation limits are provided in site-specific UFP-QAP Worksheet #15 (**Appendix D** to Amended Expanded Closure Plan).

3.2.2 Sampling Location Design and Rationale

3.2.2.1 Soils

Ten background soil samples from the interval 0-6 inches will be collected at a distance between 500 and 1000 feet from the boundary of the OD20K in soil of similar lithology as within the OD20K for perchlorate and metals analysis. Approximate sampling locations are shown in **Figure 5**. Because visual inspection of the surface soil is necessary in order to obtain a background sample of similar lithology to that of the OD20K, the exact sampling locations will be determined during sampling.

In addition, soil samples will be collected from the surface interval 0-1 foot at four locations where 2012 sampling event showed exceedances for perchlorate to confirm 2012 results (**Figure 6**).

If result of background soil sampling for perchlorate shows that perchlorate concentrations in soil are elevated compared with background, four soil samples from the surface interval 0-1 foot will be collected in the vicinity of each of the four 2012 soil sampling locations that exceeded the NMED SSL for perchlorate (**Figure 7**). As shown in **Figure 7,** these four samples will be collected at approximately 20 feet in north, south, east, and west directions with respect to the 2012 soil sampling location. If the concentrations of perchlorate in soil exceed the residential SSLs at the 20 feet step-out sampling location, then additional soil samples will be collected at locations determined by stepping out an additional 10 feet from the perchlorate exceedance location.

3.2.2.2 Groundwater

Initially all four existing monitoring wells will be sampled during the DGI to determine if groundwater analytical results are similar to2012 sampling results. The 2012 results showed that monitoring well HAFB-EOD-MW02 had perchlorate and nitrate exceedances. If the DGI groundwater sampling results confirm the 2012 results, then five additional monitoring wells will be installed in the vicinity of monitoring well Holloman AFB-EOD-MW02 (**Figure 8**). Based on the established groundwater flow direction towards the southwest, two monitoring wells will be located cross-gradient to the northwest of the existing well and two monitoring wells will be placed downgradient to the southwest. One monitoring well will be located upgradient to the northeast of the monitoring well HAFB-EOD-MW02. Each monitoring well will be separated by a minimum of 150 feet. The monitoring well locations depicted are tentative and may change depending on site conditions. Following well development, groundwater samples will be collected at the five new monitoring wells. Based on groundwater sampling results the perchlorate and nitrate contamination in groundwater will be delineated, and the appropriate remediation of contaminated areas will be proposed.

3.2.3 Sampling Procedures

3.2.3.1 Soil

A hand auger will be used to collect soil from the surface interval (0-1 foot [DGI sampling] or 0-6 inches [background sampling]) at each of the selected locations. Specific sampling procedures and technologies used during the project are described in the following references:

- Site specific UFP-QAPP (**Appendix D** to Amended Expanded Closure Plan), and
- SOPs from **Appendix A** of the site specific UFP-QAPP.

The specific SOPs for this sampling event are listed below:

- SOP No. 1: Surface and Near Surface Soil Sampling,
- SOP No. 3: Sample Handling, Documentation, and Tracking,
- SOP No. 4: Equipment and Personnel Decontamination,
- SOP No. 5: GPS Measurements, and
- SOP No. 8: IDW.

A GPS device, with an accuracy of +/- 1.0 foot, will be used to locate the sample locations. The GPS coordinates of the sample location will be recorded in the field documentation. All horizontal coordinates will be referenced to the State Plane Coordinate System, New Mexico Central.

3.2.3.2 Groundwater

The drilling, installation, and development of five new monitoring wells, if required, will be performed in accordance with FPM SOP No. 10 from **Appendix A** of the site specific UFP-QAPP (**Appendix D** to Amended Expanded Closure Plan). Monitoring well development activities will be completed prior to purging and groundwater sampling for analytical testing. Well development will consist of removing a minimum of five well casing volumes of water during repeated surging and well evacuation episodes. Well surging will be accomplished by surging the entire length of well screen using bailer or pump. During the well development activities field measurements of temperature, pH, nephelometric turbidity, specific conductance, and dissolved oxygen will be made, and the clarity, color, any presence of odors, and other comments regarding water quality will be noted in the field notebook and on the well development log.

The four existing groundwater monitoring wells were developed prior to the August 2012 groundwater sampling events, therefore redeveloping of these wells will not be necessary.

Groundwater samples will be collected in accordance with FPM SOP No. 9, Groundwater Sampling using low-flow sampling techniques (water purge rates at or below 250 milliliters per minutes [mL/min]) using a peristaltic or submersible pump and new dedicated polyethylene tubing. The tubing will be placed at mid-screen and purged until field parameters were stabilized. The groundwater samples will be collected from mid-screen interval.

The samples will be labeled, handled, and prepared for shipment in accordance with FPM SOP No. 3 (from **Appendix A** of the site specific UFP-QAPP). The samples will be placed on ice and shipped under strict chain-of-custody to the laboratory.

3.2.4 Documentation

Documentation, sample handling, chain-of-custody, and shipping will be managed in accordance with FPM SOP No. 3 (from **Appendix A** of the site specific UFP-QAPP).

Sampling personnel will use a bound field logbook with moisture resistant pages to record pertinent sampling information with waterproof ink in addition to any forms provided in, or specified by applicable SOPs. The logbook will identify sampler's name, names of other field personnel, date, general weather conditions, time and location of sampling, level of PPE used, brief description of sampling method, sample ID, any QA/QC sample, number and volume of sample containers and requested analysis, results of any field measurements, equipment used and equipment calibration information, decontamination information, brief discussion of any field decisions, and signature and date by person responsible for writing the field notes. All corrections will consist of line-out deletions that are initiated and dated.

Information on the custody, transfer, handling, and shipping of samples will be recorded on a Chain of Custody form.

Each sampling crew will also maintain Data Quality Control Report (DQCRs) to supplement the information recorded in the field logbook. The DQCR will include the following information: project name, project number, personnel on site, visitor on site, subcontractors on site, equipment on site, weather conditions, field work performed, quality control and health and safety activities, problem, down time, and standby time, name and title of person completing the DQCR.

3.2.5 Decontamination

Sampling equipment will be decontaminated as described in FPM SOP No.4 (from **Appendix A** of the site specific UFP-QAPP).

Equipment that cannot be damaged by water will be placed in a wash tub containing Alconox or low-sudsing non-phosphate detergent along with potable water and scrubbed with a bristle brush or similar utensil. Equipment will be rinsed with tap water in a second wash tub followed by a de-ionized or distilled water rinse. Equipment that may be damaged by water will be carefully wiped clean using a sponge and detergent water and rinsed with de-ionized or distilled water. Care will be taken to prevent equipment damage. Large equipment, such as a truck, will be decontaminated by steam cleaning using hot/pressure washer at a temporary decontamination pad set up at the site.

All decontamination fluids will be contained and drummed, properly labeled as non-hazardous waste, and transported under non-hazardous waste manifest to a permitted disposal facility for disposal.

3.2.6 Management of Investigation-Derived Waste

IDW generated during this project will include used personal PPE, decontamination fluids and solids (e.g., paper towels, rags, etc.), groundwater monitoring well development and purge water, and excavated soil if soil removal is required

IDW will be managed and characterized in accordance with FPM SOP No. 8 (from **Appendix A** of the site specific UFP-QAPP). Whenever possible, waste minimization techniques will be used to reduce the amount of IDW. Excess soils from the hand auger will remain at the respective sample location. *The excavated soil will be placed in appropriate roll-off containers (lined and covered, if necessary) and stored at the Holloman AFB Defense Reutilization and Maintenance Organization facility prior to shipment to an authorized disposal facility using an authorized transporter.*

3.3 Sample Analysis

This section describes the objectives and procedures associated with the analytical program.

3.3.1 Data Quality Objectives

The analytical methods selected for metals and explosives are prescribed by the Permit. The analytical method selected for perchlorate was selected based on its ability to provide reliable results and be comparable to standards identified in **Tables 2** and **3**.

Analytical chemistry data will be reviewed according to the FPM UFP-QAPP (**Appendix D** to Amended Expanded Closure Plan).

Qualifiers will be applied to data that fails to satisfy the acceptance criteria as detailed in FPM UFP-QAPP (**Appendix D** to Amended Expanded Closure Plan). Unless otherwise noted, all data validated using the methods noted above will be considered suitable for use in meeting the objectives of this study.

3.3.2 Laboratory Analytical Methods

The soil samples will be analyzed for perchlorate using USEPA Method 6850.

The groundwater samples will be analyzed as follows:

- Perchlorate by USEPA Method 6850, and
- Nitrate by USEPA Method 9056A

The analytical requirements, including preparation methods, analytical methods, and various QA/QC parameters, for soil and groundwater samples are summarized in the site-specific UFP-QAPP (**Appendix D** to Amended Expanded Closure Plan).

Sample containers, preservation, and holding times for the analytes specific to this data gap investigation are shown in site-specific QAPP Worksheet #19 and # 30, for soil and groundwater samples. Permit Attachment J, **Table J-6**, designates soil sample container, preservative, and holding time requirements. However, the sample container, preservative, and holding times shown in Worksheet #19 and # 30, which are specified by Accutest Laboratory-Orlando and based on current technology and methodologies, will be used.

Samples selected for laboratory analysis will be labeled, handled, and prepared for shipment in accordance with FPM SOP No.3 (from **Appendix A** of the site specific UFP-QAPP). The samples will be placed on ice and shipped under strict chain-of-custody to:

Accutest Laboratory-Orlando
4405 Vineland Road
Suite C-15
Orlando, FL 32811
Tel: 407.425.6700

The laboratory will provide Level IV laboratory deliverables which consist of an analytical report with results and QA/QC summaries. Internal QC results, not included as part of the Level II package, will be retained on file at the offsite laboratory.

Standard turnaround time of 14 business days will be expected for all results.

4.0 DATA MANAGEMENT PLAN

This section describes the overall data management strategy and plan for the OD20K closure sampling and associated report. This plan was used for closure soil and groundwater sampling conducted in August 2012, and, unless otherwise noted, all following sections will be applicable to the DGI.

Note Accutest Laboratories Southeast, Inc. of Florida has been selected as the analytical laboratory to support data gap investigation. Closure soil and groundwater samples collected in August 2012 were analyzed at TestAmerica Laboratories, Inc.

4.1 Data Management System and Strategy

The data management plan was used to accommodate and manage fixed-based laboratory generated data at standard turnaround time (2 weeks). Generated data included chemical analytical data, as well as spatial and features information, and various supporting data, such as photographs and standard daily forms information.

4.2 Data Type

Analytical data were generated by offsite laboratory analysis. Analytical data generated by the offsite laboratory were initially managed by the laboratory's laboratory information management system (LIMS) and transferred to the project team for use via Electronic Data Deliverable (EDD) and hard copy. Prior to project startup, formats for the offsite laboratory EDDs were approved to ensure smooth transfer and importation of the data.

Upon project completion, the data management system was used to perform final spatial analysis, as well as to support tabular and graphic report development for deliverables and miscellaneous project communications as needed.

4.2.1 Sample Identification System

Each soil, groundwater, and QA/QC sample collected were identified on the sample label and chain-of-custody records, regardless of type. Sample documentation, handling, and shipping was in accordance with Holloman AFB SOP No.1. **Tables 4** and **5** provide the sample collection information inclusive of the container type, holding time, and quantity for the soil and groundwater samples collected during the 2012 closure sample collection activities at the treatment unit. The field duplicate samples appeared in sequence with the other samples.

The sample nomenclature for soil samples collected were as follows:

<u>20KOD-SO04</u>

- Site alpha-numeric identifier: 20KOD = Open Detonation Treatment Unit
- Sample type identifier: SO = Soil
- Sequential sample number: 01, 02, etc.
- Followed by QA sample identifiers: a = field duplicate, TB = trip blank, MS = matrix spike, MSD = matrix spike duplicate

The sample nomenclature for groundwater samples collected will be as follows:

<u>20KOD-MW01</u>

- Site alpha-numeric identifier: 20KOD = Open Detonation Treatment Unit
- Sample type identifier: MW = Monitoring Well
- Sequential sample number: 01, 02, etc.
- Followed by QA sample identifiers: a = field duplicate, TB = trip blank, MS = matrix spike, MSD = matrix spike duplicate

For the DGI, sample documentation, handling, and shipping will be in accordance with FPM SOP No. 3 (**Appendix A** of the site specific UFP-QAPP). Sample containers, preservation and hold times for data gap investigation are provided in site-specific QAPP Worksheet #19 and #30 (**Appendix A** of the site specific UFP-QAPP).

4.2.2 Data Recording

The following paragraphs describe the data recording activities performed for field data, offsite and onsite laboratory analytical data, and photographs.

Data recording for DGI will be performed in accordance with the site-specific QAPP (**Appendix A** of the site-specific UFP-QAPP).

4.2.2.1 Field Data

All information pertinent to a field and/or sampling survey were recorded on appropriate data sheets, or in the project field logbook as described Section 10.5 of the Holloman AFB Basewide QAPP (Bhate, 2003a). Specific data sheets are required by certain SOPs. Samplers used a bound field logbook with consecutively numbered pages. Entries in the logbook were made using indelible ink and included at a minimum the following information:

- Name and address of the field contact (on logbook cover)
- Date of entry
- Names and companies of personnel on site
- General descriptions of each day’s field activities
- Documentation of weather conditions during field activities
- Location of sampling (e.g., monitoring well)
- Data points for field equipment derived during calibration procedures
- Observation of sample or collection environment
- Identification of sampling device
- Any field measurements made
- Sequence of collection of environmental samples
- Type of sample matrix (e.g., soil)
- Date and time of sample collection
- Field sample identification number
- Sample distribution (e.g., which laboratory shipped to for analysis)

- Sampler's name
- Sample type (e.g., composite, normal, duplicate, other QC, etc.)
- Preservative used, if applicable, for the environmental sample

If an error was made on the document or in the logbook, corrections were made simply by crossing a line through the error in such a manner that the original entry could still be read, and the correct information added as the change. All corrections were initialed by the author and dated.

Each page in the logbook was signed or initialed by the person making the entries. In addition to the information entered into the logbook, the appropriate data forms were filled out as each activity is completed.

4.2.2.2 Laboratory Analytical Data

The offsite laboratory shall maintain electronic and hardcopy records sufficient to recreate each analytical event conducted. The minimum records the laboratory shall keep include the following:

- Chain-of-custody forms
- Initial and continuing calibration records including standards preparation traceable to the original material and lot number
- Instrument tuning records (as applicable)
- Method blank results
- Internal standard results
- Surrogate spiking records and results (as applicable)
- Spike and spike duplicate records and results
- Laboratory records
- Raw data, including instrument printouts, and/or bench work sheets with compound identification and quantitation reports
- Corrective action reports
- Other method and project required QC samples and results
- Laboratory-specific written SOPs for each analytical method and QA/QC function in place at the time of project sample analysis

The laboratory analytical reports contained the following:

- Laboratory name, address, telephone number, contact person, and location where the test was carried out if different from the fixed laboratory address
- Unique laboratory project number
- Total number of pages (report must be paginated)
- Client project number (if applicable)

- Laboratory sample identification (if applicable)
- Client sample identification
- Test method
- Matrix and/or description of sample
- Dates: sample collection, collection time, sample receipt, preparation, and/or analysis date
- Definition of data qualifiers
- Reporting units
- Solid samples: indicate dry or wet weight
- Indication by flagging where results are reported below the quantitation limit

Results for all samples were presented in hard copy, if requested, and in EDD formats (on CD/DVD). Electronic data were delivered in an appropriate format such that the data can be manipulated for archiving and presentation.

4.2.2.3 Photographs

Any photographic documentation were recorded in the appropriate logbook. Information to be recorded includes:

- Camera make and model
- Time and date
- Photographer
- Details for the location of the photograph
- Direction of photograph, preferably measured with field compass
- Subject of the photograph
- Significant or relevant features
- Names of any personnel included in photograph

4.3 Data Reporting

Data obtained during 2012 sampling activities were reported according to the Holloman AFB Basewide QAPP (Bhate, 2003a). The data were generated using rigorous, analyte-specific analytical methods where analyte identifiers and quantitations are confirmed and QA/QC requirements were satisfied. For this project, regular, field duplicate, and MS/MSD samples were collected concurrently. The data met the objectives of the project for level of accuracy and precision required, intended use of the data, analytical methods, time constraints, and allowable decision errors.

Data reporting for DGI will be performed in accordance with the site-specific QAPP (**Appendix A** of the site-specific UFP-QAPP). Data will be generated using rigorous analyte-specific analytical methods as described above.

The Closure Report for OD20K 20,000-Pound Open Detonation Unit will include results from the 2012 sampling event and the DGI soil and groundwater sampling.

4.3.1 Tabular Displays

Analytical results will be presented using summary tables, as appropriate, for clear presentation in the closure report. Complete analytical results were provided in the laboratory reports.

4.3.2 Graphic Displays

During the closure sampling field effort, **Figure 3** was used by the field team to guide the sampling activities. Staff hand-annotated the figure for interim documentation of notable spatial information, such as indicating which locations were sampled and documenting in-field sample location adjustments.

During the DGI, **Figures 4 and 5** will be used by the field team to guide the sampling activities.

Administrators will perform data input and changes, as well as work with the report development team to generate requested graphical and tabular reporting documents. Creation of report quality maps, as well as complex map layouts, and other complex displays, analysis, and processing of spatial data, will be performed using desktop Geographical Information System (GIS) software (such as Environmental Systems Research Institute's [ESRI's] ArcGIS program suite). The desktop GIS software will be used to produce maps intended for use in the closure report, as well as all plate-sized map prints.

4.3.3 Data Archiving

Hardcopy and electronic data were archived in project files and on electronic archive media for the duration of the project and for a minimum of 5 years, whichever is longer.

For the DGI, Hardcopy and electronic data will be archived in project files and on electronic archive media for the duration of the project and for a minimum of 5 years, whichever is longer.

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5.0 HEALTH AND SAFETY REQUIREMENTS

For the closure inspection and soil and groundwater sampling activities performed in August 2012, health and safety practices adhered to the Basewide HASP (Bhate, 2003b). For additional data gap investigation activities, health and safety practices will follow the site-specific HASP provided in **Appendix B** of the Amended Expanded Closure Plan.

As for the previous sampling activities conducted in August 2012, DGI soil and groundwater sampling work will be conducted in accordance with the United State Army Corps of Engineers (USACE) Safety and Health Requirements Manual, EM 385-1-1, (USACE, 2011). It is anticipated that Level D PPE will be required to complete the DGI sampling activities. This includes: Occupational Safety and Health Administration (OSHA) approved safety shoes, American National Standards Institute (ANSI) approved safety glasses (Z87.1) and hard hat (Z89.1-1997: Type I), sleeved shirt and long pants, and as required, hearing protection, leather work gloves, and/or nitrile gloves during sampling.

Site security is part of safety at the site for the investigation. Items of concern include the proper designation and demarcation of the investigation boundaries (i.e., Support Zone, Contaminant Reduction Zone, and Exclusion Zone) as appropriate. Likewise, compliance with any intrusive work requirements, posting of potential hazards, and control of un-authorized site personnel was completed during the sampling events in August 2012, and will be completed during the DGI. This is discussed in both the Basewide HASP (Bhate, 2003b) and the site-specific HASP (**Appendix B** of the Amended Expanded Closure Plan).

The perimeter of the site is already secured by fencing and caution signs. As for the previous closure sampling activities (August, 2012), the following zones will be established for data gap investigation:

- The Exclusion Zone which will include the entire fenced area;
- The Support Zone which will be located outside the fenced area; and
- The Contaminant Reduction Zone and Support Zone which will be established based on site-specific conditions.

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6.0 REFERENCES

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FIGURES

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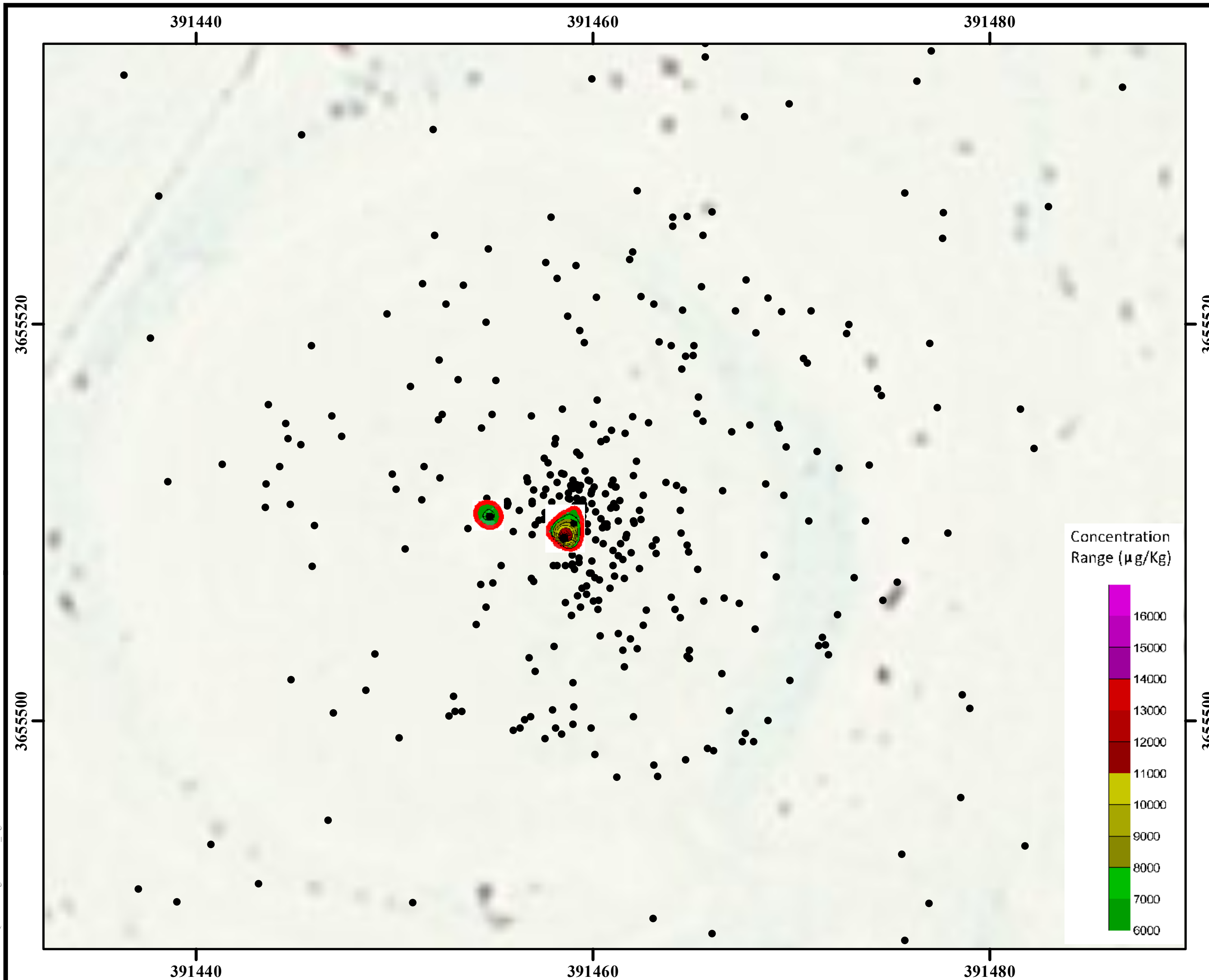

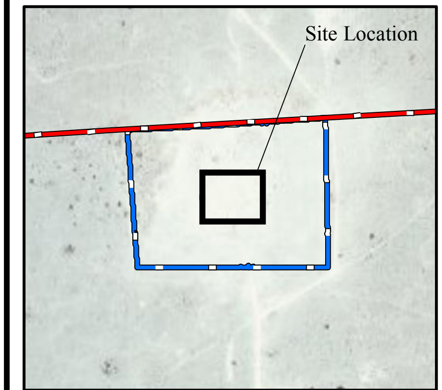

Legend

- Sampling Location
- Concentrations Exceeding NMED SSL (April 2009 and March 2011)
- OD20K 20,000-Pound Open Detonation Unit Boundary (6.2 acres)
- Installation Boundary

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FIGURE 1

Historic Nitroglycerin Sampling Locations and Concentrations Exceeding SSLs at OD20K

FPM Remediations, Inc.

2014

NOTES:
Revision Date: 8/7/2014

Coordinate System: NAD 1983 UTM Zone 13N
Projection: Transverse Mercator
Horizontal Datum: North American 1983
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -105.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter
Base Map Date: (c) 2010 Microsoft Corporation and its data suppliers
Base Map Source: ESRI Online Bing Data Source

1 inch = 25 feet
0 4 8 Meters
0 12.5 25 Feet

N W E S

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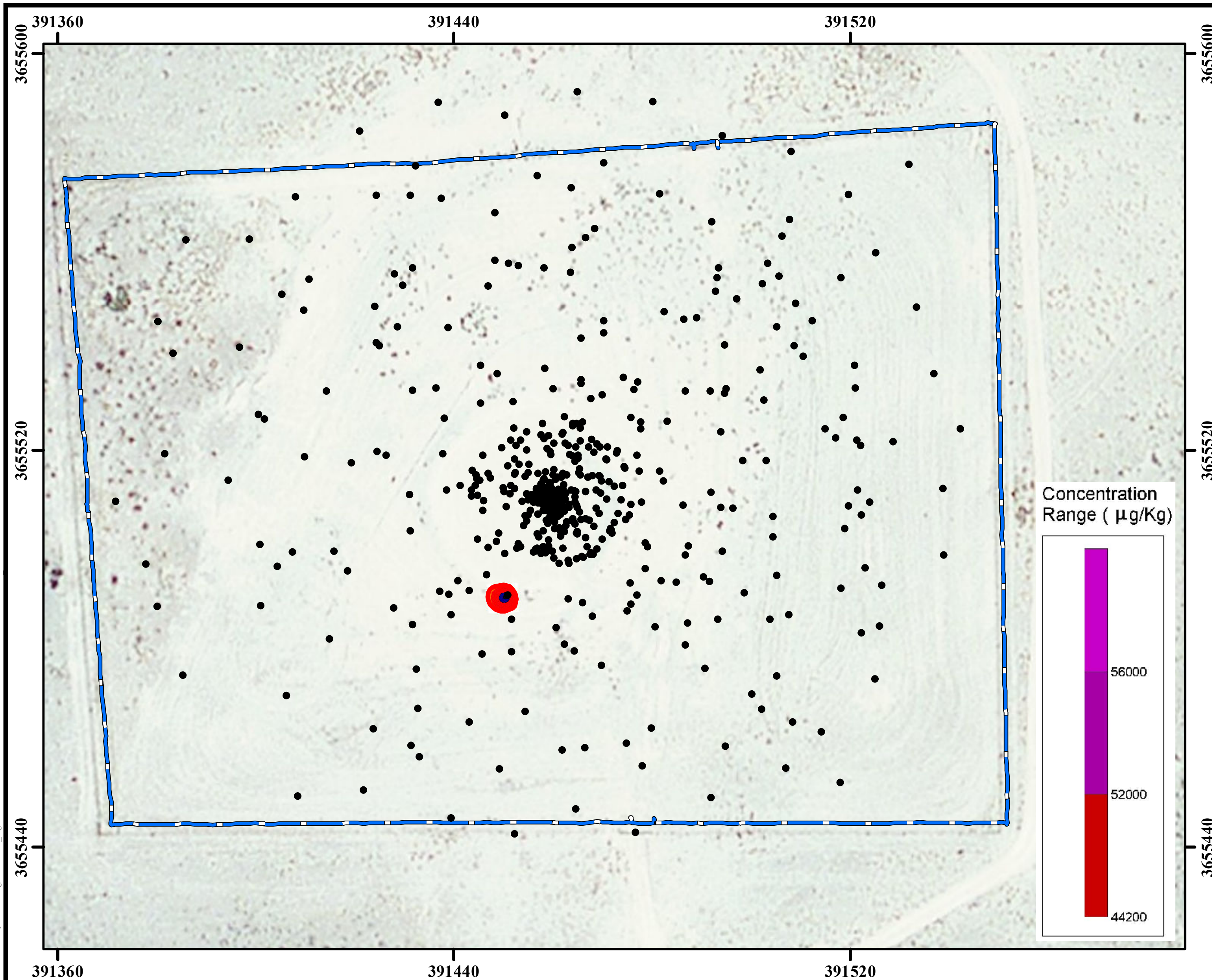

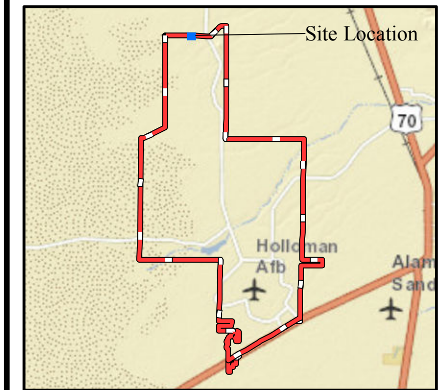

Legend

- Sampling Location
- Exceeds SSLs (January 2006)
- OD20K 20,000-Pound Open Detonation Unit Boundary (6.2 acres)

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FIGURE 2

Historic RDX Sampling Locations and Concentrations Exceeding SSLs at OD20K

FPM Remediations, Inc.

2014

NOTES:
Revision Date: 8/7/2014

Coordinate System:NAD 1983 UTM Zone 13N
Projection: Transverse Mercator
False Easting: 500,000.0000
Central Meridian: -105.0000
Latitude Of Origin: 0.0000
Horizontal Datum: North American 1983
False Northing: 0.0000
Scale Factor: 0.9996
Units: Meter
Base Map Date: (c) 2010 Microsoft Corporation and its data suppliers
Base Map Source: ESRI Online Bing Data Source

1 inch = 100 feet
0 15 30 Meters
0 50 100 Feet

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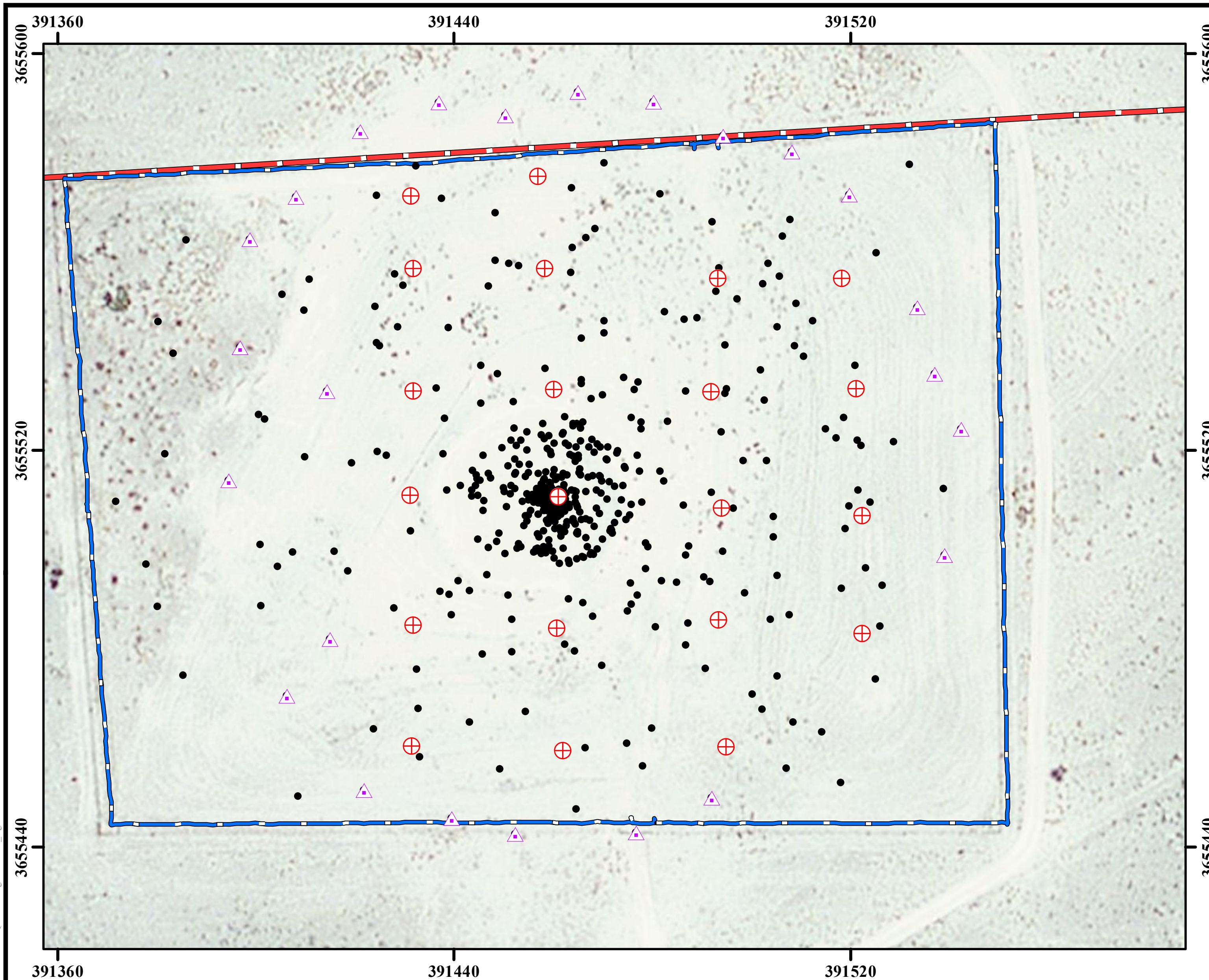

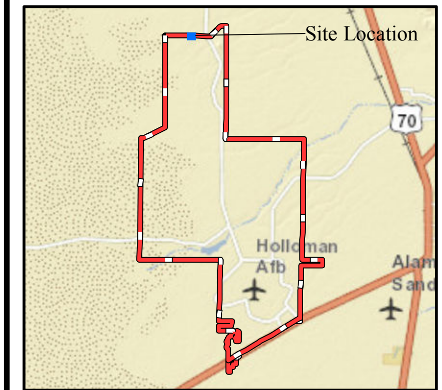

Legend

- 2012 Sampling Location - Perchlorate Only
- 2012 Sampling Location - All Parameters
- Historic Sampling Location
- OD20K 20,000-Pound Open Detonation Unit Boundary (6.2 acres)
- Installation Boundary

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FIGURE 3

2012 Soil Sample Locations and Analytical Parameters OD20K

FPM Remediations, Inc.

2014

NOTES:
Revision Date: 8/7/2014

Coordinate System:NAD 1983 UTM Zone 13N
Projection: Transverse Mercator
False Easting: 500,000.0000
Central Meridian: -105.0000
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Horizontal Datum: North American 1983
False Northing: 0.0000
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Units: Meter
Base Map Date: (c) 2010 Microsoft Corporation and its data suppliers
Base Map Source: ESRI Online Bing Data Source

1 inch = 100 feet

0 15 30 Meters

0 50 100 Feet

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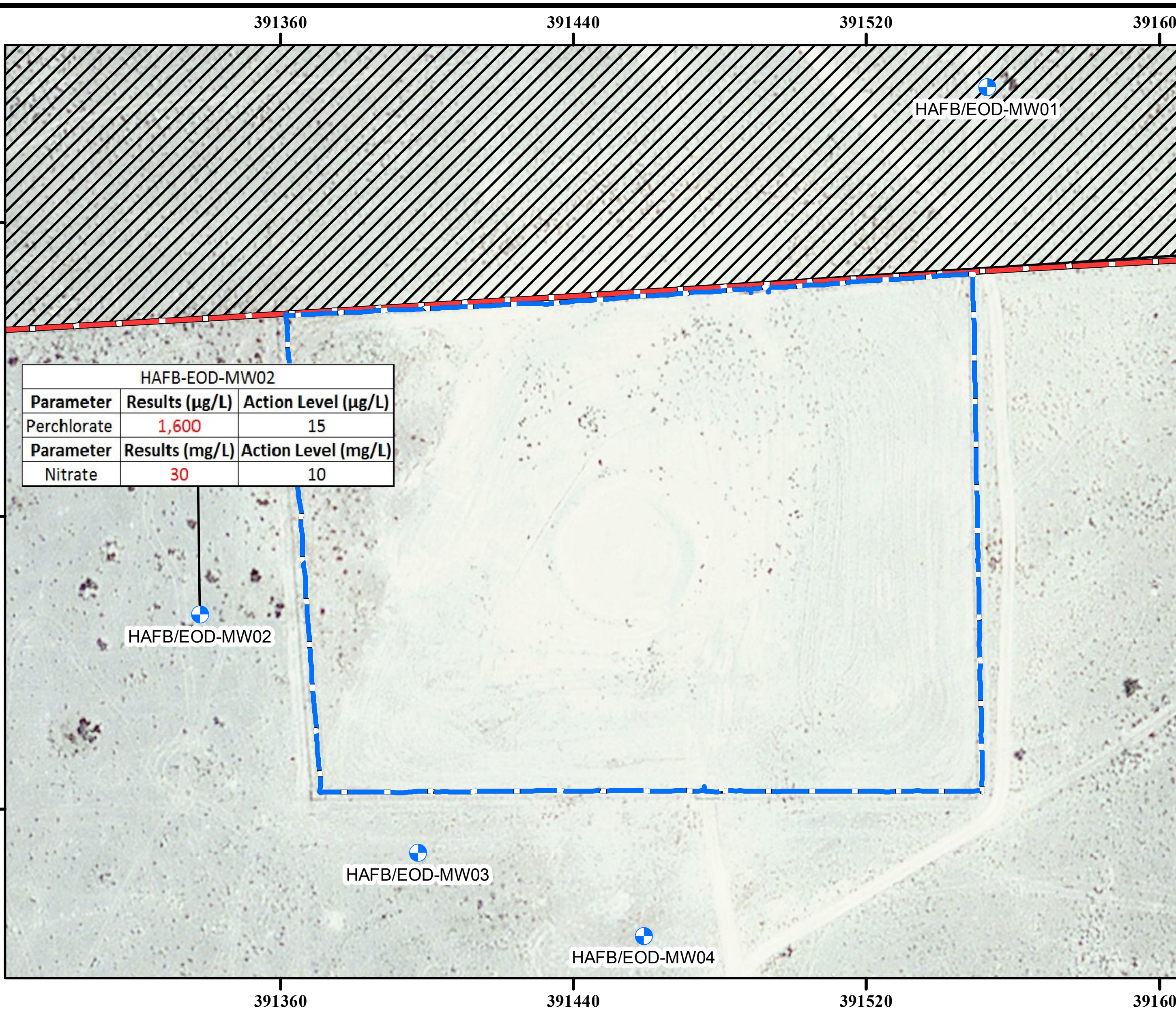
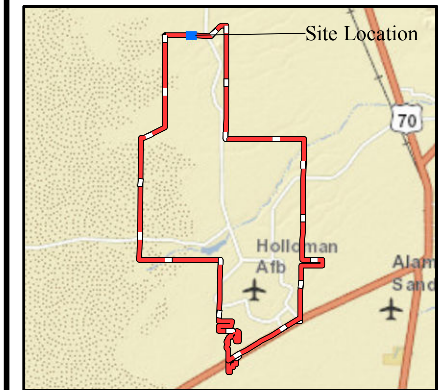


HAFB-EOD-MW02		
Parameter	Results (µg/L)	Action Level (µg/L)
Perchlorate	1,600	15
Parameter	Results (mg/L)	Action Level (mg/L)
Nitrate	30	10



Legend

- 2012 Groundwater Sampling - Monitoring Well Location
- OD20K 20,000-Pound Open Detonation Unit Boundary (6.2 acres)
- WSMR
- Installation Boundary

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FIGURE 4

2012 Sampling Groundwater Monitoring Wells Locations OD20K

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NOTES:
Revision Date: 8/7/2014

Coordinate System: NAD 1983 UTM Zone 13N
Projection: Transverse Mercator
Horizontal Datum: North American 1983
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -105.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter
Base Map Date: (c) 2010 Microsoft Corporation and its data suppliers
Base Map Source: ESRI Online Bing Data Source

1 inch = 140 feet

0 21 42 Meters

0 70 140 Feet

N W E S

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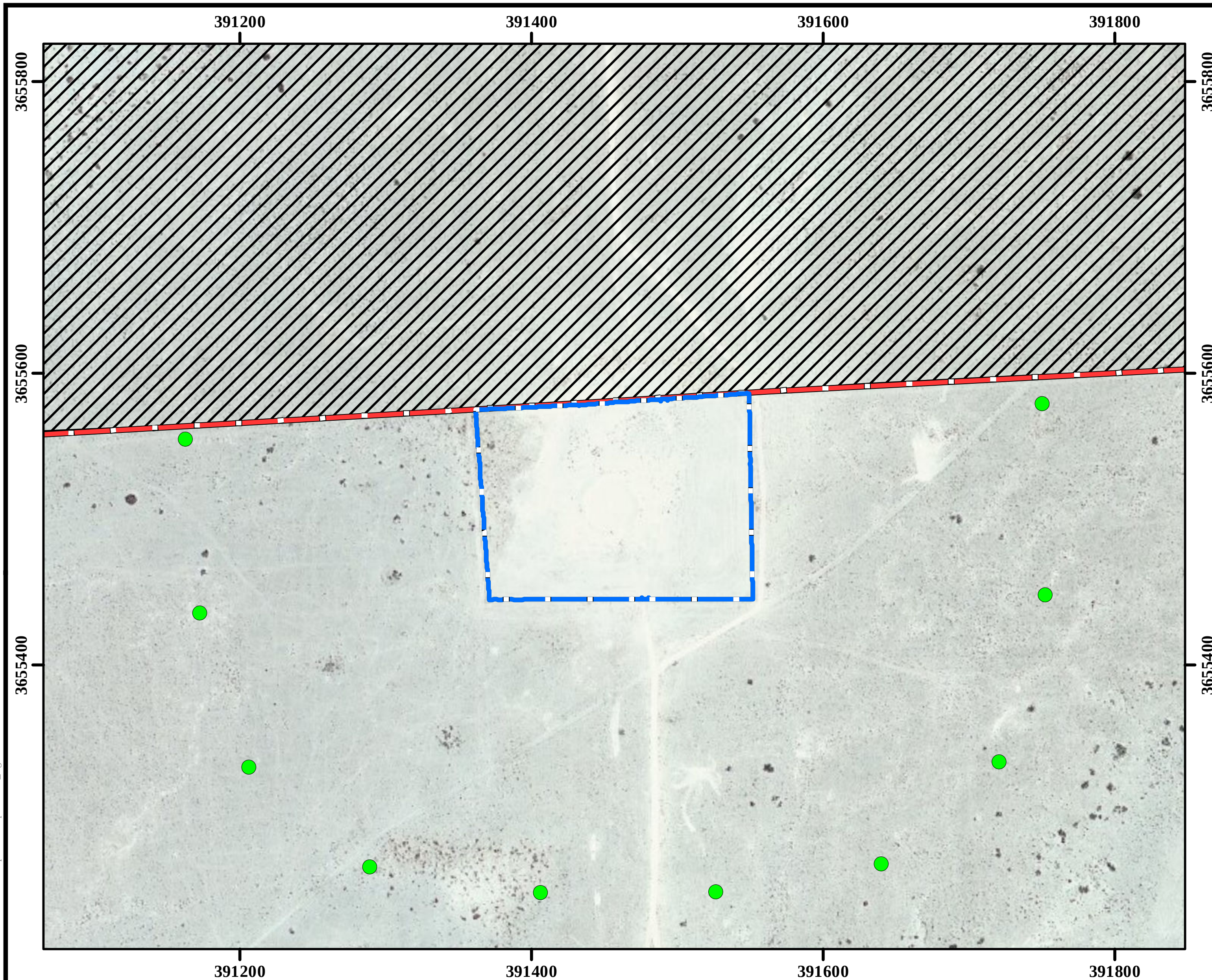

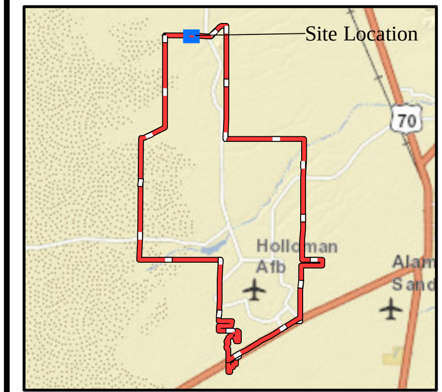

Legend

- Background Soil Sampling Locations
- OD20K 20,000-Pound Open Detonation Unit Boundary (6.2 acres)
- WSMR
- Installation Boundary

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FIGURE 5

Background Soil Sampling Locations for Perchlorate and Metals Analysis

FPM Remediations, Inc.

2014

NOTES:
Revision Date: 10/7/2014

Coordinate System:NAD 1983 UTM Zone 13N
Projection: Transverse Mercator
False Easting: 500,000.0000
Central Meridian: -105.0000
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Horizontal Datum: North American 1983
False Northing: 0.0000
Scale Factor: 0.9996
Units: Meter

1 inch = 340 feet

0 50 100 Meters

0 170 340 Feet

N S W E

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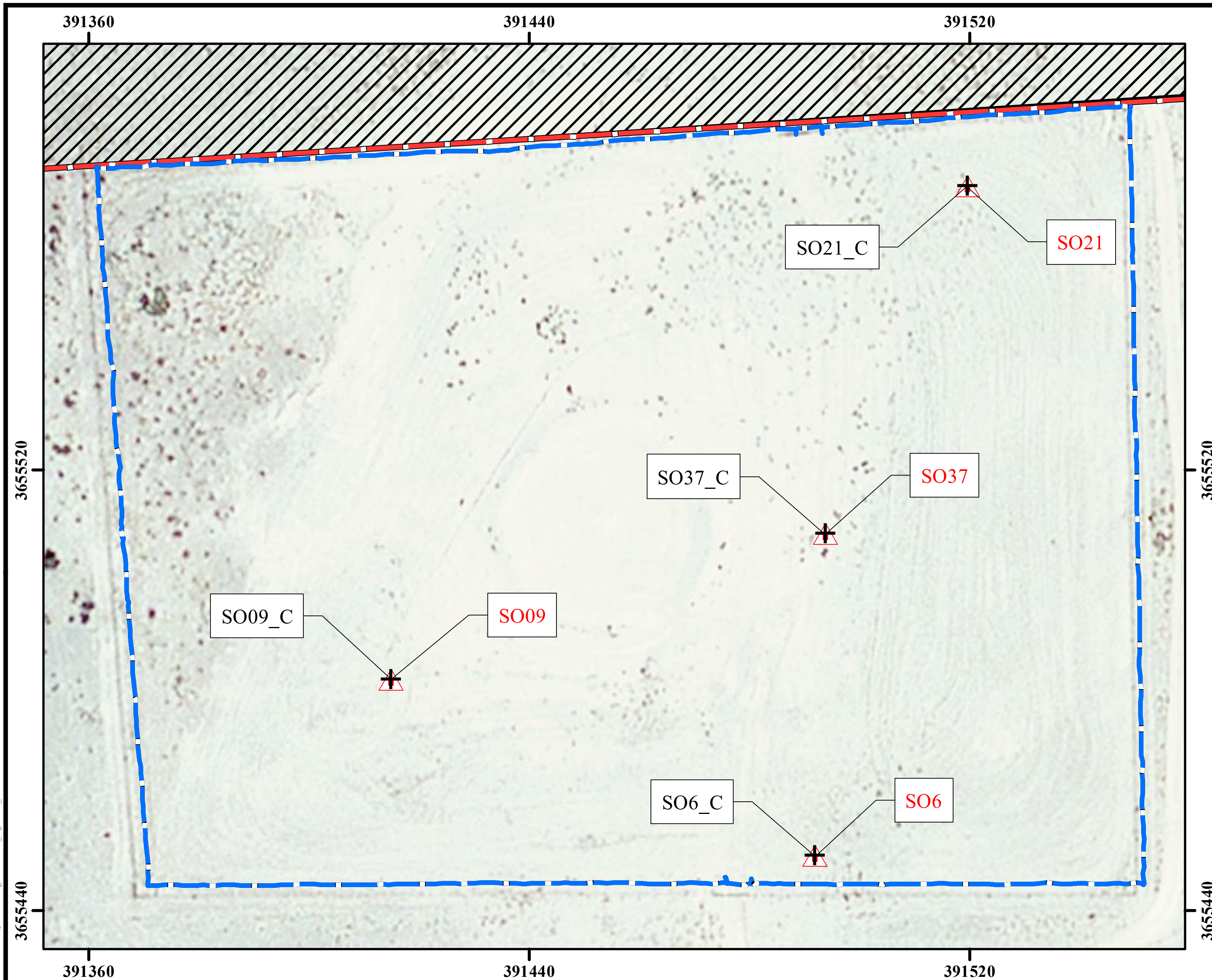

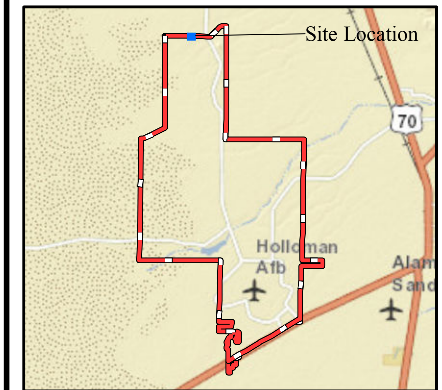

Legend

- + DGI Confirmation Soil Sample for Perchlorate Analysis
- 2012 Soil Sampling Location (Perchlorate Above NMED SSL)
- OD20K 20,000-Pound Open Detonation Unit Boundary (6.2 acres)
- WSMR
- Installation Boundary

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FIGURE 6

DGI Confirmation Soil Samples for Perchlorate Analysis OD20K

FPM Remediations, Inc.

2014

NOTES:
Revision Date: 10/16/2014

Coordinate System:NAD 1983 UTM Zone 13N
Projection: Transverse Mercator
False Easting: 500,000.0000
Central Meridian: -105.0000
Latitude Of Origin: 0.0000
Horizontal Datum: North American 1983
False Northing: 0.0000
Scale Factor: 0.9996
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Base Map Date: (c) 2010 Microsoft Corporation and its data suppliers
Base Map Source: ESRI Online Bing Data Source

1 inch = 90 feet
0 15 30 Meters
0 45 90 Feet

N W E S

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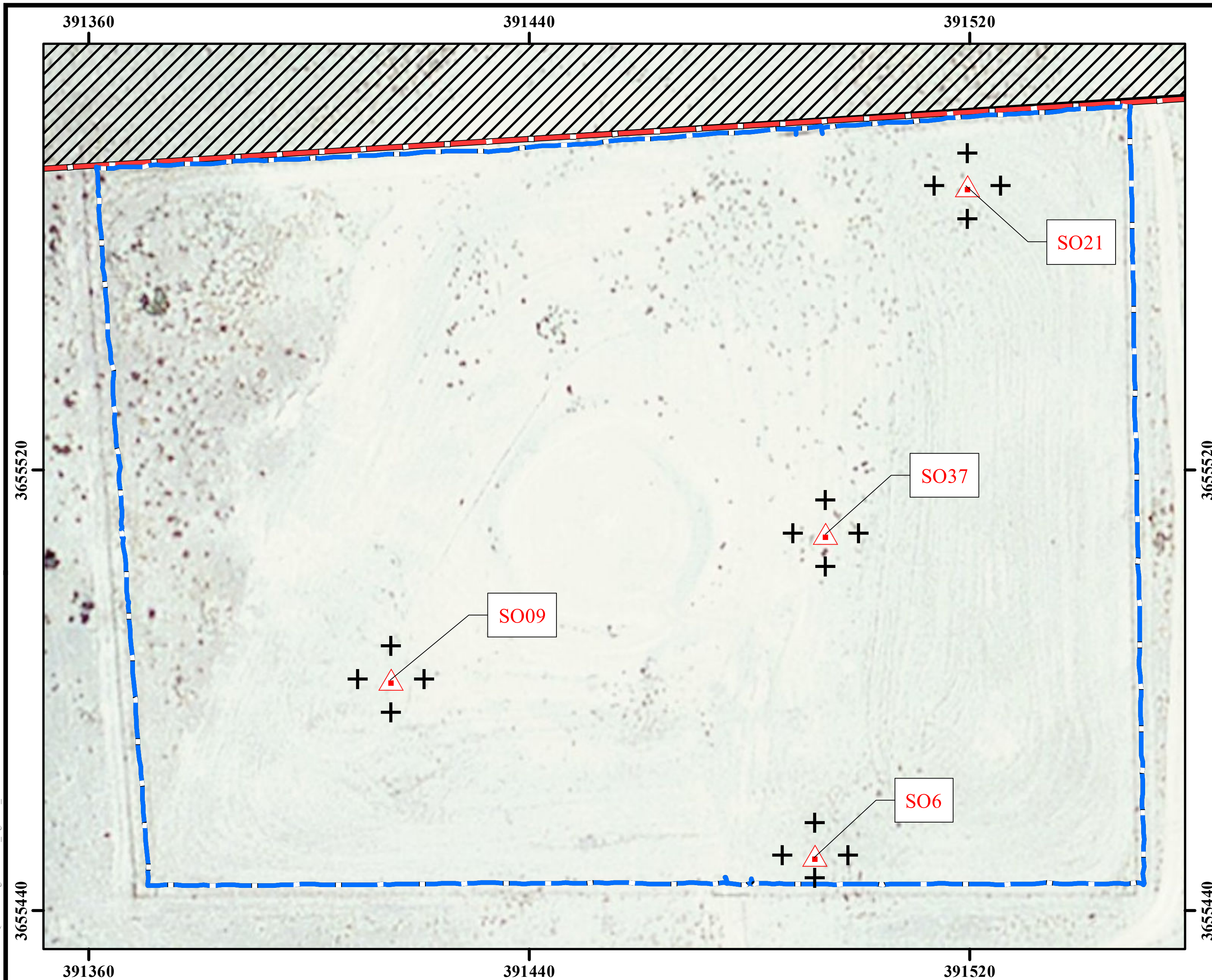

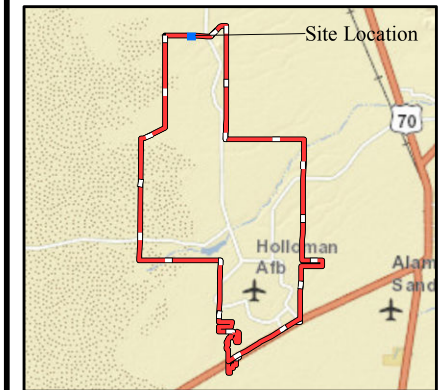

Legend

- + Additional DGI Soil Sampling Location for Perchlorate Analysis (20 feet step-out)
- 2012 Soil Sampling Location (Perchlorate Above NMED SSL)
- OD20K 20,000-Pound Open Detonation Unit Boundary (6.2 acres)
- WSMR
- Installation Boundary

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FIGURE 7

Additional DGI Soil Sampling Locations for Perchlorate Analysis OD20K

FPM Remediations, Inc.

2014

NOTES:
Revision Date: 10/16/2014

Coordinate System:NAD 1983 UTM Zone 13N
Projection: Transverse Mercator
False Easting: 500,000.0000
Central Meridian: -105.0000
Latitude Of Origin: 0.0000
Horizontal Datum: North American 1983
False Northing: 0.0000
Scale Factor: 0.9996
Units: Meter
Base Map Date: (c) 2010 Microsoft Corporation and its data suppliers
Base Map Source: ESRI Online Bing Data Source

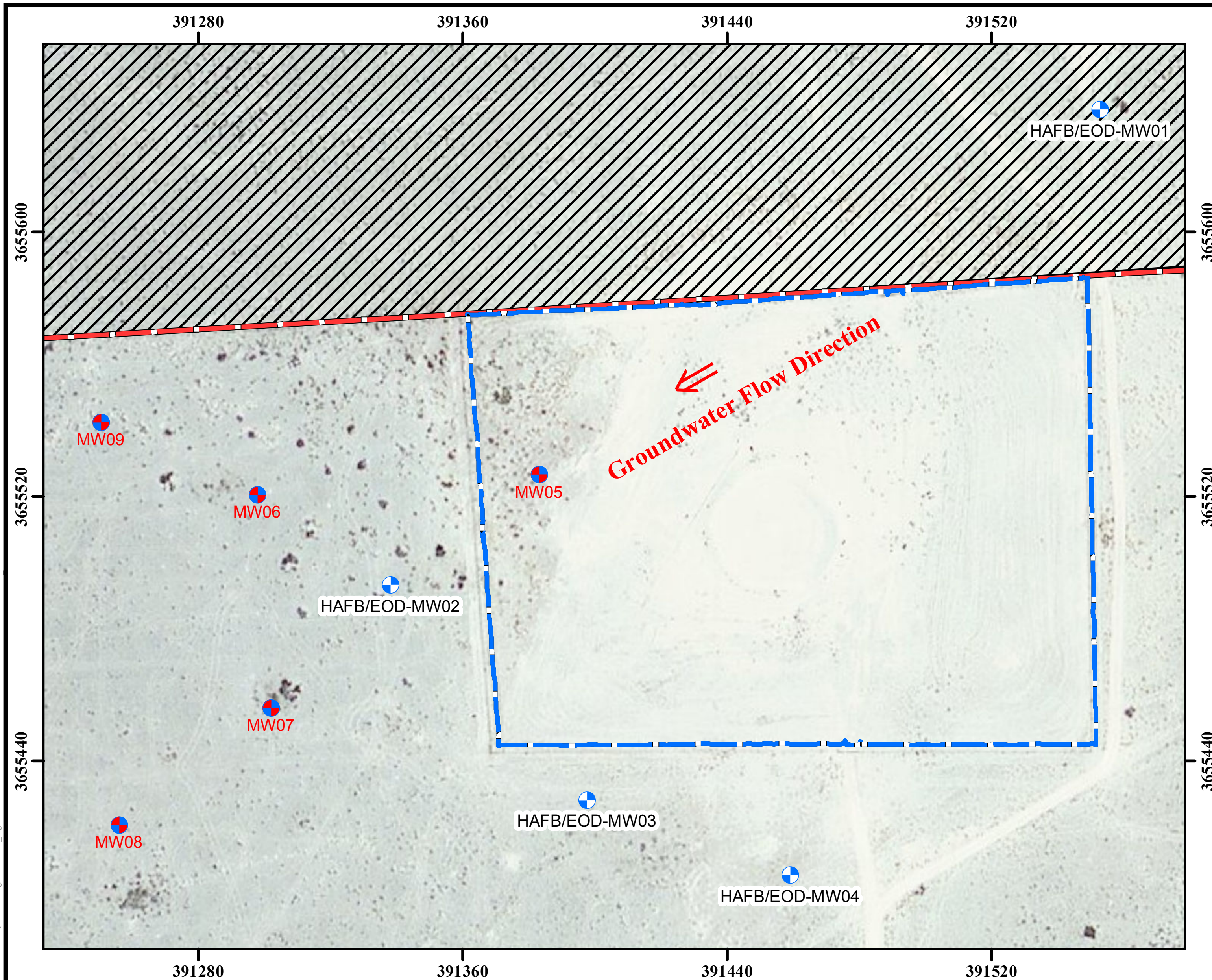
1 inch = 90 feet

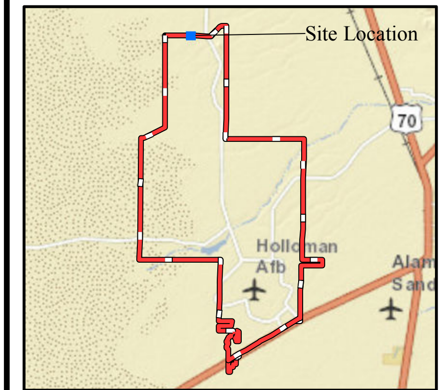
0 15 30 Meters

0 45 90 Feet

N
W E
S

Path: C:\Projects\New Mexico\GIS\OD20K UFP-QUAPP Figures\SAP_figure 7_R.mxd





Legend

- Additional Groundwater Monitoring Well Location
- Existing Groundwater Monitoring Well Location
- OD20K 20,000-Pound Open Detonation Unit Boundary (6.2 acres)
- WSMR
- Installation Boundary

Performance Based Remediation
New Mexico-Arizona
Holloman Air Force Base
Alamogordo, NM

AFCEC

FIGURE 8

Additional Groundwater Monitoring Wells Locations OD20K

FPM Remediations, Inc.

2014

NOTES:
Revision Date: 10/16/2014

Coordinate System:NAD 1983 UTM Zone 13N
Projection: Transverse Mercator
False Easting: 500,000.0000
Central Meridian: -105.0000
Latitude Of Origin: 0.0000
Horizontal Datum: North American 1983
False Northing: 0.0000
Scale Factor: 0.9996
Units: Meter
Base Map Date: (c) 2010 Microsoft Corporation and its data suppliers
Base Map Source: ESRI Online Bing Data Source

1 inch = 150 feet

0 22.5 45 Meters

0 75 150 Feet

N W E S

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TABLES

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Table 1: Soil Standards for Closure (2012 SAP)

Parameter	Method1	Laboratory Reporting Limit	NMED Residential SSL or EPA RSL3
Soil Moisture4	ASTM-D-	NA	NA
Perchlorate	686	0.001	54.8
Nitrate	30	5	125,000
Phosphorus	365.	5	NA
METALS			
Antimony	6010B	1.5	31.3
Arsenic	6010B	2	3.9
Barium	6010B	1	15,600
Beryllium	6010B	0.5	156
Cadmium	6010B	0.5	70.3
Chromium	6010B	1.5	117,000
Copper	6010B	2	3,130
Lead	6010B	0.8	400
Nickel	6010B	4	1,560
Selenium	6010B	1.3	391
Silver	6010B	1	391
Strontium (stable)	6010B	1	46,900
Mercury (elemental)	7471A	0.033	15.6
EXPLOSIVES			
HMX	833	0.10	3,910
RDX	833	0.20	58.2
1,3,5-Trinitrobenzene (TNB)	833	0.10	2,200
1,3-Dinitrobenzene (DNB)	833	0.10	6.1
Tetryl	833	0.20	244
Nitrobenzene (NB)	833	2.0	53.5
2,4-Dinitrotoluene (DNT)	833	0.10	15.7
2,6-Dinitrotoluene (DNT)	833	0.10	61.1
Trinitrotoluene (TNT)	833	0.20	39.1
Pentaerythritol tetranitrate (PETN)	833	3.5	120
2-Nitrotoluene (NT) (o-	833	0.20	29.1
3-Nitrotoluene (NT) (m-	833	0.20	7.82
4-Nitrotoluene (NT) (p-	833	0.20	244
Nitroglycerin	833	2.0	6.11
4-Amino-2,6-Dinitrotoluene	833	0.1	150
2-Amino-4,6-Dinitrotoluene	833	0.1	150
N-Nitroso-dimethylamine (NDMA)	8270C-SIM	0.018	0.0226

1. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846

2. NMED SSLs, 2012.

3. In the absence of NMED SSLs, EPA RSLs (May 2014) are used. EPA RSLs are presented *italics and underlined*.

4. Soil Moisture analysis is required for calculating other analytical concentrations

Table 2: Water Standards for Closure (2012 SAP)

Parameter	Method1	Laboratory Reporting Limit (µg/L)	Water Quality Standard	
			NM WQCC 2 Standard (µg/L unless otherwise noted)	EPA MCL3 (µg/L)
Perchlorate	6860	0.05	NA	15
Nitrate	300	0.5 mg/L	10,000	1000
Phosphorus	365.3	0.05 mg/L	NA	NA
Total Dissolved Solids (TDS)	2540C	10 mg/l	10,000 mg/l	NA
METALS				
Antimony	6010B	10	NA	6
Arsenic (dissolved)	6010B	15	100	10
Barium (dissolved)	6010B	10	1,000	2,000
Beryllium (dissolved)	6010B	1	NA	4.0
Cadmium (dissolved)	6010B	5	10	5.0
Chromium (dissolved)	6010B	10	50	100
Copper (dissolved)	6010B	15	1,000	1,300
Lead (dissolved)	6010B	9	50	15
Nickel (dissolved)	6010B	40	200	NA
Selenium (dissolved)	6010B	15	50	50
Silver (dissolved)	6010B	10	50	NA
Strontium (stable)	6010B	10	NA	NA
Mercury (elemental)	7470A	0.2	2	2.0
EXPLOSIVES				
HMX	8330	0.4	NA	NA
RDX	8330	0.2	NA	NA
1,3,5-Trinitrobenzene (TNB)	8330	1	NA	NA
1,3-Dinitrobenzene (DNB)	8330	0.4	NA	NA
Tetryl	8330	0.2	NA	NA
Nitrobenzene (NB)	8330	0.4	NA	NA
2,4-Dinitrotoluene (DNT)	8330	0.4	NA	NA
2,6-Dinitrotoluene (DNT)	8330	0.2	NA	NA
2,4,6-Trinitrotoluene (TNT)	8330	0.4	NA	NA
Pentaerythritol tetranitrate	8330	0.4	NA	NA
2-Nitrotoluene (NT) (o-	8330	0.4	NA	NA
3-Nitrotoluene (NT) (m-	8330	0.4	NA	NA
4-Nitrotoluene (NT) (p-	8330	1	NA	NA
4-Amino-2,6-Dinitrotoluene	8330	0.2	NA	NA
2-Amino-4,6-Dinitrotoluene	8330	0.2	NA	NA
Nitroglycerin	8330	3	NA	NA
N-Nitroso-dimethylamine	8270C-SIM	0.4	NA	NA

1. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846
2. New Mexico Administrative Code 20.6.2.3103.
3. EPA MCL, 2014.

NA = Not available

Table 3: 2012 Soil Sample Locations and Analyses for Closure Sampling (2012 SAP)

X Coord.	Y Coord.	Label	Metals	Explosive	Perchlorate	Nitrate	Phosphorus
1667259	739685	20KOD-SO01	X	X	X	X	X
1667119	739299	20KOD-SO02	X	X	X	X	X
1667403	739673	20KOD-SO03	X	X	X	X	X
1667121	739629	20KOD-SO04	X	X	X	X	X
1667545	739517	20KOD-SO05	X	X	X	X	X
1667401	739235	20KOD-SO06	X	X	X	X	X
1667357	739695	20KOD-SO07	X	X	X	X	X
1667307	739701	20KOD-SO08	X	X	X	X	X
1667147	739337	20KOD-SO09	X	X	X	X	X
1667079	739441	20KOD-SO10	X	X	X	X	X
1667229	739219	20KOD-SO11	X	X	X	X	X
1667533	739561	20KOD-SO12	X	X	X	X	X
1667143	739501	20KOD-SO13	X	X	X	X	X
1667215	739693	20KOD-SO14	X	X	X	X	X
1667553	739397	20KOD-SO15	X	X	X	X	X
1667449	739663	20KOD-SO16	X	X	X	X	X
1667085	739529	20KOD-SO17	X	X	X	X	X
1667271	739209	20KOD-SO18	X	X	X	X	X
1667163	739673	20KOD-SO19	X	X	X	X	X
1667351	739211	20KOD-SO20	X	X	X	X	X
1667487	739635	20KOD-SO21	X	X	X	X	X
1667171	739237	20KOD-SO22	X	X	X	X	X
1667091	739601	20KOD-SO23	X	X	X	X	X
1667563	739481	20KOD-SO24	X	X	X	X	X
1667200	739502	20KOD-SO25			X	X	X
1667293	739504	20KOD-SO26			X	X	X
1667397	739504	20KOD-SO27			X	X	X
1667493	739507	20KOD-SO28			X	X	X
1667286	739584	20KOD-SO29			X	X	X
1667199	739583	20KOD-SO30			X	X	X
1667197	739631	20KOD-SO31			X	X	X
1667281	739645	20KOD-SO32			X	X	X
1667401	739579	20KOD-SO33			X	X	X
1667483	739580	20KOD-SO34			X	X	X
1667199	739433	20KOD-SO35			X	X	X

Table 3: Proposed Soil Sample Locations and Analyses for Closure Sampling (continued) (2012 SAP)

X Coord.	Y Coord.	Label	Metals	Explosive	Perchlorate	Nitrate	Phosphorus
1667297	739433	20KOD-SO36			X	X	X
1667405	739427	20KOD-SO37			X	X	X
1667498	739423	20KOD-SO38			X	X	X
1667499	739345	20KOD-SO39			X	X	X
1667404	739353	20KOD-SO40			X	X	X
1667297	739346	20KOD-SO41			X	X	X
1667202	739347	20KOD-SO42			X	X	X
1667302	739265	20KOD-SO43			X	X	X
1667410	739269	20KOD-SO44			X	X	X
1667202	739267	20KOD-SO45			X	X	X

Table 4: Summary of Sample Container, Preservative, and Holding Time Requirements for Soil Samples (2012 SAP)

SW-846 Method	Analyte	Container	Preservative	Holding Time
6010B	Total Metals (except mercury)	One 4 oz amber glass	None, cool, 4°C	6 months
7471A	Mercury		None, cool, 4°C	28 days
8330	Explosive Residues	One 4 oz amber glass	None, cool, 4 °C	14 days to extraction 40 days after extraction
6860	Perchlorate	One 4 oz amber glass	None, cool, 4°C	28 days
300	Nitrate	One 4 oz amber glass	None, cool, 4°C	48 hours
365.3	Phosphorus	One 4 oz amber glass	None, cool, 4°C	28 days
8270C-SIM	NDMA	One 4 oz amber glass	None, cool, 4 °C	14 days to extraction 40 days after extraction

Permit Attachment J, Table J-6, designates sample container, preservative, and holding time requirements. However, the sample container, preservative, and holding times shown in this Table, which are specified by TestAmerica-Denver and based on current technology and methodologies, will be used.

Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846

Table 5: Summary of Sample Container, Preservative, and Holding Time Requirements for Groundwater Samples (2012 SAP)

SW-846 Method	Analyte	Container	Preservative	Holding Time
6010B	Metals (dissolved) (except mercury)	250 mL plastic bottle	Field filtered, Ice to 4oC pH <2 with HNO_3	6 months
7471A	Mercury	w/metals	Field filtered, Ice to 4oC pH <2 with HNO_3	28 days
8330	Explosive Residues	1 L amber glass	None, cool, 4oC	7 days to extraction 40 days after extraction
6860	Perchlorate	125 ml poly	Sterile field filtered w/ 0.2 µm filter	28 days
300	Nitrate	125 ml poly	None, cool, 4°C	48 hours
365.3	Phosphorus	250 ml glass	H2SO4	28 days
8270CSIM	NDMA	Two 1 L amber	None, cool, 4°C	7 days to extraction 40 days after extraction
2540C	TDS	1 L plastic	None, cool, 4°C	7 days
Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846				

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Exhibit H-1 (Table 1)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-A-01	Nitroglycerine	<	3,200.0000	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-A-02	Nitroglycerine	<	3,200.0000	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-A-03	Chromium		14.6000	B	mg/kg	9.5027	234	YES	NO	No Action: result flagged "B"
OD-SO-A-03	Nickel		7.6000	B	mg/kg	6.5898	1560	YES	NO	No Action: result flagged "B"
OD-SO-A-03	Nitroglycerine		6,300.0000		µg/kg	93.6772	347000	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04	Nitroglycerine	<	3,200.0000	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-B-01	Antimony		17.1000		mg/kg	3.5279	31.3	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-B-01	Cadmium		0.7300		mg/kg	0.5417	74.1	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-B-01	Chromium		34.3000	B	mg/kg	9.5027	234	YES	NO	No Action: result flagged "B"
OD-SO-B-01	Copper		137.0000	B	mg/kg	9.1595	3130	YES	NO	No Action: result flagged "B"
OD-SO-B-01	Lead		11.0000	B	mg/kg	7.6508	400	YES	NO	No Action: result flagged "B"
OD-SO-B-01	Nitroglycerine		11,000.0000		µg/kg	93.6772	347000	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-B-02	Nitroglycerine	<	3,100.0000	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-B-03	Cadmium		1.4000		mg/kg	0.5417	74.1	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-B-03	Lead		7.9000	B	mg/kg	7.6508	400	YES	NO	No Action: result flagged "B"
OD-SO-B-03	Nitroglycerine	<	3,100.0000	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-B-03A	Cadmium		1.2000		mg/kg	0.5417	74.1	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-B-03A	Copper		10.8000	B	mg/kg	9.1595	3130	YES	NO	No Action: result flagged "B"
OD-SO-B-03A	Lead		10.7000	B	mg/kg	7.6508	400	YES	NO	No Action: result flagged "B"
OD-SO-B-03A	Nitroglycerine	<	3,200.0000	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-B-04	Nitroglycerine	<	2,700.0000	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-C-01	Arsenic		3.0000		mg/kg	1.4963	3.9	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-01	Barium		90.8000	B	mg/kg	79.4971	5450	YES	NO	No Action: result flagged "B"
OD-SO-C-01	Beryllium		0.5100		mg/kg	0.42	156	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-01	Chromium		11.9000	B	mg/kg	9.5027	234	YES	NO	No Action: result flagged "B"
OD-SO-C-01	Copper		14.6000	B	mg/kg	9.1595	3130	YES	NO	No Action: result flagged "B"
OD-SO-C-01	Lead		12.2000	B	mg/kg	7.6508	400	YES	NO	No Action: result flagged "B"
OD-SO-C-01	Nickel		8.1000	B	mg/kg	6.5898	1560	YES	NO	No Action: result flagged "B"
OD-SO-C-01	Nitroglycerine	<	3,000.0000	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-C-02	Nitroglycerine	<	2,900.0000	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-C-03	Cadmium		1.1000		mg/kg	0.5417	74.1	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-03	Nitroglycerine	<	2,800.0000	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-C-04	Arsenic		2.1000		mg/kg	1.4963	3.9	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-04	Barium		79.7000	B	mg/kg	79.4971	5450	YES	NO	No Action: result flagged "B"
OD-SO-C-04	Cadmium		0.7300		mg/kg	0.5417	74.1	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-04	Chromium		10.3000	B	mg/kg	9.5027	234	YES	NO	No Action: result flagged "B"
OD-SO-C-04	Copper		16.3000	B	mg/kg	9.1595	3130	YES	NO	No Action: result flagged "B"
OD-SO-C-04	Lead		14.5000	B	mg/kg	7.6508	400	YES	NO	No Action: result flagged "B"
OD-SO-C-04	Nickel		7.2000	B	mg/kg	6.5898	1560	YES	NO	No Action: result flagged "B"
OD-SO-C-04	Nitroglycerine	<	3,100.0000	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-A-01	Antimony		0.3600		mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Arsenic		1.2000		mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Barium		34.6000	B	mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 1)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-A-01	Beryllium		0.0610		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Cadmium		0.5000		mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Chromium		3.3000	B	mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Copper		3.9000	B	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Lead		2.9000	B	mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Nickel		2.1000	B	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Selenium	<	0.3000	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Silver	<	0.0530	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Mercury	<	0.0200	U	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-A-01	1,3,5-Trinitrobenzene	<	29.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	1,3-Dinitrobenzene	<	12.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	2-Amino-4,6-Dinitrotoluene	<	19.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	4-Amino-2,6-Dinitrotoluene	<	36.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	2,4-Dinitrotoluene	<	24.0000	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	2,6-Dinitrotoluene	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	HMX		1,000.0000		µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	m-Nitrotoluene	<	25.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Nitrobenzene	<	10.0000	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-01	o-Nitrotoluene	<	20.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Pentaerythritol Tetranitrate	<	210.0000	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	p-Nitrotoluene	<	48.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	RDX		1,300.0000		µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Tetryl	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	2,4,6-Trinitrotoluene (TNT)	<	18.0000	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Antimony		0.4600		mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Arsenic		1.1000		mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Barium		27.5000	B	mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Beryllium		0.0250		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Cadmium		0.0990		mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Chromium		2.5000	B	mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Copper		2.2000	B	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Lead		2.7000	B	mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Nickel		1.4000	B	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Selenium	<	0.2600	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Silver	<	0.0470	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Mercury	<	0.0190	U	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-A-02	1,3,5-Trinitrobenzene	<	29.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	1,3-Dinitrobenzene	<	12.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	2-Amino-4,6-Dinitrotoluene	<	19.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	4-Amino-2,6-Dinitrotoluene	<	36.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	2,4-Dinitrotoluene	<	24.0000	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	2,6-Dinitrotoluene	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	HMX	<	18.0000	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 1)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-A-02	m-Nitrotoluene	<	25.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Nitrobenzene		65.0000		µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-02	o-Nitrotoluene	<	20.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Pentaerythritol Tetranitrate	<	210.0000	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	p-Nitrotoluene	<	48.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	RDX	<	79.0000	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Tetryl	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	2,4,6-Trinitrotoluene (TNT)	<	18.0000	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Antimony		0.5600		mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Arsenic		1.2000		mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Barium		29.6000	B	mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Beryllium		0.0350		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Cadmium		0.3400		mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Copper		3.4000	B	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Lead		3.7000	B	mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Selenium	<	0.2700	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Silver	<	0.0480	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Mercury	<	0.0200	U	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-A-03	1,3,5-Trinitrobenzene	<	29.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	1,3-Dinitrobenzene	<	12.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	2-Amino-4,6-Dinitrotoluene	<	19.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	4-Amino-2,6-Dinitrotoluene	<	36.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	2,4-Dinitrotoluene	<	24.0000	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	2,6-Dinitrotoluene	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	HMX	<	18.0000	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	m-Nitrotoluene	<	25.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Nitrobenzene		73.0000		µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-03	o-Nitrotoluene	<	20.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Pentaerythritol Tetranitrate	<	210.0000	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	p-Nitrotoluene	<	48.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	RDX	<	79.0000	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Tetryl	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	2,4,6-Trinitrotoluene (TNT)	<	18.0000	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Antimony		0.5500		mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Arsenic		1.2000		mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Barium		35.4000	B	mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Beryllium		0.0690		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Cadmium		0.3200		mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Chromium		3.6000	B	mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Copper		3.7000	B	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Lead		3.0000	B	mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Nickel		2.0000	B	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Selenium	<	0.2900	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 1)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-A-04	Silver	<	0.0520	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Mercury	<	0.0180	U	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-A-04	1,3,5-Trinitrobenzene	<	29.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	1,3-Dinitrobenzene	<	12.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	2-Amino-4,6-Dinitrotoluene	<	19.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	4-Amino-2,6-Dinitrotoluene	<	36.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	2,4-Dinitrotoluene	<	24.0000	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	2,6-Dinitrotoluene	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	HMX	<	18.0000	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	m-Nitrotoluene	<	25.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Nitrobenzene	<	10.0000	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-04	o-Nitrotoluene	<	20.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Pentaerythritol Tetranitrate	<	210.0000	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	p-Nitrotoluene	<	48.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	RDX	<	79.0000	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Tetryl	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	2,4,6-Trinitrotoluene (TNT)	<	18.0000	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Arsenic		1.1000		mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Barium		35.5000	B	mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Beryllium		0.0590		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Nickel		2.4000	B	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Selenium	<	0.2900	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Silver		0.0510		mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Mercury	<	0.0210	U	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-B-01	1,3,5-Trinitrobenzene	<	29.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	1,3-Dinitrobenzene	<	12.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	2-Amino-4,6-Dinitrotoluene	<	19.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	4-Amino-2,6-Dinitrotoluene	<	36.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	2,4-Dinitrotoluene	<	24.0000	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	2,6-Dinitrotoluene	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	HMX	<	18.0000	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	m-Nitrotoluene	<	25.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Nitrobenzene		460.0000		µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-01	o-Nitrotoluene	<	20.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Pentaerythritol Tetranitrate	<	210.0000	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	p-Nitrotoluene	<	48.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	RDX	<	79.0000	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Tetryl	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	2,4,6-Trinitrotoluene (TNT)	<	18.0000	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Antimony		0.4800		mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Arsenic		0.4900		mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Barium		27.1000	B	mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Beryllium	<	0.0100	U	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 1)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-B-02	Cadmium		0.0350		mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Chromium		2.0000	B	mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Copper		2.0000	B	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Lead		1.6000	B	mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Nickel		1.3000	B	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Selenium	<	0.2900	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Silver	<	0.0520	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Mercury	<	0.0200	U	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-B-02	1,3,5-Trinitrobenzene	<	29.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	1,3-Dinitrobenzene	<	12.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	2-Amino-4,6-Dinitrotoluene	<	19.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	4-Amino-2,6-Dinitrotoluene	<	36.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	2,4-Dinitrotoluene	<	24.0000	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	2,6-Dinitrotoluene	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	HMX	<	18.0000	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	m-Nitrotoluene	<	25.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Nitrobenzene	<	10.0000	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-02	o-Nitrotoluene	<	20.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Pentaerythritol Tetranitrate	<	210.0000	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	p-Nitrotoluene	<	48.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	RDX		290.0000		µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Tetryl	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	2,4,6-Trinitrotoluene (TNT)	<	18.0000	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Antimony		0.4300		mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Arsenic		1.4000		mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Barium		37.1000	B	mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Beryllium		0.0810		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Chromium		4.4000	B	mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Copper		8.2000	B	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Nickel		2.6000	B	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Selenium	<	0.2900	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Silver		0.0840		mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Mercury	<	0.0190	U	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-B-03	1,3,5-Trinitrobenzene	<	29.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	1,3-Dinitrobenzene	<	12.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	2-Amino-4,6-Dinitrotoluene	<	19.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	4-Amino-2,6-Dinitrotoluene	<	36.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	2,4-Dinitrotoluene	<	24.0000	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	2,6-Dinitrotoluene	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	HMX	<	18.0000	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	m-Nitrotoluene	<	25.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Nitrobenzene		100.0000		µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-03	o-Nitrotoluene	<	20.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 1)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-B-03	Pentaerythritol Tetranitrate	<	210.0000	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	p-Nitrotoluene	<	48.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	RDX	<	79.0000	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Tetryl	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	2,4,6-Trinitrotoluene (TNT)	<	18.0000	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Antimony		0.5000		mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Arsenic		1.2000		mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Barium		39.4000	B	mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Beryllium		0.0890		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Chromium		4.3000	B	mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Nickel		2.5000	B	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Selenium	<	0.2800	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Silver	<	0.0510	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Mercury	<	0.0200	U	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	1,3,5-Trinitrobenzene	<	29.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	1,3-Dinitrobenzene	<	12.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	2-Amino-4,6-Dinitrotoluene	<	19.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	4-Amino-2,6-Dinitrotoluene	<	36.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	2,4-Dinitrotoluene		100.0000		µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	2,6-Dinitrotoluene	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	HMX	<	18.0000	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	m-Nitrotoluene	<	25.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Nitrobenzene		290.0000		µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	o-Nitrotoluene	<	20.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Pentaerythritol Tetranitrate	<	210.0000	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	p-Nitrotoluene	<	48.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	RDX	<	79.0000	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Tetryl	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	2,4,6-Trinitrotoluene (TNT)	<	18.0000	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Antimony	<	0.2000	U	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Arsenic		0.6200		mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Barium		25.4000	B	mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Beryllium		0.0270		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Cadmium		0.0480		mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Chromium		2.0000	B	mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Copper		2.4000	B	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Lead		1.9000	B	mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Nickel		1.4000	B	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Selenium	<	0.2400	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Silver	<	0.0430	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Mercury	<	0.0150	U	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-B-04	1,3,5-Trinitrobenzene	<	29.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	1,3-Dinitrobenzene	<	12.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 1)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-B-04	2-Amino-4,6-Dinitrotoluene	<	19.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	4-Amino-2,6-Dinitrotoluene	<	36.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	2,4-Dinitrotoluene	<	24.0000	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	2,6-Dinitrotoluene	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	HMX	<	18.0000	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	m-Nitrotoluene	<	25.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Nitrobenzene	<	10.0000	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-04	o-Nitrotoluene	<	20.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Pentaerythritol Tetranitrate	<	210.0000	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	p-Nitrotoluene	<	48.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	RDX	<	79.0000	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Tetryl	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	2,4,6-Trinitrotoluene (TNT)	<	18.0000	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Antimony		0.5200		mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Cadmium		0.3500		mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Selenium	<	0.2500	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Silver	<	0.0440	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Mercury		0.0230		mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-C-01	1,3,5-Trinitrobenzene	<	29.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	1,3-Dinitrobenzene	<	12.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	2-Amino-4,6-Dinitrotoluene	<	19.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	4-Amino-2,6-Dinitrotoluene	<	36.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	2,4-Dinitrotoluene	<	24.0000	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	2,6-Dinitrotoluene	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	HMX	<	18.0000	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	m-Nitrotoluene	<	25.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Nitrobenzene	<	10.0000	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-01	o-Nitrotoluene	<	20.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Pentaerythritol Tetranitrate	<	210.0000	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	p-Nitrotoluene	<	48.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	RDX	<	79.0000	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Tetryl	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	2,4,6-Trinitrotoluene (TNT)	<	18.0000	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Antimony		0.4300		mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Arsenic		1.0000		mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Barium		43.9000	B	mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Beryllium		0.1100		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Cadmium		0.1900		mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Chromium		3.9000	B	mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Copper		6.8000	B	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Lead		3.6000	B	mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Nickel		2.6000	B	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Selenium		0.3100		mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 1)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-C-02	Silver	<	0.0440	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Mercury	<	0.0190	U	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-C-02	1,3,5-Trinitrobenzene	<	29.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	1,3-Dinitrobenzene	<	12.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	2-Amino-4,6-Dinitrotoluene	<	19.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	4-Amino-2,6-Dinitrotoluene	<	36.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	2,4-Dinitrotoluene	<	24.0000	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	2,6-Dinitrotoluene	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	HMX	<	18.0000	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	m-Nitrotoluene	<	25.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Nitrobenzene		39.0000		µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-02	o-Nitrotoluene	<	20.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Pentaerythritol Tetranitrate	<	210.0000	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	p-Nitrotoluene	<	48.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	RDX	<	79.0000	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Tetryl	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	2,4,6-Trinitrotoluene (TNT)	<	18.0000	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Antimony		0.6300		mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Arsenic		1.1000		mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Barium		36.1000	B	mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Beryllium		0.1000		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Chromium		3.9000	B	mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Copper		6.5000	B	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Lead		5.9000	B	mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Nickel		2.6000	B	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Selenium	<	0.2400	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Silver		0.0860		mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Mercury	<	0.0170	U	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-C-03	1,3,5-Trinitrobenzene	<	29.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	1,3-Dinitrobenzene	<	12.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	2-Amino-4,6-Dinitrotoluene	<	19.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	4-Amino-2,6-Dinitrotoluene	<	36.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	2,4-Dinitrotoluene	<	24.0000	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	2,6-Dinitrotoluene	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	HMX	<	18.0000	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	m-Nitrotoluene	<	25.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Nitrobenzene		45.0000		µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-03	o-Nitrotoluene	<	20.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Pentaerythritol Tetranitrate	<	210.0000	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	p-Nitrotoluene	<	48.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	RDX		250.0000		µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Tetryl	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	2,4,6-Trinitrotoluene (TNT)	<	18.0000	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 1)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-C-04	Antimony		0.6000		mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Beryllium		0.4200		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Selenium	<	0.2600	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Silver	<	0.0460	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Mercury	<	0.0190	U	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-C-04	1,3,5-Trinitrobenzene	<	29.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	1,3-Dinitrobenzene	<	12.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	2-Amino-4,6-Dinitrotoluene	<	19.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	4-Amino-2,6-Dinitrotoluene	<	36.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	2,4-Dinitrotoluene	<	24.0000	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	2,6-Dinitrotoluene	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	HMX		94.0000		µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	m-Nitrotoluene	<	25.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Nitrobenzene	<	10.0000	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-04	o-Nitrotoluene	<	20.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Pentaerythritol Tetranitrate	<	210.0000	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	p-Nitrotoluene	<	48.0000	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	RDX	<	79.0000	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Tetryl	<	26.0000	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	2,4,6-Trinitrotoluene (TNT)	<	18.0000	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded

[1] 20,000 UTL: Final Background Study, 20000-Pound Open Detonation Unit, December 1997

[2] NMED SSL: New Mexico Environment Department Soil Screening Levels, February 2004, Revision 2

Exhibit H-1 (Table 2)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-A-01	Mercury	<	0.04	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-A-01	Nitroglycerine	<	6400.00	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-A-02	Mercury	<	0.04		mg/kg	0.0269	6.11	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-02	Nitroglycerine	<	6300.00	B	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "B"
OD-SO-A-03	Chromium		14.60	B	mg/kg	9.5027	234	YES	NO	No Action: result flagged "B"
OD-SO-A-03	Mercury	<	0.04		mg/kg	0.0269	6.11	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-03	Nickel		7.60		mg/kg	6.5898	1560	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-03	Nitroglycerine		6300.00		µg/kg	93.6772	347000	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04	Mercury	<	0.04	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-A-04	Nitroglycerine	<	6400.00		µg/kg	93.6772	347000	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-B-01	Antimony		17.10	U	mg/kg	3.5279	31.3	YES	NO	No Action: result flagged "U"
OD-SO-B-01	Cadmium		0.73	U	mg/kg	0.5417	74.1	YES	NO	No Action: result flagged "U"
OD-SO-B-01	Chromium		34.30	U	mg/kg	9.5027	234	YES	NO	No Action: result flagged "U"
OD-SO-B-01	Copper		137.00	U	mg/kg	9.1595	3130	YES	NO	No Action: result flagged "U"
OD-SO-B-01	Lead		11.00	U	mg/kg	7.6508	400	YES	NO	No Action: result flagged "U"
OD-SO-B-01	Mercury	<	0.04	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-B-01	Nitroglycerine		11000.00	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-B-02	Mercury	<	0.04	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-B-02	Nitroglycerine	<	6300.00	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-B-03	Cadmium		1.40	U	mg/kg	0.5417	74.1	YES	NO	No Action: result flagged "U"
OD-SO-B-03	Lead		7.90	U	mg/kg	7.6508	400	YES	NO	No Action: result flagged "U"
OD-SO-B-03	Mercury	<	0.04	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-B-03	Nitroglycerine	<	6200.00	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-B-03A	Cadmium		1.20	U	mg/kg	0.5417	74.1	YES	NO	No Action: result flagged "U"
OD-SO-B-03A	Copper		10.80	U	mg/kg	9.1595	3130	YES	NO	No Action: result flagged "U"
OD-SO-B-03A	Lead		10.70	U	mg/kg	7.6508	400	YES	NO	No Action: result flagged "U"
OD-SO-B-03A	Mercury	<	0.04	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-B-03A	Nitroglycerine	<	6400.00	B	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "B"
OD-SO-B-04	Mercury	<	0.03	B	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "B"
OD-SO-B-04	Nitroglycerine	<	5500.00		µg/kg	93.6772	347000	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-01	Arsenic		3.00	B	mg/kg	1.4963	3.9	YES	NO	No Action: result flagged "B"
OD-SO-C-01	Barium		90.80	B	mg/kg	79.4971	5450	YES	NO	No Action: result flagged "B"
OD-SO-C-01	Beryllium		0.51		mg/kg	0.42	156	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-01	Chromium		11.90	*	mg/kg	9.5027	234	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-01	Copper		14.60		mg/kg	9.1595	3130	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-01	Lead		12.20	U	mg/kg	7.6508	400	YES	NO	No Action: result flagged "U"
OD-SO-C-01	Nickel		8.10		mg/kg	6.5898	1560	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-01	Nitroglycerine	<	5900.00	U	µg/kg	93.6772	347000	YES	NO	No Action:UTL exceeded but not SSL

Exhibit H-1 (Table 2)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-C-02	Mercury	<	0.04	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-C-02	Nitroglycerine	<	5900.00	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-C-03	Cadmium		1.10	U	mg/kg	0.5417	74.1	YES	NO	No Action: result flagged "U"
OD-SO-C-03	Mercury	<	0.03	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-C-03	Nitroglycerine	<	5500.00	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-C-04	Arsenic		2.10	U	mg/kg	1.4963	3.9	YES	NO	No Action: result flagged "U"
OD-SO-C-04	Barium		79.70	U	mg/kg	79.4971	5450	YES	NO	No Action: result flagged "U"
OD-SO-C-04	Cadmium		0.73	U	mg/kg	0.5417	74.1	YES	NO	No Action: result flagged "U"
OD-SO-C-04	Chromium		10.30		mg/kg	9.5027	234	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-04	Copper		16.30	U	mg/kg	9.1595	3130	YES	NO	No Action: result flagged "U"
OD-SO-C-04	Lead		14.50	U	mg/kg	7.6508	400	YES	NO	No Action: result flagged "U"
OD-SO-C-04	Mercury	<	0.04	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-C-04	Nickel		7.20	U	mg/kg	6.5898	1560	YES	NO	No Action: result flagged "U"
OD-SO-C-04	Nitroglycerine	<	6200.00	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-A-01	Antimony		0.36	U	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Arsenic		1.20		mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Barium		34.60	U	mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Beryllium		0.06	U	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Cadmium		0.50	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Chromium		3.30	B	mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Copper		3.90		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Lead		2.90	B	mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Nickel		2.10	B	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Selenium	<	2.10		mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Silver	<	0.32	*	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-A-01	1,3,5-Trinitrobenzene	<	100.00		µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	1,3-Dinitrobenzene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	2,4-Dinitrotoluene	<	100.00		µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	2,6-Dinitrotoluene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	2-Amino-4,6-Dinitrotoluene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	4-Amino-2,6-Dinitrotoluene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	HMX		1000.00	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	m-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Nitrobenzene	<	100.00	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-01	o-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Pentaerythritol Tetranitrate	<	500.00	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	p-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	RDX		1300.00	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 2)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-A-01	Tetryl	<	200.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	TNT	<	100.00	J	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Antimony		0.46	U	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Arsenic		1.10	U	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Barium		27.50	U	mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Beryllium		0.03	U	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Cadmium		0.10	U	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Chromium		2.50	U	mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Copper		2.20	U	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Lead		2.70	B	mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Nickel		1.40	B	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Selenium	<	1.90		mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Silver	<	0.28	B	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-A-02	1,3,5-Trinitrobenzene	<	100.00	B	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	1,3-Dinitrobenzene	<	100.00		µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	2,4-Dinitrotoluene	<	100.00	*	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	2,6-Dinitrotoluene	<	100.00		µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	2-Amino-4,6-Dinitrotoluene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	4-Amino-2,6-Dinitrotoluene	<	100.00		µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	HMX	<	200.00	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	m-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Nitrobenzene		65.00	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-02	o-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Pentaerythritol Tetranitrate	<	500.00	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	p-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	RDX	<	200.00	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Tetryl	<	200.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	TNT	<	100.00	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Antimony		0.56	U	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Arsenic		1.20	U	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Barium		29.60	J	mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Beryllium		0.04	J	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Cadmium		0.34	U	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Copper		3.40	U	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Lead		3.70	U	mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Selenium	<	1.90	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Silver	<	0.29	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-A-03	1,3,5-Trinitrobenzene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 2)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-A-03	1,3-Dinitrobenzene	<	100.00	B	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	2,4-Dinitrotoluene	<	100.00	B	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	2,6-Dinitrotoluene	<	100.00		µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	2-Amino-4,6-Dinitrotoluene	<	100.00	B	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	4-Amino-2,6-Dinitrotoluene	<	100.00	B	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	HMX	<	200.00		µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	m-Nitrotoluene	<	200.00	*	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Nitrobenzene		73.00		µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-03	o-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Pentaerythritol Tetranitrate	<	500.00		µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	p-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	RDX	<	200.00	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Tetryl	<	200.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	TNT	<	100.00	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Antimony		0.55	U	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Arsenic		1.20	U	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Barium		35.40	U	mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Beryllium		0.07	U	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Cadmium		0.32	U	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Chromium		3.60	U	mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Copper		3.70	U	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Lead		3.00	U	mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Nickel		2.00	U	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Selenium	<	2.10	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Silver	<	0.31	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-A-04	1,3,5-Trinitrobenzene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	1,3-Dinitrobenzene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	2,4-Dinitrotoluene	<	100.00	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	2,6-Dinitrotoluene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	2-Amino-4,6-Dinitrotoluene	<	100.00		µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	4-Amino-2,6-Dinitrotoluene	<	100.00	B	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	HMX	<	200.00		µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	m-Nitrotoluene	<	200.00	B	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Nitrobenzene	<	100.00		µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-04	o-Nitrotoluene	<	200.00		µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Pentaerythritol Tetranitrate	<	500.00	*	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	p-Nitrotoluene	<	200.00		µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	RDX	<	200.00	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 2)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-A-04	Tetryl	<	200.00		µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	TNT	<	100.00	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Arsenic		1.10	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Barium		35.50	U	mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Beryllium		0.06	U	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Nickel		2.40	U	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Selenium	<	2.00	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Silver		0.05	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-01	1,3,5-Trinitrobenzene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	1,3-Dinitrobenzene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	2,4-Dinitrotoluene	<	100.00	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	2,6-Dinitrotoluene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	2-Amino-4,6-Dinitrotoluene	<	100.00		µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	4-Amino-2,6-Dinitrotoluene	<	100.00		µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	HMX	<	200.00	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	m-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Nitrobenzene		460.00	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-01	o-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Pentaerythritol Tetranitrate	<	500.00	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	p-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	RDX	<	200.00	B	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Tetryl	<	200.00	B	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	TNT	<	100.00		µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Antimony		0.48	U	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Arsenic		0.49	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Barium		27.10		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Beryllium	<	0.21	*	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Cadmium		0.04		mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Chromium		2.00	U	mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Copper		2.00		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Lead		1.60	U	mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Nickel		1.30	U	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Selenium	<	2.10	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Silver	<	0.31	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-02	1,3,5-Trinitrobenzene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	1,3-Dinitrobenzene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	2,4-Dinitrotoluene	<	100.00	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	2,6-Dinitrotoluene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 2)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-B-02	2-Amino-4,6-Dinitrotoluene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	4-Amino-2,6-Dinitrotoluene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	HMX	<	200.00	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	m-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Nitrobenzene	<	100.00	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-02	o-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Pentaerythritol Tetranitrate	<	500.00	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	p-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	RDX		290.00		µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Tetryl	<	200.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	TNT	<	100.00	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Antimony		0.43	B	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Arsenic		1.40	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Barium		37.10		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Beryllium		0.08	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Chromium		4.40		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Copper		8.20		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Nickel		2.60	*	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Selenium	<	2.00		mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Silver		0.08	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-03	1,3,5-Trinitrobenzene	<	100.00		µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	1,3-Dinitrobenzene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	2,4-Dinitrotoluene	<	100.00	B	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	2,6-Dinitrotoluene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	2-Amino-4,6-Dinitrotoluene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	4-Amino-2,6-Dinitrotoluene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	HMX	<	200.00	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	m-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Nitrobenzene		100.00	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-03	o-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Pentaerythritol Tetranitrate	<	500.00	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	p-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	RDX	<	200.00		µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Tetryl	<	200.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	TNT	<	100.00	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Antimony		0.50	U	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Arsenic		1.20	U	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Barium		39.40	U	mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 2)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-B-03A	Beryllium		0.09	U	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Chromium		4.30	U	mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Nickel		2.50	B	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Selenium	<	2.00	B	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Silver	<	0.30		mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	1,3,5-Trinitrobenzene	<	100.00	B	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	1,3-Dinitrobenzene	<	100.00		µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	2,4-Dinitrotoluene		100.00		µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	2,6-Dinitrotoluene	<	100.00	*	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	2-Amino-4,6-Dinitrotoluene	<	100.00		µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	4-Amino-2,6-Dinitrotoluene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	HMX	<	200.00		µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	m-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Nitrobenzene		290.00	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	o-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Pentaerythritol Tetranitrate	<	500.00	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	p-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	RDX	<	200.00		µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Tetryl	<	200.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	TNT	<	100.00	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Antimony	<	1.70	U	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Arsenic		0.62	U	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Barium		25.40	U	mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Beryllium		0.03		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Cadmium		0.05	U	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Chromium		2.00	U	mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Copper		2.40	U	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Lead		1.90	U	mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Nickel		1.40	U	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Selenium	<	1.70	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Silver	<	0.26	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-04	1,3,5-Trinitrobenzene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	1,3-Dinitrobenzene	<	100.00	B	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 2)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-B-04	2,4-Dinitrotoluene	<	100.00		µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	2,6-Dinitrotoluene	<	100.00	B	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	2-Amino-4,6-Dinitrotoluene	<	100.00	B	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	4-Amino-2,6-Dinitrotoluene	<	100.00		µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	HMX	<	200.00	*	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	m-Nitrotoluene	<	200.00		µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Nitrobenzene	<	100.00	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-04	o-Nitrotoluene	<	200.00		µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Pentaerythritol Tetranitrate	<	500.00	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	p-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	RDX	<	200.00	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Tetryl	<	200.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	TNT	<	100.00	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Antimony		0.52	U	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Cadmium		0.35	U	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Mercury		0.02	U	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Selenium	<	1.80	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Silver	<	0.26	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-01	1,3,5-Trinitrobenzene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	1,3-Dinitrobenzene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	2,4-Dinitrotoluene	<	100.00	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	2,6-Dinitrotoluene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	2-Amino-4,6-Dinitrotoluene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	4-Amino-2,6-Dinitrotoluene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	HMX	<	200.00	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	m-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Nitrobenzene	<	100.00	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-01	o-Nitrotoluene	<	200.00	B	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Pentaerythritol Tetranitrate	<	500.00		µg/kg	61300	NA	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 2)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-C-01	p-Nitrotoluene	<	200.00		µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	RDX	<	200.00		µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Tetryl	<	200.00	B	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	TNT	<	100.00		µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Antimony		0.43	*	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Arsenic		1.00		mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Barium		43.90	B	mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Beryllium		0.11		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Cadmium		0.19	U	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Chromium		3.90	U	mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Copper		6.80	U	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Lead		3.60	U	mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Nickel		2.60	U	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Selenium		0.31	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Silver	<	0.27	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-02	1,3,5-Trinitrobenzene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	1,3-Dinitrobenzene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	2,4-Dinitrotoluene	<	100.00	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	2,6-Dinitrotoluene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	2-Amino-4,6-Dinitrotoluene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	4-Amino-2,6-Dinitrotoluene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	HMX	<	200.00	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	m-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Nitrobenzene		39.00	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-02	o-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Pentaerythritol Tetranitrate	<	500.00	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	p-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	RDX	<	200.00	B	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Tetryl	<	200.00	B	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 2)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-C-02	TNT	<	100.00		µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Antimony		0.63	B	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Arsenic		1.10	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Barium		36.10		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Beryllium		0.10	*	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Chromium		3.90		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Copper		6.50	U	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Lead		5.90		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Nickel		2.60	B	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Selenium	<	1.70	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Silver		0.09	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-03	1,3,5-Trinitrobenzene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	1,3-Dinitrobenzene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	2,4-Dinitrotoluene	<	100.00	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	2,6-Dinitrotoluene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	2-Amino-4,6-Dinitrotoluene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	4-Amino-2,6-Dinitrotoluene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	HMX	<	200.00	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	m-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Nitrobenzene		45.00	J	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-03	o-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Pentaerythritol Tetranitrate	<	500.00	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	p-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	RDX		250.00	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Tetryl	<	200.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	TNT	<	100.00	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Antimony		0.60	U	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Beryllium		0.42	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Selenium	<	1.90	B	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 2)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-C-04	Silver	<	0.28		mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-04	1,3,5-Trinitrobenzene	<	100.00	B	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	1,3-Dinitrobenzene	<	100.00		µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	2,4-Dinitrotoluene	<	100.00		µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	2,6-Dinitrotoluene	<	100.00	*	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	2-Amino-4,6-Dinitrotoluene	<	100.00		µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	4-Amino-2,6-Dinitrotoluene	<	100.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	HMX		94.00		µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	m-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Nitrobenzene	<	100.00	B	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-04	o-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Pentaerythritol Tetranitrate	<	500.00	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	p-Nitrotoluene	<	200.00	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	RDX	<	200.00	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Tetryl	<	200.00	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	TNT	<	100.00	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
[1] 20,000 UTL:	Final Background Study, 20000-Pound Open Detonation Unit, December 1997									
[2] NMED SSL:	New Mexico Environment Department Soil Screening Levels, February 2004, Revision 2									

Exhibit H-1 (Table 3)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-A-01	Mercury	<	0.037	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-A-01	Nitroglycerine	<	6,100	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-A-02	Mercury	<	0.037	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-A-02	Nitroglycerine	<	5,900	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-A-03	Nitroglycerine	<	6,200	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-A-04	Lead		8.1		mg/kg	7.6508	400	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04	Mercury	<	0.039	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-A-04	Nitroglycerine	<	6,200	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-B-01	Arsenic		2.2		mg/kg	1.4963	3.9	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-B-01	Barium		81.6		mg/kg	79.4971	5450	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-B-01	Beryllium		0.5		mg/kg	0.42	156	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-B-01	Chromium		9.7		mg/kg	9.5027	234	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-B-01	Copper		9.4	*	mg/kg	9.1595	3130	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-B-01	Mercury	<	0.036	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-B-01	Nitroglycerine	<	5,900	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-B-02	Mercury	<	0.04	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-B-02	Nitroglycerine	<	6,500	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-B-03	Mercury	<	0.035	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-B-03	Nitroglycerine	<	5,900	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-B-03A	Mercury	<	0.036	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-B-03A	Nitroglycerine	<	5,700	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-B-04	Mercury	<	0.035	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-B-04	Nitroglycerine	<	5,900	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-C-01	Mercury	<	0.036	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-C-01	Nitroglycerine		160,000		µg/kg	93.6772	347000	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-02	Copper		932	*	mg/kg	9.1595	3130	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-02	Nitroglycerine	<	5,800	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-C-03	Mercury	<	0.035	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-C-03	Nitroglycerine	<	5,800	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-C-04	Mercury	<	0.035	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-C-04	Nitroglycerine	<	6,000	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-A-01	Antimony	<	2.1	U	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Arsenic		0.78	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Barium		31		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Beryllium		0.13	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Cadmium		0.14	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Chromium		2.6		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Copper		5.4	*	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Lead		1.9		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 3)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-A-01	Nickel		1.8		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Selenium	<	2.1	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Silver	<	0.32	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-A-01	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	2,4,6-Trinitrotoluene	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	2-Amino-4,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	4-Amino-2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-01	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Pentaerythritol Tetranitrate	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	RDX		250		µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Antimony	<	2.1	U	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Arsenic		0.68	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Barium		33		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Beryllium		0.15	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Cadmium		0.14	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Chromium		2.9		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Copper		3.5	*	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Lead		1.6		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Nickel		1.5		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Selenium	<	2.1	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Silver	<	0.32	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-A-02	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	2,4,6-Trinitrotoluene	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	2-Amino-4,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	4-Amino-2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 3)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-A-02	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Pentaerythritol Tetranitrate	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	RDX		100	J	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Antimony		0.4	B	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Arsenic		0.8	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Barium		38.7		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Beryllium		0.13	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Cadmium		0.18	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Chromium		2.8		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Copper		4.8	*	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Lead		5.5		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Nickel		2.5		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Selenium	<	2.2	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Silver	<	0.32	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Mercury		0.022	B	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-A-03	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	2,4,6-Trinitrotoluene	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	2-Amino-4,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	4-Amino-2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	HMX		190	J	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-03	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Pentaerythritol Tetranitrate	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	RDX		510		µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Antimony	<	2.1	U	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Arsenic		0.96	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Barium		37.7		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Beryllium		0.14	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Cadmium		0.2	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Chromium		3		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Copper		5.5	*	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 3)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-A-04	Nickel		1.9		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Selenium	<	2.1	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Silver	<	0.32	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-A-04	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	2,4,6-Trinitrotoluene	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	2-Amino-4,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	4-Amino-2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	HMX		670		µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Nitrobenzene		410		µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-04	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Pentaerythritol Tetranitrate	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	RDX		320		µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Antimony	<	2	U	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Cadmium		0.39	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Lead		6.8		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Nickel		6.4		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Selenium	<	2	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Silver	<	0.3	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-01	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	2,4,6-Trinitrotoluene	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	2-Amino-4,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	4-Amino-2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Nitrobenzene		63	J	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-01	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Pentaerythritol Tetranitrate	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 3)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-B-02	Antimony	<	2.2	U	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Arsenic		1	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Barium		33.7		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Beryllium		0.12	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Cadmium		0.13	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Chromium		2.4		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Copper		4.2	*	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Lead		3		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Nickel		1.7		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Selenium	<	2.2	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Silver	<	0.34	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-02	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	2,4,6-Trinitrotoluene	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	2-Amino-4,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	4-Amino-2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	HMX		99	J	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-02	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Pentaerythritol Tetranitrate	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	RDX		730		µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Antimony	<	1.9	U	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Arsenic		0.54	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Barium		24.3		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Beryllium		0.093	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Cadmium		0.092	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Chromium		3		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Copper		2.4	*	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Lead		1.2		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Nickel		1		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Selenium	<	1.9	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Silver	<	0.28	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-03	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 3)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-B-03	2,4,6-Trinitrotoluene	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	2-Amino-4,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	4-Amino-2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-03	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Pentaerythritol Tetranitrate	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Antimony	<	2	U	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Arsenic		0.58	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Barium		25.3		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Beryllium		0.083	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Cadmium		0.054	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Chromium		2		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Copper		1.4	*	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Lead		0.87	B	mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Nickel		0.91	B	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Selenium	<	2	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Silver	<	0.3	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	2,4,6-Trinitrotoluene	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	2-Amino-4,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	4-Amino-2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Pentaerythritol Tetranitrate	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 3)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-B-04	Antimony	<	2	U	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Arsenic		0.96	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Barium		40.4		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Beryllium		0.19	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Cadmium		0.2	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Chromium		4.2		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Copper		4.7	*	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Lead		2		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Nickel		2.2		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Selenium	<	2	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Silver	<	0.29	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-04	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	2,4,6-Trinitrotoluene	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	2-Amino-4,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	4-Amino-2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Nitrobenzene		86	J	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-04	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Pentaerythritol Tetranitrate	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Antimony		0.37	B	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Arsenic		0.85	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Barium		43.8		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Beryllium		0.19	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Cadmium		0.34	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Chromium		4		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Copper		7.2	*	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Lead		4.5		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Nickel		2.8		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Selenium	<	2.1	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Silver	<	0.31	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-01	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 3)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-C-01	2,4,6-Trinitrotoluene	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	2-Amino-4,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	4-Amino-2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-01	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Pentaerythritol Tetranitrate	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Antimony	<	2	U	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Arsenic		1.1	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Barium		49.2		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Beryllium		0.23		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Cadmium		0.21	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Chromium		4.5		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Lead		3.2		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Nickel		2.9		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Selenium	<	2	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Silver	<	0.29	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Mercury		0.02	B	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-C-02	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	2,4,6-Trinitrotoluene	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	2-Amino-4,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	4-Amino-2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Nitrobenzene		65	J	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-02	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Pentaerythritol Tetranitrate	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 3)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-C-03	Antimony	<	2	U	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Arsenic		0.96	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Barium		37.4		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Beryllium		0.14	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Cadmium		0.24	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Chromium		3.1		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Copper		4	*	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Lead		2.1		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Nickel		1.9		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Selenium	<	2	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Silver	<	0.31	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-03	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	2,4,6-Trinitrotoluene	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	2-Amino-4,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	4-Amino-2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-03	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Pentaerythritol Tetranitrate	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Antimony	<	1.9	U	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Arsenic		1.3	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Barium		45.5		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Beryllium		0.18	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Cadmium		0.19	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Chromium		4.5		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Copper		5.2	*	mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Lead		2.6		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Nickel		2.6		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Selenium	<	1.9	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Silver	<	0.29	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-04	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 3)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-C-04	2,4,6-Trinitrotoluene	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	2-Amino-4,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	4-Amino-2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-04	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Pentaerythritol Tetranitrate	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
[1] 20,000 UTL:	Final Background Study, 20000-Pound Open Detonation Unit, December 1997									
[2] NMED SSL:	New Mexico Environment Department Soil Screening Levels, February 2004, Revision 2									

Exhibit H-1 (Table 4)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-A-01	Mercury	<	0.033	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-A-01	Nitroglycerine	<	5,900	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-A-02	Cadmium		2.2		mg/kg	0.5417	74.1	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-02	Copper		98.3		mg/kg	9.1595	3130	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-02	Lead		9		mg/kg	7.6508	400	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-02	Silver		2.1		mg/kg	0.7328	391	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-02	Mercury	<	0.036	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-A-02	Nitroglycerine	<	5,700	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-A-03	Chromium		15.9		mg/kg	9.5027	234	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-03	Copper		17.7		mg/kg	9.1595	3130	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-03	Lead		8.4		mg/kg	7.6508	400	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-03	Nickel		9.7	E	mg/kg	6.5898	1560	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-03	Mercury	<	0.033	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-A-03	Nitroglycerine	<	5,800	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-A-04	Arsenic		1.7	B	mg/kg	1.4963	3.9	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04	Cadmium		1.1		mg/kg	0.5417	74.1	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04	Chromium		12.8		mg/kg	9.5027	234	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04	Copper		52.1		mg/kg	9.1595	3130	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04	Lead		12		mg/kg	7.6508	400	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04	Silver		0.75		mg/kg	0.7328	391	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04	Mercury	<	0.034	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-A-04	Nitroglycerine	<	5,900	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-B-01	Lead		7.8		mg/kg	7.6508	400	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-B-01	Mercury	<	0.031	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-B-01	Nitroglycerine	<	6,000	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-B-02	Selenium	<	2.3	U	mg/kg	2.2645	391	YES	NO	No Action: result flagged "U"
OD-SO-B-02	Mercury	<	0.035	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-B-02	Nitroglycerine	<	6,400	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-B-03	Mercury	<	0.034	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-B-03	Nitroglycerine	<	5,900	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-B-04	Mercury	<	0.033	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-B-04	Nitroglycerine	<	6,300	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-C-01	Arsenic		2.3		mg/kg	1.4963	3.9	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-01	Beryllium		0.43		mg/kg	0.42	156	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-01	Cadmium		1.2		mg/kg	0.5417	74.1	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-01	Copper		18.9		mg/kg	9.1595	3130	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-01	Lead		15.1		mg/kg	7.6508	400	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-01	Mercury	<	0.033	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"

Exhibit H-1 (Table 4)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-C-01	Nitroglycerine	<	6,100	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-C-02	Mercury	<	0.028	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-C-02	Nitroglycerine	<	6,200	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-C-03	Mercury	<	0.031	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-C-03	Nitroglycerine	<	5,400	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-C-04	Mercury	<	0.033	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-C-04	Nitroglycerine	<	5,800	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-C-04A	Mercury	<	0.03	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-C-04A	Nitroglycerine	<	5,800	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-A-01	Antimony	<	2.1	UN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Arsenic		0.76	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Barium		30.7		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Beryllium		0.13	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Cadmium		0.13	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Chromium		3.4		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Copper		8.1		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Lead		2.5		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Nickel		1.9	E	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Selenium	<	2.1	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Silver	<	0.32	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-A-01	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	2-Amino-4,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	4-Amino-2,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Nitrobenzene		140		µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-01	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Antimony	<	2	UN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Arsenic		1	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Barium		49.3		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 4)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-A-02	Beryllium		0.23		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Chromium		8.1		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Nickel		4.3	E	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Selenium	<	2	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-02	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	2-Amino-4,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	4-Amino-2,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-02	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Antimony		0.35	BN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Arsenic		1.3	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Barium		64.8		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Beryllium		0.39		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Cadmium		0.28	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Selenium	<	2	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Silver	<	0.3	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-A-03	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	2-Amino-4,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	4-Amino-2,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-03	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 4)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-A-03	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Antimony	<	2	UN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Barium		56.1		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Beryllium		0.33		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Nickel		5.6	E	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Selenium	<	2	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-04	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	2-Amino-4,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	4-Amino-2,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-04	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Antimony	<	2.1	UN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Arsenic		0.66	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Barium		29		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Beryllium		0.1	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Cadmium		0.043	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Chromium		2.7		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Copper		5.3		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Nickel		2.5	E	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Selenium	<	2.1	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Silver	<	0.31	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-01	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	2-Amino-4,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 4)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-B-01	4-Amino-2,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-01	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Antimony		0.54	BN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Arsenic		0.65	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Barium		31.9		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Beryllium		0.15	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Cadmium		0.069	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Chromium		3.3		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Copper		3.7		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Lead		2.1		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Nickel		2.1	E	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Silver	<	0.34	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-02	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	2-Amino-4,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	4-Amino-2,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-02	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Antimony	<	2	UN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Arsenic		0.54	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Barium		30.9		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 4)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-B-03	Beryllium		0.11	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Cadmium		0.089	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Chromium		2.7		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Copper		3.6		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Lead		1.5		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Nickel		1.6	E	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Selenium	<	2	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Silver	<	0.3	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-03	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	2-Amino-4,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	4-Amino-2,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-03	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Antimony	<	2.1	UN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Arsenic		0.87	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Barium		35.6		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Beryllium		0.13	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Cadmium		0.18	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Chromium		3.5		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Copper		5.9		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Lead		3.3		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Nickel		2.2	E	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Selenium	<	2.1	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Silver	<	0.31	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-04	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 4)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-B-04	2-Amino-4,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	4-Amino-2,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-04	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Antimony		0.5	BN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Barium		74.8		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Chromium		9.3		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Nickel		6.2	E	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Selenium	<	2	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Silver	<	0.29	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-01	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	2-Amino-4,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	4-Amino-2,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-01	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Antimony	<	2	UN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Arsenic		1	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Barium		38.5		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Beryllium		0.17	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Cadmium		0.14	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Chromium		4		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 4)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-C-02	Copper		5.4		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Lead		3.4		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Nickel		2.5	E	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Selenium	<	2	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Silver	<	0.3	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-02	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	2-Amino-4,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	4-Amino-2,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-02	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	RDX		480		µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Antimony	<	2	UN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Arsenic		0.84	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Barium		39.4		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Beryllium		0.12	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Cadmium		0.4	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Chromium		3.2		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Copper		5.8		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Lead		3.8		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Nickel		2.3	E	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Selenium	<	2	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Silver	<	0.29	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-03	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	2-Amino-4,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	4-Amino-2,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 4)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-C-03	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-03	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Antimony	<	1.9	UN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Arsenic		1.1	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Barium		30.5		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Beryllium		0.098	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Cadmium		0.33	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Chromium		2.5		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Copper		3.1		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Lead		1.8		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Nickel		1.6	E	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Selenium	<	1.9	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Silver	<	0.28	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-04	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	2-Amino-4,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	4-Amino-2,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-04	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	Antimony	<	1.8	UN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	Arsenic		1.1	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	Barium		29.6		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	Beryllium		0.089	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 4)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-C-04A	Cadmium		0.31	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	Chromium		2.1		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	Copper		3		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	Lead		1.4		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	Nickel		1.5	E	mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	Selenium	<	1.8	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	Silver	<	0.26	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	2-Amino-4,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	4-Amino-2,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04A	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
[1] 20,000 UTL:	Final Background Study, 20000-Pound Open Detonation Unit, December 1997									
[2] NMED SSL:	New Mexico Environment Department Soil Screening Levels, February 2004, Revision 2									

Exhibit H-1 (Table 5)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-A-01	Arsenic		2.2		mg/kg	1.4963	3.9	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-01	Barium		81.2		mg/kg	79.4971	5450	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-01	Copper		9.6		mg/kg	9.1595	3130	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-03	Arsenic		2.3		mg/kg	1.4963	3.9	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-03	Barium		89.5		mg/kg	79.4971	5450	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04	Arsenic		3.2		mg/kg	1.4963	3.9	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04	Beryllium		0.76		mg/kg	0.42	156	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04	Cadmium		0.76		mg/kg	0.5417	74.1	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04	Chromium		15.9		mg/kg	9.5027	234	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04	Copper		44.5		mg/kg	9.1595	3130	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04	Lead		8.2		mg/kg	7.6508	400	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04	Nickel		12.6		mg/kg	6.5898	1560	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04	Silver		1.5	*	mg/kg	0.7328	391	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04	Mercury	<	0.032	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-A-04	Nitroglycerine	<	5800	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-A-04A	Arsenic		2.2		mg/kg	1.4963	3.9	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04A	Barium		96.9		mg/kg	79.4971	5450	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04A	Beryllium		0.52		mg/kg	0.42	156	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04A	Cadmium		1.3		mg/kg	0.5417	74.1	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04A	Chromium		13.3		mg/kg	9.5027	234	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04A	Copper		33.5		mg/kg	9.1595	3130	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04A	Nickel		11.6		mg/kg	6.5898	1560	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04A	Silver		2.9	*	mg/kg	0.7328	391	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04A	Mercury	<	0.032	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-A-04A	Nitroglycerine	<	5800	U	µg/kg	93.6772	347000	YES	NO	No Action: result flagged "U"
OD-SO-B-02	Copper		12.2		mg/kg	9.1595	3130	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-B-03	Mercury	<	0.034	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-B-03	Nitroglycerine		4000	J	µg/kg	93.6772	347000	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-03	Arsenic		2.1		mg/kg	1.4963	3.9	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-03	Cadmium		0.59		mg/kg	0.5417	74.1	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-03	Copper		13.4		mg/kg	9.1595	3130	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-03	Lead		10		mg/kg	7.6508	400	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-04	Cadmium		0.57	B	mg/kg	0.5417	74.1	YES	NO	No Action: result flagged "B"
OD-SO-A-01	Antimony		0.54	BN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Beryllium		0.41		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Cadmium		0.25	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Chromium		8.7		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Lead		4.3		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Nickel		6.4		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 5)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-A-01	Selenium	<	0	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Silver		0.28	B*	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Mercury	<	0	U	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-A-01	1,3,5-Trinitrobenzene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	1,3-Dinitrobenzene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	2,4-Dinitrotoluene	<	0	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	2,6-Dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	2-Amino-4,6-dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	4-Amino-2,6-dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	HMX	<	0	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	m-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Nitrobenzene		60	JB	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-01	o-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	PETN	<	0	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	p-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	RDX	<	0	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Tetryl	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	TNT	<	0	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Nitroglycerine	<	0	U	µg/kg	93.6772	347000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Antimony		0.42	BN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Arsenic		1	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Barium		34.1		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Beryllium		0.17	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Cadmium		0.18	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Chromium		3.6		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Copper		3		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Lead		2.1		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Nickel		2.4		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Selenium	<	0	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Silver		0.28	*	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Mercury	<	0	U	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-A-02	1,3,5-Trinitrobenzene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	1,3-Dinitrobenzene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	2,4-Dinitrotoluene	<	0	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	2,6-Dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	2-Amino-4,6-dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	4-Amino-2,6-dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	HMX	<	0	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	m-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 5)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-A-02	Nitrobenzene		50	B	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-02	o-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	PETN	<	0	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	p-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	RDX	<	0	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Tetryl	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	TNT	<	0	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Nitroglycerine	<	0	U	µg/kg	93.6772	347000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Antimony		0.48	BN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Beryllium		0.41		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Cadmium		0.27	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Chromium		8.6		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Copper		6.2		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Lead		4.2		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Nickel		6.2		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Selenium	<	0	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Silver	<	0	U*	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Mercury	<	0	U	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-A-03	1,3,5-Trinitrobenzene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	1,3-Dinitrobenzene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	2,4-Dinitrotoluene	<	0	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	2,6-Dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	2-Amino-4,6-dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	4-Amino-2,6-dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	HMX	<	0	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	m-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Nitrobenzene		0	B	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-03	o-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	PETN	<	0	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	p-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	RDX		20		µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Tetryl	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	TNT	<	0	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Nitroglycerine	<	0	U	µg/kg	93.6772	347000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Antimony		0.79	BN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Barium		15		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Selenium	<	1.8	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-04	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 5)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-A-04	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	2-Amino-4,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	4-Amino-2,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Nitrobenzene		50	B	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-04	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-A-04A	Antimony		0.45	BN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-04A	Lead		7.3		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-A-04A	Selenium	<	1.9	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-04A	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04A	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04A	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-04A	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04A	2-Amino-4,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04A	4-Amino-2,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04A	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-04A	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-04A	Nitrobenzene		100	B	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-04A	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-04A	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04A	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-04A	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-A-04A	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04A	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Antimony		0.42	BN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Arsenic		0.7	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Barium		36		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Beryllium		0.15	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Cadmium		0.19	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Chromium		5.8		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Copper		4.1		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Lead		2.2		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 5)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-B-01	Nickel		3.1		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Selenium	<	0	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Silver		0.17	B*	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Mercury	<	0	U	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-B-01	1,3,5-Trinitrobenzene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	1,3-Dinitrobenzene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	2,4-Dinitrotoluene	<	0	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	2,6-Dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	2-Amino-4,6-dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	4-Amino-2,6-dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	HMX	<	0	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	m-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Nitrobenzene		90	B	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-01	o-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	PETN	<	0	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	p-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	RDX	<	0	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Tetryl	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	TNT	<	0	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Nitroglycerine	<	0	U	µg/kg	93.6772	347000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Antimony		0.58	BN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Arsenic		1.2	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Barium		35.1		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Beryllium		0.16	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Cadmium		0.21	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Chromium		4.2		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Lead		2.2		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Nickel		2.2		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Selenium	<	0	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Silver	<	0	U*	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Mercury	<	0	U	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-B-02	1,3,5-Trinitrobenzene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	1,3-Dinitrobenzene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	2,4-Dinitrotoluene	<	0	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	2,6-Dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	2-Amino-4,6-dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	4-Amino-2,6-dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	HMX	<	0	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	m-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 5)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-B-02	Nitrobenzene		85	JB	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-02	o-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	PETN	<	0	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	p-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	RDX		0		µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Tetryl	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	TNT	<	0	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Nitroglycerine	<	0	U	µg/kg	93.6772	347000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Antimony		0.44	B	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Arsenic		1.1		mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Barium		48		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Beryllium		0.24		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Cadmium		0.37	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Chromium		4.9		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Copper		9.1		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Lead		4.3		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Nickel		3.3		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Selenium	<	1.9	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Silver		0.29	U*	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-03	1,3,5-Trinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	2-Amino-4,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	4-Amino-2,6-dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-03	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	p-Nitrotoluene		360	B	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	RDX		3800		µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Tetryl	<	30	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Antimony		0.38	BN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Arsenic		0.97	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Barium		35.8		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Beryllium		0.14	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Cadmium		0.22	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 5)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-B-04	Chromium		3.4		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Copper		6.9		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Lead		3.3		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Nickel		2.7		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Selenium	<	0	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Silver	<	0	U*	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Mercury	<	0	U	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-B-04	1,3,5-Trinitrobenzene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	1,3-Dinitrobenzene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	2,4-Dinitrotoluene	<	0	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	2,6-Dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	2-Amino-4,6-dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	4-Amino-2,6-dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	HMX	<	0	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	m-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Nitrobenzene		0	B	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-04	o-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	PETN	<	0	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	p-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	RDX		50	J	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Tetryl	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	TNT	<	0	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Nitroglycerine	<	0	U	µg/kg	93.6772	347000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Antimony		0	UN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Arsenic		1.3	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Barium		59.6		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Beryllium		0.31		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Cadmium		0.29	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Chromium		6.4		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Copper		9		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Lead		5.5		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Nickel		4.4		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Selenium	<	0	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Silver		0.15	B*	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Mercury	<	0	U	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-C-01	1,3,5-Trinitrobenzene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	1,3-Dinitrobenzene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	2,4-Dinitrotoluene	<	0	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	2,6-Dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 5)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-C-01	2-Amino-4,6-dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	4-Amino-2,6-dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	HMX	<	0	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	m-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Nitrobenzene		71	JB	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-01	o-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	PETN	<	0	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	p-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	RDX	<	0	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Tetryl	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	TNT	<	0	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Nitroglycerine	<	0	U	µg/kg	93.6772	347000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Antimony	<	0	UN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Arsenic		1.3	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Barium		29.1		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Beryllium		0.12	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Cadmium		0.11	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Chromium		2.7		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Copper		3.9		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Lead		1.5		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Nickel		1.7		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Selenium	<	0	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Silver		0.13	B*	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Mercury	<	0	U	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-C-02	1,3,5-Trinitrobenzene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	1,3-Dinitrobenzene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	2,4-Dinitrotoluene	<	0	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	2,6-Dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	2-Amino-4,6-dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	4-Amino-2,6-dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	HMX	<	0	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	m-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Nitrobenzene		40	B	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-02	o-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	PETN	<	0	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	p-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	RDX	<	0	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Tetryl	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	TNT	<	0	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 5)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-C-02	Nitroglycerine	<	0	U	µg/kg	93.6772	347000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Antimony	<	0	UN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Barium		70.7		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Beryllium		0.4		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Chromium		8.2		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Nickel		5.9		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Selenium	<	0	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Silver		0.17	B*	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Mercury	<	0	U	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-C-03	1,3,5-Trinitrobenzene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	1,3-Dinitrobenzene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	2,4-Dinitrotoluene	<	0	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	2,6-Dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	2-Amino-4,6-dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	4-Amino-2,6-dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	HMX	<	0	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	m-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Nitrobenzene		46	JB	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-03	o-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	PETN	<	0	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	p-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	RDX	<	0	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Tetryl	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	TNT	<	0	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Nitroglycerine	<	0	U	µg/kg	93.6772	347000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Antimony		0.39	BN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Arsenic		1.1	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Barium		56.6		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Beryllium		0.25		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Chromium		5.5		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Copper		8.5		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Lead		5		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Nickel		3.8		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Selenium	<	0	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Silver		0.18	B*	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Mercury	<	0	U	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-C-04	1,3,5-Trinitrobenzene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	1,3-Dinitrobenzene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	2,4-Dinitrotoluene	<	0	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 5)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-C-04	2,6-Dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	2-Amino-4,6-dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	4-Amino-2,6-dinitrotoluene	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	HMX	<	0	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	m-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Nitrobenzene		85	JB	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-04	o-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	PETN	<	0	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	p-Nitrotoluene	<	0	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	RDX	<	0	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Tetryl	<	0	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	TNT	<	0	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Nitroglycerine	<	0	U	µg/kg	93.6772	347000	NO	NO	No Action: No standard exceeded
[1] 20,000 UTL:	Final Background Study, 20000-Pound Open Detonation Unit, December 1997									
[2] NMED SSL:	New Mexico Environment Department Soil Screening Levels, February 2004, Revision 2									

Exhibit H-1 (Table 6)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-A-01	Mercury	<	0.039	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-A-02	Copper		13.4		mg/kg	9.1595	3130	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-02	Mercury	<	0.036	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-A-03	Copper		14.1		mg/kg	9.1595	3130	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-03	Mercury	<	0.034	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-A-04	Cadmium		2.5		mg/kg	0.5417	74.1	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04	Copper		9.3		mg/kg	9.1595	3130	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-04	Mercury		0.04		mg/kg	0.0269	6.11	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-B-01	Mercury	<	0.033	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-B-02	Mercury	<	0.036	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-B-03	Mercury	<	0.033	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-B-03A	Mercury	<	0.037	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-B-04	Mercury	<	0.036	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-C-01	Arsenic		1.5	B	mg/kg	1.4963	3.9	YES	NO	No Action: result flagged "B"
OD-SO-C-01	Cadmium		1.8		mg/kg	0.5417	74.1	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-01	Copper		11.4		mg/kg	9.1595	3130	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-01	Lead		11.4		mg/kg	7.6508	400	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-01	Mercury	<	0.036	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-C-02	Cadmium		0.94		mg/kg	0.5417	74.1	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-02	Lead		7.8		mg/kg	7.6508	400	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-02	Mercury	<	0.037	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-C-03	Copper		37.5		mg/kg	9.1595	3130	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-03	Mercury	<	0.042	U	mg/kg	0.0269	6.11	YES	NO	No Action: result flagged "U"
OD-SO-C-04	Arsenic		2.2		mg/kg	1.4963	3.9	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-04	Beryllium		0.47		mg/kg	0.42	156	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-04	Cadmium		0.6		mg/kg	0.5417	74.1	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-04	Copper		13.9		mg/kg	9.1595	3130	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-C-04	Lead		12.3		mg/kg	7.6508	400	YES	NO	No Action:UTL exceeded but not SSL
OD-SO-A-01	Antimony		0.39	BN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Arsenic		1.1	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Barium		33.6		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Beryllium		0.13	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Cadmium		0.31	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Chromium		5.5		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Copper		9		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Lead		4.2		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Nickel		4.1		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Selenium	<	2.1	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Silver	<	0.31	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-A-01	1,3,5-Trinitrobenze	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	2,4-Dinitrotoluene		55	J	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 6)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-A-01	2-Amino-4,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	4-Amino-2,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	HMX		90	J	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Nitrobenzene		39	J	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Nitroglycerine	<	6,300	U	µg/kg	93677.2	347000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-01	RDX		1,400		µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-A-01	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-01	TNT		590		µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Antimony	<	1.8	UN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Arsenic		1.1	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Barium		31.5		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Beryllium		0.13	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Cadmium		0.21	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Chromium		4.4		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Lead		5.5		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Nickel		2.2		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Selenium	<	1.8	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Silver	<	0.27	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-A-02	1,3,5-Trinitrobenze	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	2-Amino-4,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	4-Amino-2,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Nitroglycerine		9,700		µg/kg	93677.2	347000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-02	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-A-02	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-02	TNT		95	J	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Antimony		0.45	BN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Arsenic		1.2	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Barium		29.5		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Beryllium		0.12	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Cadmium		0.2	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 6)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-A-03	Chromium		3.9		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Lead		2.4		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Nickel		2.4		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Selenium	<	2	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Silver	<	0.31	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-A-03	1,3,5-Trinitrobenze	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	2-Amino-4,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	4-Amino-2,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Nitrobenzene		38	J	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Nitroglycerine	<	5,900	U	µg/kg	93677.2	347000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-03	RDX		500		µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-A-03	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-03	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Antimony		0.58	BN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Arsenic		1.1	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Barium		30.8		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Beryllium		0.16	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Chromium		3.9		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Lead		7.3		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Nickel		2.6		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Selenium	<	2	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Silver	<	0.29	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-A-04	1,3,5-Trinitrobenze	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	2-Amino-4,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	4-Amino-2,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Nitrobenzene		53	J	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Nitroglycerine	<	5,900	U	µg/kg	93677.2	347000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-A-04	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 6)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-A-04	RDX		2,100		µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-A-04	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-A-04	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Antimony	<	1.9	UN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Arsenic		0.87	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Barium		27.2		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Beryllium		0.11	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Cadmium		0.17	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Chromium		2.4		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Copper		4.3		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Lead		5.1		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Nickel		1.5		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Selenium	<	1.9	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Silver	<	0.28	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-01	1,3,5-Trinitrobenze	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	2,4-Dinitrotoluene		270		µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	2-Amino-4,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	4-Amino-2,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Nitroglycerine	<	5,500	U	µg/kg	93677.2	347000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-01	RDX		970		µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-01	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-01	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Antimony		0.46	BN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Arsenic		0.93	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Barium		27.7		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Beryllium		0.13	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Cadmium		0.084	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Chromium		2.5		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Copper		2.5		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Lead		0.97	B	mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Nickel		1.5		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Selenium	<	2.2	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Silver	<	0.32	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-02	1,3,5-Trinitrobenze	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 6)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-B-02	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	2-Amino-4,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	4-Amino-2,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Nitroglycerine	<	5,800	U	µg/kg	93677.2	347000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-02	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-02	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-02	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Antimony		0.49	BN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Arsenic		0.81	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Barium		29.2		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Beryllium		0.11	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Cadmium		0.14	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Chromium		3.1		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Copper		3.8		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Lead		3.3		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Nickel		1.6		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Selenium	<	2	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Silver	<	0.3	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-03	1,3,5-Trinitrobenze	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	2-Amino-4,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	4-Amino-2,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Nitroglycerine	<	5,600	U	µg/kg	93677.2	347000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03	RDX		1,300		µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-03	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Antimony	<	1.9	UN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Arsenic		0.87	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 6)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-B-03A	Barium		31.4		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Beryllium		0.13	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Cadmium		0.26	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Chromium		3.8		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Copper		6.1		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Lead		3.8		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Nickel		2.5		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Selenium	<	1.9	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Silver	<	0.29	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	1,3,5-Trinitrobenze	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	2-Amino-4,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	4-Amino-2,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	HMX		78	J	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Nitrobenzene		49	J	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Nitroglycerine	<	5,800	U	µg/kg	93677.2	347000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	RDX		2,900		µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-03A	TNT		290		µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Antimony		0.43	BN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Arsenic		1	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Barium		28.7		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Beryllium		0.1	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Cadmium		0.086	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Chromium		2.5		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Copper		1.8		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Lead		2		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Nickel		1.3		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Selenium	<	1.9	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Silver	<	0.29	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-B-04	1,3,5-Trinitrobenze	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	2-Amino-4,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	4-Amino-2,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 6)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-B-04	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Nitrobenzene	<	100	U	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Nitroglycerine	<	5,900	U	µg/kg	93677.2	347000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-B-04	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-B-04	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-B-04	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Antimony		0.52	BN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Barium		46.6		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Beryllium		0.25		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Chromium		5.8		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Nickel		4		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Selenium	<	2.1	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Silver	<	0.31	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-01	1,3,5-Trinitrobenze	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	2-Amino-4,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	4-Amino-2,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Nitrobenzene		38	J	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Nitroglycerine	<	5,900	U	µg/kg	93677.2	347000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-01	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-01	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-01	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Antimony		0.46	BN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Arsenic		0.9	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Barium		35.3		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Beryllium		0.14	B	mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Chromium		5		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Copper		7.5		mg/kg	9.1595	3130	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Nickel		2.4		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Selenium	<	2.1	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Silver	<	0.31	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-02	1,3,5-Trinitrobenze	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 6)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-C-02	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	2-Amino-4,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	4-Amino-2,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Nitrobenzene		35	J	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Nitroglycerine	<	6,000	U	µg/kg	93677.2	347000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-02	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-02	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-02	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Antimony	<	2.2	UN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Arsenic		1.2	B	mg/kg	1.4963	3.9	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Barium		60		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Beryllium		0.29		mg/kg	0.42	156	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Cadmium		0.29	B	mg/kg	0.5417	74.1	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Chromium		6.7		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Lead		7.2		mg/kg	7.6508	400	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Nickel		4		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Selenium	<	2.2	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Silver	<	0.33	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-03	1,3,5-Trinitrobenze	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	2-Amino-4,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	4-Amino-2,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Nitrobenzene		63	J	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Nitroglycerine	<	6,700	U	µg/kg	93677.2	347000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-03	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-03	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-03	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Antimony		0.72	BN	mg/kg	3.5279	31.3	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Barium		76.4		mg/kg	79.4971	5450	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Chromium		9.5		mg/kg	9.5027	234	NO	NO	No Action: No standard exceeded

Exhibit H-1 (Table 6)
Analytical Sample Results

Location	Parameter		Value	Flags	Units	20,000 UTL[1]	NMED SSL[2]	>UTL?	>SSL?	Evaluation
OD-SO-C-04	Mercury		0.019	B	mg/kg	0.0269	6.11	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Nickel		6.4		mg/kg	6.5898	1560	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Selenium	<	1.9	U	mg/kg	2.2645	391	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Silver	<	0.29	U	mg/kg	0.7328	391	NO	NO	No Action: No standard exceeded
OD-SO-C-04	1,3,5-Trinitrobenze	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	1,3-Dinitrobenzene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	2,4-Dinitrotoluene	<	100	U	µg/kg	NA	120000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	2,6-Dinitrotoluene	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	2-Amino-4,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	4-Amino-2,6-dinitro	<	100	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	HMX	<	200	U	µg/kg	NA	3000000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	m-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Nitrobenzene		68	J	µg/kg	NA	21800	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Nitroglycerine	<	6,000	U	µg/kg	93677.2	347000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	o-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	PETN	<	500	U	µg/kg	61300	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	p-Nitrotoluene	<	200	U	µg/kg	NA	410000	NO	NO	No Action: No standard exceeded
OD-SO-C-04	RDX	<	200	U	µg/kg	NA	4420	NO	NO	No Action: No standard exceeded
OD-SO-C-04	Tetryl	<	200	U	µg/kg	NA	NA	NO	NO	No Action: No standard exceeded
OD-SO-C-04	TNT	<	100	U	µg/kg	NA	30000	NO	NO	No Action: No standard exceeded
[1] 20,000 UTL:	Final Background Study, 20000-Pound Open Detonation Unit, December 1997									
[2] NMED SSL:	New Mexico Environment Department Soil Screening Levels, February 2004, Revision 2									

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ATTACHMENT I
ENVIRONMENTAL PROTECTION

HOLLOMAN AIR FORCE BASE
20,000-POUND OPEN DETONATION TREATMENT UNIT

Permit No. NM6572124422

ATTACHMENT I
ENVIRONMENTAL PROTECTION

INTRODUCTION

The environmental performance standards in New Mexico Administrative Code, Title 20, Chapter 4, Part 1, Subpart V (20.4.1.500 NMAC), incorporating Title 40 Code of Federal Regulations (CFR) Part 264, require Miscellaneous Units to be located, designed, constructed, operated, maintained, and closed in a manner that will ensure protection of human health and the environment. The Holloman Air Force Base (HAFB) 20,000-Pound Open Detonation (OD) Unit is located in an isolated area in the explosive ordnance disposal (EOD) Range with no developments or habitation within an approximately 5-mile radius from the unit. The OD Unit is designed and operated to prevent adverse human health and environmental impacts. Waste management practices are detailed in Attachment F. The OD Unit will be operated, maintained, and closed in a manner that will continue to ensure protection of human health and the environment. The Waste Analysis Plan included in Attachment B includes information on the volume and physical and chemical characteristics of wastes treated at the OD Unit. A Contingency Plan describing emergency response actions that will be implemented to minimize adverse impacts of unexpected spills or releases is included in Attachment E.

I.1 SITE CHARACTERISTICS [20.4.1.500 NMAC §264.601]

The geologic, hydrologic, and meteorological characteristics for the HAFB region are described in the following sections as required by 20.4.1.500 NMAC §264.601. Information on land use within HAFB and surrounding areas is presented in Attachment A, General Facility Description.

I.1.1 GEOLOGY [20.4.1.500 NMAC §264.601(a)(2)]

HAFB is located within the northern Chihuahuan Desert, in the region known as the Tularosa Basin. The basin is approximately 120 miles long and 28 miles wide. It is bounded on the east by the Sacramento Mountains and on the west by the San Andres Mountains. The basin was formed when the surrounding mountains were uplifted, creating an elongated, faulted valley known as a graben. Elevations within the Tularosa Basin range from 4400 feet above mean sea level (MSL) at the northeast corner to 4000 feet above MSL in the southwest corner. The OD Unit is located down slope of the Sacramento Mountains at an approximate elevation of 4100 feet above MSL.

The surrounding Sacramento and San Andres Mountains are composed of Precambrian to Permian granite, limestone, dolomite, and gypsum with interbedded clays, sands, and gravels. Eroded sediments from these mountains were deposited by streams, filling the Tularosa Basin. Since these sediments were carried by water into a closed basin, they are called bolson deposits. These bolson deposits are approximately 4,000 feet thick in the vicinity of HAFB. Only the uppermost bolson deposits are of significance to this permit text. A generalized geologic cross-section of the present-day Tularosa Basin is presented in Figure I-1.

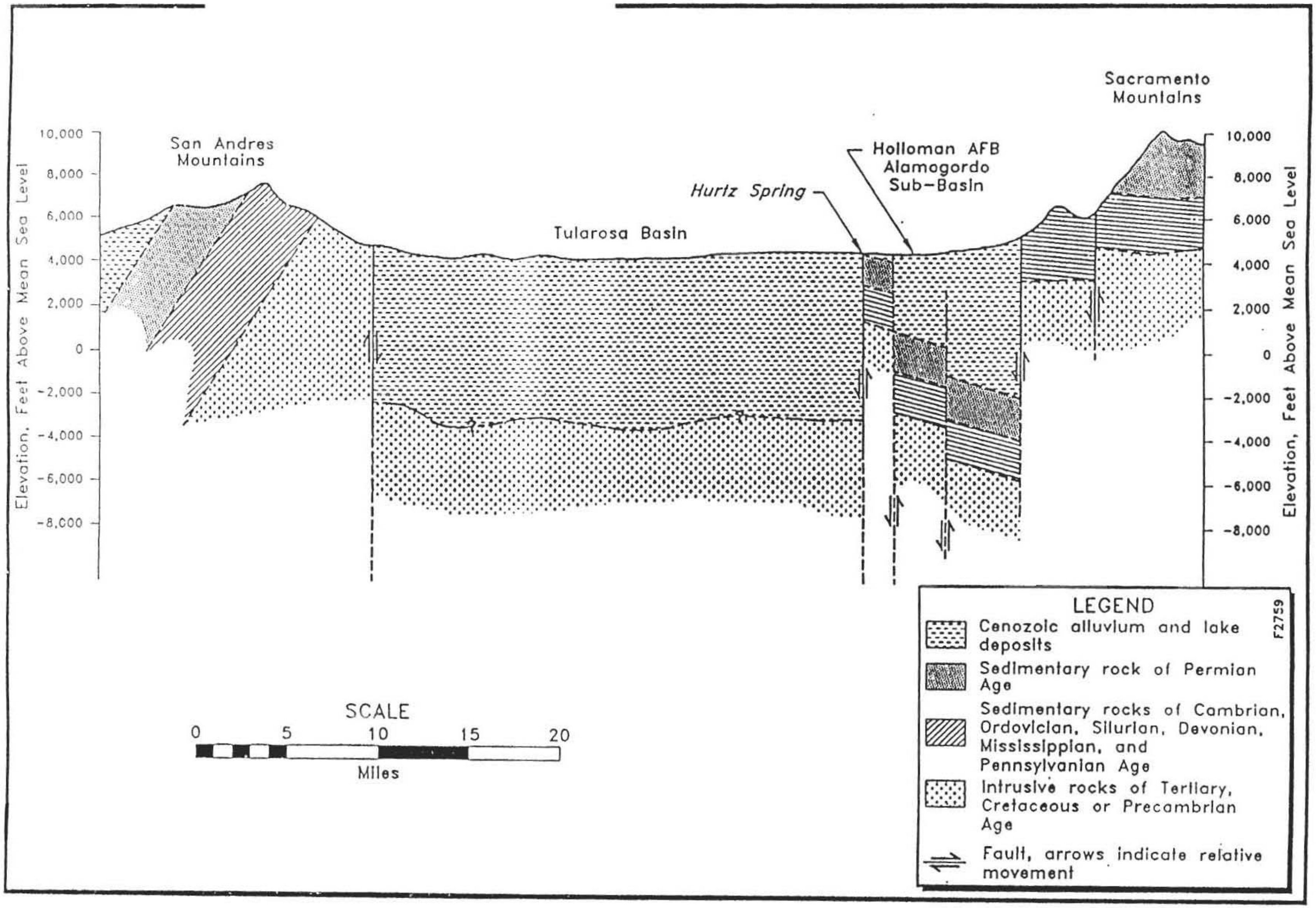

Figure I-1 Generalized Geologic Cross Section of the Tularosa Basin

I.1.1.1 Soils

Two soil types were identified on the installation. The main soil type is the Holloman-Gypsum Land-Yesum complex, 0 to 5 percent slopes. The other soil type is Mead silty clay loam, 0 to 1 percent slopes. This soil type is located only across the main drainage area for the installation.

The Holloman-Gypsum Land-Yesum complex, 0 to 5 percent slopes soil consists of large areas of shallow and deep, well drained soils and areas of exposed gypsum. The Holloman soil makes up about 35 percent of the complex. Typically, the surface layer is light brown very fine sandy loam about 3 inches thick. The upper 13 inches of the substratum is pink very fine sandy loam that is very high in gypsum. Below that, the substratum is white gypsum to a depth of more than 60 inches. This soil is calcareous and mildly alkaline to moderately alkaline throughout. Permeability is moderate, and available water capacity is very low.

Gypsum land makes up about 30 percent of the Holloman-Gypsum land-Yesum complex, 0 to 5 percent slopes. Typically, less than 1 inch of very fine sandy loam overlies soft to hard, white gypsum. The deep Yesum very fine sandy loam makes up about 20 percent of the complex. Typically, the surface layer is light brown very fine sandy loam about 3 inches thick. The upper 9 inches of the substratum is light brown fine sandy loam that is very high in gypsum. Below that, the substratum is pink very fine sandy loam to a depth of more than 60 inches. The soil is calcareous throughout and is mildly alkaline. Permeability is moderate, and available water capacity is moderate. Many fine gypsum crystals are found throughout the profile.

The remaining soil type on the installation is Mead silty clay loam, 0 to 1 percent slopes. This deep, poorly drained, nearly level soil is on outer fringes of alluvial fans. This soil formed in fine textured alluvium over lacustrine lake sediment. It is very high in salt content because of periodic flooding and poor drainage. Slopes are smooth and concave. Typically, the surface layer is reddish brown silty clay loam and clay loam about 5 inches thick. The substratum, to a depth of 48 inches, is light reddish brown clay that has a high content of salts. Below that, the substratum is lacustrine material of variable texture and color to a depth of more than 60 inches. Included with this soil are areas of Holloman soils and Gypsum land along the margins of the unit of steep, short gully sides and knolls. These inclusions make up about 15 percent of the map unit for this soil type. Individual areas are generally smaller than 10 acres. This soil is moderately calcareous throughout and is moderately to strongly alkaline. It has a layer of salt that is more soluble than gypsum. Permeability is very slow, and available water capacity is low.

Subsurface soils were investigated in 1993 during installation of four monitoring wells (HAFB/EODMW-01, -02, -03, and -04) near the OD Unit. Lithologies encountered during the investigation are presented in a generalized geologic log (Table I-1) and illustrated in a geologic cross-section of the OD Unit (Figure I-2). An analysis of the geologic cross-section presented in Figure I-2 shows a slight change in depositional environments across the OD Unit. The thickest sequence of silty clay (playa-lacustrine deposits) is shown in HAFB/EOD-MW-01, while HAFB/EOD-MW-02 shows the thickest sequence of sand and silty sand mixtures (eolian deposits). The eolian deposits are predominantly interdune deposits consisting of fine sand and silt. Below 30 feet the geologic interpretation becomes more complex. The geologic logs show litho logic changes across the site between silty clay, silty sand, and sand at the down gradient wells (HAFB/EOD-MW-02, -03, and -04). Meanwhile, the up gradient well (HAFB/EOD-MW-

01) shows massive silty clay with stringers or lenses of sand. It is highly probable that these sand zones are interconnected.

Table I-1 Generalized Geologic (Soil Boring) Log[1]

DEPTH	GENERALIZED DESCRIPTION
0 and 10 feet	**SAND** – Light tan, yellowish tan and light brown fine- grained well sorted sand with layers of silt-sand, porous, loose to slightly firm and dry to trace moisture present. This upper zone represents eolian-type deposits. The sands are most likely dunes, and the silt-sand represents an interdune sequence.
10 to 12 feet (Extends to 16 feet at HAFB/EOD-MW-02)	**SILT to SILTY CLAY** – Reddish brown (HAFB/EOD-MW-02 also has alternating layers of gray green and light gray to white), slightly firm, low to moderately plastic and dry to trace moisture. Most likely represents a small playa at the site.[2,3]
12 to 30 feet (Extends to 40 feet at HAFB/EOD-MW-02)	**SAND** – Light tan, yellowish tan and light brown with reddish brown and brown layers, predominantly a fine-grained, well-sorted sand and with occasional layers of medium-to-coarse grained sands slightly firm to firm and trace moisture present.
30 to 50 (HAFB/EOD-MW-02 starts at 40 feet)	**SILTY CLAY with interbedded SAND** – A gradational change of depositional environments can be observed in the logs. Reddish brown silty clay representing playa/lacustrine deposits[2] with dune and interdunal deposits merge in and out of the clay, or back and forth across the playa. The occasional thin layers of sand in the larger clay units may represent wind-blown particulate across the playa or an occasional sheet flood that are common in this type of environment. The clay deposits are thickest at HAFB/EOD-MW-01. These deposits are reddish brown silty clay with light gray or green gray mottling[4] in the upper 2 feet, moderate to high plasticity, slightly firm to firm, ranting in moisture from trace to wet. At 50 feet, 1 to 2 mm gypsum crystals were found. Sands found below 30 feet are fine to medium grained, medium grain predominant. At HAFB/EOD-MW-02 flowing sands were encountered at 42 feet.

[1] Modified from ICF Kaiser and Labat-Anderson, 1993.

[2] The reddish brown color associated with the playas is common and suggest an oxidizing environment of the iron present in the sediments. The coloration may also imply well-drained soils.

[3] Poorly drained soils which are saturated most of the time are generally gray in color because the iron has been reduced or removed. This is true for humid climates; however, not always true in arid environments.

[4] A mottled gray and reddish brown color suggests the subsoils are subjected to alternating or seasonable periods of saturation.

I.1.2 HYDROLOGY [20.4.1.500 NMAC §264.601(a)(2)]

I.1.2.1 Surface Water

OD Unit Area Surface Drainage

Surface drainages near the OD Unit include the Allen Draw, the Reagan Draw, and the Guilez Draw. In the vicinity of the OD Unit, surface water flow is associated only with infrequent heavy rainfall or snow melt events. The OD Unit is located on relatively flat terrain far above the 100-year floodplain boundaries and approximately 1000 feet north of and 27 feet in elevation above the Allen Draw channel. A minimum 2 foot high berm surrounds the OD Unit which prevents surface water run-on and run-off and subsequent migration of waste constituents following intermittent/seasonal thunderstorms from the area of the OD Unit. Typically, surface water from precipitation in the area of the OD Unit is lost to evaporation, transpiration, and infiltration.

I.1.2.2 Water Balance

Low annual precipitation rates coupled with the high evapotranspiration rate means that minimal water infiltrates into the subsurface. With minimal infiltrating water there is minimal potential for leaching of constituents to the uppermost saturated zone.

I.1.2.3 Unsaturated Zone Soil Characteristics

The U.S. Department of Agriculture (USDA) Soil Conservation Service (SCS) has identified soil as the Holloman-Gypsum Land-Yesum complex.

The Holloman-Gypsum Land-Yesum complex, identified by USDA SCS is representative of the surface soil found throughout HAFB (including the OD Unit area). The soils of this association are formed from alluvial and eolian (wind blown) gypsiferous sediments. The Holloman unit makes up about 35 percent of the complex. It is a very fine grained, sandy loam with high gypsum content. The soil is moderately permeable, calcareous, and mildly alkaline.

I.1.2.4 Depth to the Uppermost Saturated Zone

The depth to the uppermost saturated zone decreases from 270 feet below the ground surface (BGS) (or more) near the base of the mountains to less than 40 feet BGS at HAFB. The water table depth beneath the OD Unit ranges from approximately 27 to 31 feet BGS.

I.1.2.5 Saturated Zone Characteristics

Hydrogeologic Characterization

Groundwater occurs in unconfined conditions in the unconsolidated bolson deposits beneath HAFB. The primary source of recharge for groundwater in the bolson fill is percolation of rainfall and stream runoff through the coarse, unconsolidated alluvial fan deposits along the western flank of the Sacramento Mountains. Water migrates downward into the bolson fill and flows down gradient through progressively finer-grained sediments into the basin. The hydraulic gradient is steep along the recharge zones at the base of the mountains, but then flattens out as groundwater migrates into the valley. Groundwater discharge occurs either through evapotranspiration, springs or seeps along steep-sided arroyos, or into closed playa lakes such as Lake Lucero, the regional groundwater discharge area approximately 30 miles southwest of the OD Unit. The regional groundwater flow beneath the OD Unit is southwesterly toward the center of the basin.

Saturated Zone Physical Properties

The saturated zone beneath the OD Unit begins approximately 27 to 31 feet BGS. The cross-section in Figure I-2 shows that the top of the saturated zone at HAFB OD monitoring well MWO1 is located within the upper portion of the silty clay unit. The wells to the south and southwest show that the top of the water table is within the eolian sediments (fine to medium grained silty sand), above the silty clay. This indicates that the down gradient wells are in coarser grained material, with greater permeability and porosity.

Four aquifer slug tests were conducted in the four wells installed during the May 1993 OD Unit investigation (HAFB/EODMW-01, MW-02, MW-03, and MW-04). The data collected were from rising head tests. The Bouwer and Rice analytical method was chosen to analyze the hydraulic conductivity. The computer-generated hydraulic conductivity results are as follows:

- HAFB/EOD-MW-01 = 2.42 x 10^{-4} feet/minute (ft/min)
- HAFB/EOD-MW-02 = 5.30 x 10^{-4} ft/min
- HAFB/EOD-MW-03 = 1.03 x 10^{-4} ft/min
- HAFB/EOD-MW-04 = 1.46 x 10^{-4} ft/min

Holloman Air Force Base
Open Detonation Treatment Unit
NMED Control Copy

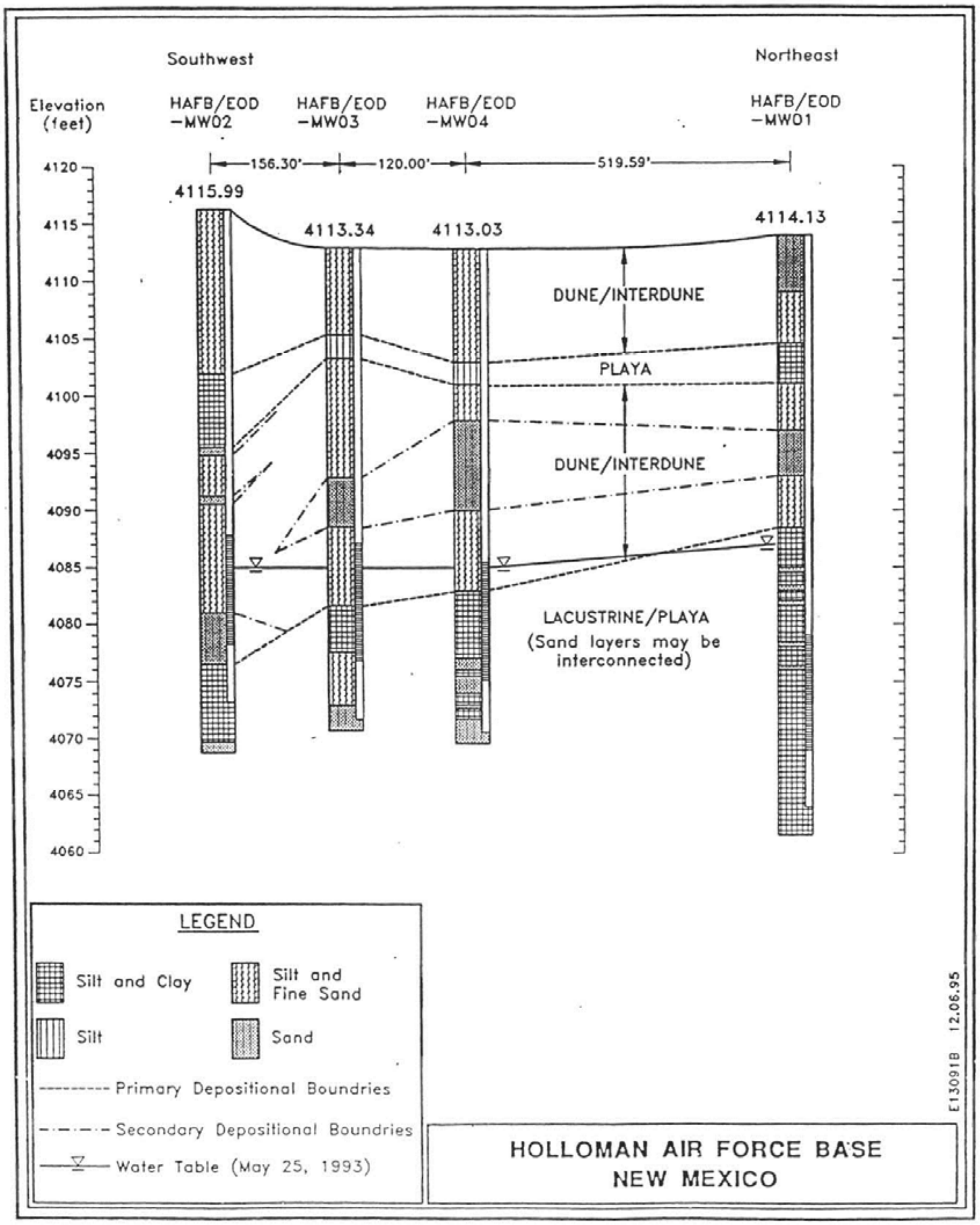

Figure I-2 Geologic Cross Section of the OD Unit Area (After Labat-Anderson, 1993)

I.1.2.6 Existing Groundwater Quality [20.4.1.500 NMAC §264.601(a)(3) and (b)(5)]

Overall water quality in the Tularosa Basin varies with the distance from the recharge areas. Regions of groundwater recharge near the mountain escarpments have the best water quality. Wells installed in the alluvial fans that surround the valley floor are used for domestic and agricultural purposes. Water percolating through sediments high in gypsum, limestone, and dolomite becomes highly mineralized. Groundwater in the Tularosa Basin beneath HAFB contains concentrations of total dissolved solids (TDS) ranging from 3,100 milligrams per liter (mg/L) to 41,000 mg/L. Sulfate concentrations range from 1,700 mg/L to 6,700 mg/L. In general, the high concentrations of TDS and sulfate in the Tularosa Basin make groundwater unusable for domestic or agricultural water supplies and can be classified as Class III B groundwater (not considered a source or potential source of drinking water) under EPA guidelines.

Groundwater samples were collected from the four wells (HAFB/EOD-MW-01, -02, -03, and -04) on 16 August 2007 by TestAmerica Laboratories, Inc. Table I-2 shows the TDS by each monitoring well.

TDS at the OD Unit were all found to exceed New Mexico Human Health Standards (NMHHS). TDS analytical results from the OD Unit monitoring wells are presented in Table I-2.

According to the New Mexico Water Quality Control Commission Regulations (20.6.1 NMAC, December 1, 1995), the groundwater below the OD Unit is designated as unfit for human consumption because it exceeds NMHHS for TDS.

Table I-2 Summary of Results 20,000-Pound OD Unit Investigation

TDS by Monitoring Well (MW)	CONCENTRATION RANGE (mg/L) OD UNIT MONITORING WELLS	NEW MEXICO HUMAN HEALTH STANDARD (mg/L)
MW- 01	5500	1,000
MW-02	6500	1000
MW-03	5300	1000
MW-04	5100	1000

I.1.2.7 Groundwater Direction and Flow Rate [20.4.1.500 NMAC §264.601(a)(4) and (b)(5)]

Based on groundwater elevation measurements collected in May 1993, the direction of groundwater flow beneath the OD Unit is to the southwest. An OD Unit groundwater contour map is presented in Figure I-3. The hydraulic gradient shows that the groundwater drops one vertical foot for every 41.4 feet traversed horizontally. No surface features were found to have an effect on the groundwater flow direction.

Groundwater flow velocity was calculated using a basic advective transport equation derived from Darcy's Law. To compensate for the increasing hydraulic conductivity values southwest of the OD Unit, an average hydraulic conductivity was calculated between the finer grained material (HAFB/EOD-MW-01, -03, and -04) and the coarser grained material (HAFB/EOD-MW-02). Using an average hydraulic conductivity value of 3.47 x 10^{-4} feet/minute, a groundwater flow velocity of 2.79 x 10^{-5} feet/minute was calculated. Groundwater at this velocity will flow approximately 14.7 feet per year to the southwest.

I.1.2.8 Proximity to Groundwater Withdrawal Points [20.4.1.500 NMAC §264.601(a)(5)]

No water supply wells are located on HAFB because of the poor water quality. Base potable water supplies are obtained from Bonito Lake and from 21 wells in three separate well fields (Boles, San Andres, and Douglas) located on the western slope of the Sacramento Mountains approximately 10 miles east of HAFB. Production wells in that area intercept groundwater at depths ranging from 250 to 300 feet BGS. The nearest production well down gradient of HAFB is a livestock well located approximately 3.5 miles southwest of the Base. No other down gradient or near-Base potable or irrigation wells exist.

Other chief water users in the Tularosa Basin include the city of Alamogordo and White Sands Missile Range (WSMR) Headquarters. The city of Alamogordo obtains its water from several sources, including Lake Bonito, 60 miles northeast of the basin; developed springs in La Luz, Alamo, and Fresnal Canyons in the Sacramento Mountains; and from wells drilled in alluvial fan deposits at the base of the Sacramento Mountains between Alamogordo and La Luz (located more than 10 miles southeast of the OD Unit). WSMR obtains its fresh water supply from alluvial deposits between the Organ and San Andres Mountains, and along the mountain front on the west side of the basin.

It is extremely unlikely that the water in the uppermost saturated zone beneath the OD Unit would ever be used for drinking water, domestic purposes, or irrigation.

I.1.3 WETLANDS [20.4.1.500 NMAC §264.601(b)(3)]

Jurisdictional wetlands are a subcategory of Waters of the U.S. and have been defined by the U.S. Army Corps of Engineers as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions.

No wetlands are located in the vicinity of the OD Unit.

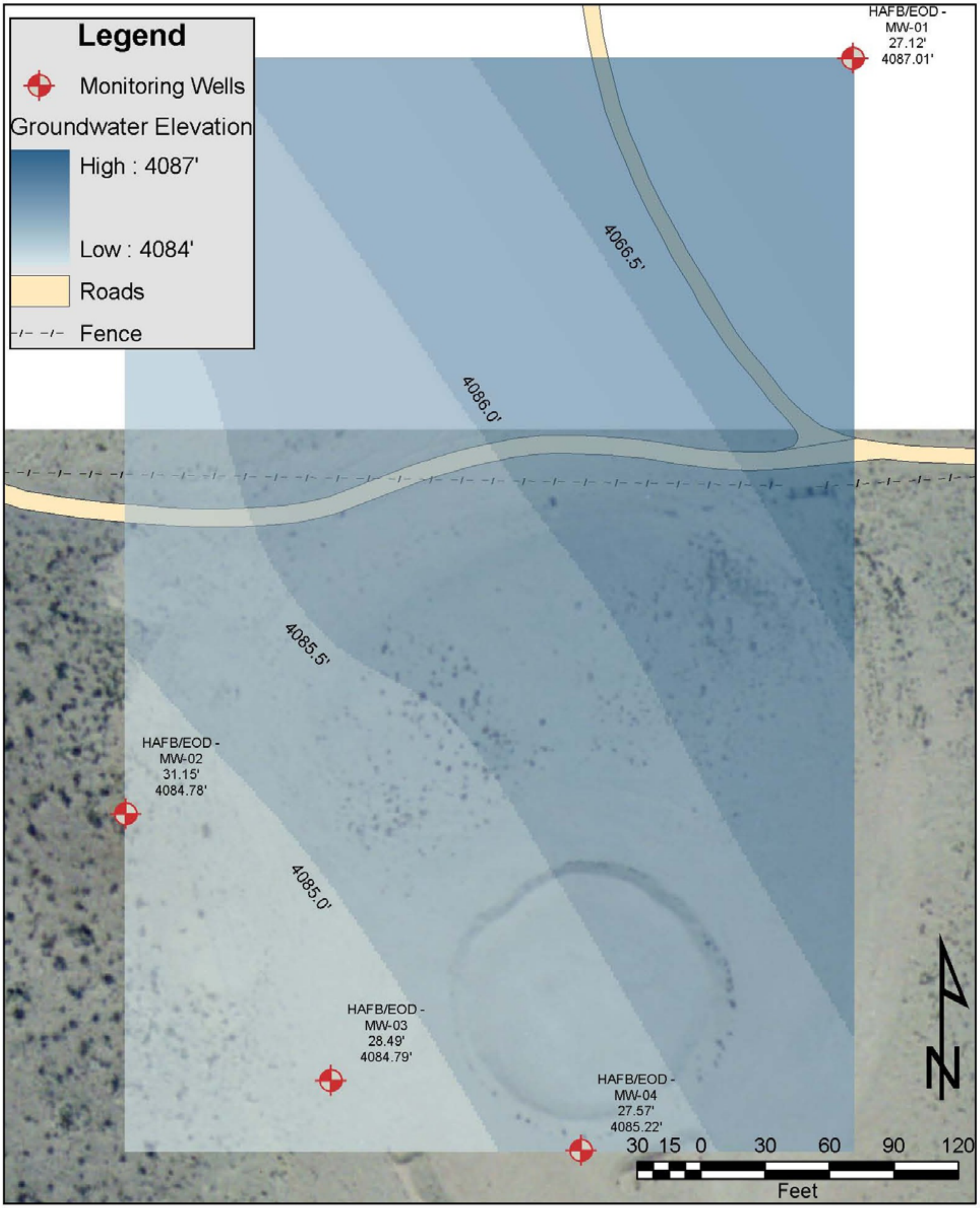

Figure I-3 Potentiometric Groundwater Surface Map at the OD Unit (after Labat-Anderson, 1993)

I.1.4 METEOROLOGICAL CHARACTERISTICS [20.4.1.500 NMAC §264.601(b)(4) and (c)(4)]

Estimated Annual Precipitation [20.4.1.500 NMAC §264.601(b)(4)]

The annual precipitation at Holloman AFB averages 7.9 inches, with annual extremes from 2.5 inches to 13.5 inches. The mean annual lake evaporation rate, commonly used to estimate the mean annual evapotranspiration rate, averages an estimated 67 inches per year. The annual net precipitation for the area is approximately -59 inches per year.

Diurnal Temperature Variation

The mean daily temperature variation in the HAFB OD Unit area ranges from an average daily low of 26°F in December to an average daily high of 93°F in July.

Wind roses for the five most recent years are provided in Attachment A, Figures A-7 through A-11.

I.1.5 AIR QUALITY [20.4.1.500 NMAC §264.601(c)]

Federal ambient air quality primary and secondary standards are defined in 40 CFR §50.2b as follows:

> "National primary ambient air quality standards define levels of air quality which the Administrator judges are necessary, with an adequate margin of safety, to protect the public health. National secondary ambient air quality standards define levels of air quality which the Administrator judges necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant" (1976).

EPA has established federal air quality standards for carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter less than 10 microns in diameter (PM_{10}), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), and sulfur dioxide (SO_2). These standards are termed the National Ambient Air Quality Standards (NAAQS) and may not be exceeded more than once a year, except for the annual standards, which may never be exceeded. The State of New Mexico has developed the New Mexico Ambient Air Quality Standards (NMAAQS) and has also adopted the NAAQS to regulate some pollutant levels in New Mexico. None of the NAAQS or the NMAAQS has consistently been exceeded at HAFB. Attachment J presents the air dispersion modeling results showing that NMAAQS and NAAQS are not exceeded by the open detonation unexploded ordnance at the HAFB OD Unit.

HAFB is located in the State of New Mexico Air Quality Control Region 6. Particulates (primarily windblown dust) are the only air pollutants of concern in the HAFB area. While ambient pollutant concentrations at HAFB are not monitored, HAFB generally has very low concentrations of air pollutants because of good atmospheric dispersion conditions and the absence of continuous emissions. HAFB is in attainment, meaning that no pollutant concentrations exceed the designated federal and State air quality standards. Presently, HAFB and the surrounding areas are in attainment for all of the NAAQS.

I.1.6 VEGETATION AND WILDLIFE [20.4.1.500 NMAC §264.601(a)(9), (b)(11) and (c)(7)]

I.1.6.1 Flora

HAFB is dominated by xerophytic shrubland and grassland communities having plant assemblages biogeographically related to the Great Basin and Chihuahuan Desert.

I.1.6.2 Fauna

A wide variety of fauna can be found at HAFB as it provides a relatively diverse range of habitats for both aquatic and terrestrial species. Habitats found on the installation provide ideal environments for a variety of reptiles and amphibians, mammals, and birds. Available habitats include upland grasslands, xerophytic shrublands, brackish marshlands, playas, and surface water habitats.

Previously performed wildlife inventories have identified numerous species of wildlife throughout the installation.

Native big game mammals are uncommon in the project area and include mule deer (*Odocoileus hemionus*) and pronghorn (*Antilocapra americana*). Predators include bobcat (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), and coyote (*Canis latrans*). Badger (*Taxidea taxus*) and striped skunk (*Mephitis mephitis*) are uncommon predators and omnivores, respectively. No classes of fauna are negatively impacted by operation of the OD Unit.

Malone and Ritas Draws and the Lost River drainage are approximately 10 miles away from the OD Unit. These areas, classified as Essential Pupfish Habitat, are protected under Cooperative Agreement for the Protection and Maintenance of White Sands Pupfish between the U.S. Army - WSMR, U.S. Air Force - HAFB, National Park Service - White Sands National Monument, U.S. Fish and Wildlife Service (USFWS) and New Mexico Department of Game and Fish, but are not affected by the use of the OD Unit.

I.1.7 THREATENED AND ENDANGERED AND SPECIAL STATUS SPECIES

For purposes of this assessment, sensitive biological resources are defined as those plant and animal species listed as threatened or endangered by the USFWS or the State of New Mexico. There are no federally-listed endangered or threatened species in the vicinity of the OD Unit. Therefore, the Endangered Species Act (ESA) is not applicable to the OD Unit activities. A copy of the response from the USFWS regarding this issue is included in Exhibit I-1. There are no state-listed threatened or endangered species in the vicinity of the OD Unit.

Species with protected status are included in Table I-3: (1) federally listed threatened and endangered species; and (2) state listed species.

- Federally Listed Threatened and Endangered Species. The ESA of 1973 provides protection to species federally listed as endangered or threatened. Endangered species are those species that are at risk of extinction in all or a significant portion of their range. Threatened species are those that could be listed as endangered in the near future.

- State Listed Wildlife and Plants. The State of New Mexico maintains its own list of state endangered, threatened, and sensitive wildlife species.

Table I-3 Threatened and Endangered Species in Vicinity of Holloman

Common Name	Scientific Name	Status	Potential for occurrence
Mammals			
Spotted bat	*Euderma maculatum*	ST	Present on HAFB; very unlikely to occur in project area based on habitat associations
Birds			
American peregrine falcon	*Falco peregrinus anatum*	ST	Present on HAFB (documented at Lake Holloman); occurrence in project area is possible, unlikely to be affected.
Northern aplomado falcon	*Falco femoralis septentrionalis*	SE, FE, Sec10(j)	Nonessential Experimental Population (NES). Present on HAFB; occurrence in project area is possible (has been documented about 3-5 miles to the north)
Snowy plover	*Charadrius alexandrinus*	FE	Present on HAFB; occurrence in project area is possible, unlikely to be affected.
Interior least tern	*Sterna antillarum athalassos*	SE, FE	Present on HAFB. Occurrence in project area is unlikely.
Southwestern willow flycatcher	*Empidonax traillii extimus*	SE, FE	Unlikely to be present on HAFB
Bell's vireo	*Vireo bellii*	ST	Unlikely to be present on HAFB
Gray vireo	*Vireo vicinior*	ST	Possibly present on HAFB. Occurrence in project area is unlikely.
Baird's sparrow	*Ammodramus bairdii*	ST	Present on HAFB; occurrence in project area is possible, unlikely to be affected.
Fish			
White Sands pupfish	*Cyprinodon tularosa*	ST	Present on HAFB but not in project area

FE = Federal Endangered; FT = Federal Threatened; SE = State Endangered; ST = State Threatened. Sources: HAFB 1998a; Pers. Comm. Dye.

I.2 EXPOSURE PATHWAYS AND RECEPTORS [20.4.1.500 NMAC §264.601]

There are no permanent natural surface waters within the HAFB boundary; therefore, surface water is not considered an exposure pathway. None of the surface water features (lakes, canals, or wastewater lagoon) are located in the vicinity of the OD Unit. The OD Unit is situated on relatively flat, basin-floor upland, approximately 1000 feet north of and 27 feet in elevation above the Allen Draw channel. A minimum of 2 foot high berm surrounds the OD Unit which prevents surface water run-on and run-off and subsequent migration of waste constituents following intermittent/seasonal thunderstorms from the area of the OD Unit. Typically, surface water from precipitation in the area of the OD Unit is lost to evaporation, transpiration, and infiltration.

The OD Unit area is cleared of vegetation and fenced to keep wildlife from intruding. Therefore, wildlife and vegetation are not considered as receptors.

Because the OD Unit is located in a remote, sparsely populated area and access is controlled, human receptors are limited to personnel performing work at the unit. As described in Attachment H, Sampling and Analysis Plan, HAFB will perform periodic soil sampling at the OD Unit as required by the OD Subpart X permit in order to ensure that contaminants have not been released to the surface at levels that could endanger human health or the environment.

I.3 ENVIRONMENTAL PERFORMANCE STANDARDS

In accordance with 20.4.1.500 NMAC §264.601, a miscellaneous unit must be located, designed, constructed, operated, maintained, and closed in a manner that will ensure protection of human health and the environment. This section presents information on site conditions and measures implemented at the OD Unit to ensure protection of human health and the environment.

I.3.1 PROCEDURES TO PREVENT EXPOSURE [20.4.1.500 NMAC §264.601]

Waste handling and other operational procedures designed to ensure protection of human health are detailed in Attachment F, OD Unit Management, of this permit renewal application. A summary of the procedures and measures implemented is presented below.

- <u>Access to the OD Unit</u>: The public is denied access to the OD Unit by a number of mechanisms, including HAFB Security Forces and the remoteness of the OD Unit from human habitation. Access is provided to the HAFB EOD personnel only during OD operations. No one is allowed at the OD Unit during open detonation activities.

- <u>Waste Detonation:</u> Before each OD activity, the propellants, explosives, and pyrotechnics (PEP) hazardous wastes are expeditiously placed in the appropriate above ground treatment area, initiation materials are applied, and after retreat by the EOD personnel to a specified safe distance, the ignition is accomplished by remote control. The precise times between PEP arrival and placement, initiator placement and ignition, vary. However, because no waste is stored at the unit, all activities will occur between 7:00 am and 5:00 pm of the same day.

- <u>Post Detonation Inspection:</u> After the OD operation, EOD personnel will return to the treatment unit within 24 hours to inspect for unexploded ordnance (UXO) and kick-outs, when it has been determined that it is safe to do so. This drive time and the required wind speed (greater than 3 knots [5.6 kilometers per hour]) is considered sufficient by EOD procedures to protect the EOD specialists from any gases, vapors, or airborne particulates resulting from the OD operations.

<u>Management of Waste Residues:</u> Any metal fragments and remnants greater than 2 inches in length resulting from OD operations will be collected within 72 hours after every treatment activity. The Permittee shall characterize the debris collected after each detonation in accordance with 40 CFR §261, Subpart C. This will be accomplished by sampling and analysis, MSDS review, or generator knowledge. Based on this characterization, the Permittee shall manage the

fragments collected in accordance with 40 CFR §261 as applicable to the waste. The fragments so collected will be placed into appropriate containers, and handled accordingly. The OD Unit currently has no visual indication of ash or other chemical residue.

I.3.2 PROTECTION OF GROUNDWATER [20.4.1.500 NMAC §264.601(a)]

The following site conditions and operational procedures minimize the potential for migration of hazardous waste constituents to the vadose zone and uppermost saturated zone and minimize the effects of explosive open detonation events on geologic units and groundwater flow under the OD Unit.

- Waste munitions are transported to the OD Unit in their original containers or casings, which are designed for long-term stability and thus ensure that no wastes are inadvertently released to the environment prior to treatment. In addition, no free liquids are included among the wastes treated at the OD Unit.

- All OD Unit waste treatment activities are conducted on the ground surface, or according to specific TOs, AF Man 91-201 or manufactures suggestions.

- The OD Unit thermal treatment process generally ensures complete destruction of the waste. Residual waste munitions compounds become nonhazardous once detonation occurs. Organic constituents of the wastes are converted to gaseous products such as CO, CO_2, and NO during thermal treatment, thereby eliminating the hazardous characteristics of the wastes. Explosive compounds generally have very limited solubility in water, further minimizing potential for vertical leaching.

- The metal debris remaining after thermal treatment of the wastes is typically present in elemental states or as oxides that are insoluble or of limited solubility in water, thus eliminating the potential for metallic compounds to migrate through the soil or into surface water or groundwater. An inspection of the OD Unit is conducted 24 hours after detonation. During the inspection, metal fragments are collected and placed in appropriate containers for disposal or recycling as appropriate.

- The low precipitation rate for the area results in a negligible driving force for hazardous waste contaminant migration. The annual precipitation at HAFB averages 7.9 inches. The mean annual evapotranspiration rate averages an estimated 67 inches per year, resulting in a net annual precipitation rate for the area of approximately -59 inches per year.

- At all four monitoring well locations near the OD Unit (Figure A-3 and Figure I-3), a low permeability silt/silty clay unit was encountered between 10 to 15 feet deep. Drilling records indicate that this unit ranges from approximately 2 to 7 feet thick. This low permeability unit acts as a barrier that prevents or minimizes any potential vertical hazardous waste contaminant migration.

- The depth to the uppermost saturated zone beneath the OD Unit ranges from 27 to 31 feet BGS. Because the net annual precipitation rate averages an estimated -59 inches per year, it is extremely unlikely that hazardous waste contaminants could migrate to the uppermost saturated zone.

1.3.2.1 Assessment of Groundwater Migration Potential [20.4.1.500 NMAC §264.601(a)]

This section presents information on the potential for migration of contaminants within the uppermost saturated zone. In summary, migration of contaminants within the uppermost saturated zone is considered negligible because of the following:

- An approximate groundwater flow velocity of 14.7 feet per year and hydraulic conductivity values averaging 3.47 x 10^{-4} feet/minute suggest an extremely low potential for hazardous waste contaminant migration in the uppermost saturated zone. Contaminants seldom move at the advective transport velocity of groundwater and generally move at much slower rates because of adsorption to soil particles and other processes

- Natural TDS, chloride, and sulfate concentrations at the OD Unit all exceed the NMHHS. According to the New Mexico Water Quality Control Commission Regulations (20.6.1 NMAC, December 1, 1995), the groundwater below the OD Unit is designated as unfit for human consumption because it exceeds NMHHS for TDS, sulfate, and chloride. Furthermore, based on the Base-Wide Background Study (Radian, 1993), the upper tolerance limit for selenium also naturally exceeds NMHHS standards for groundwater

- No water supply wells are located on the Base due to poor water quality. The nearest well of any kind is a livestock water supply well located approximately 3.5 miles southwest of the Base

- There is no risk associated with the groundwater in the vicinity of the OD Unit since the resource is not used as a domestic, industrial, or agricultural water supply and in all likelihood will never be used as a resource

I.3.3 PROTECTION OF SURFACE WATER, WETLANDS AND SOIL SURFACE [20.4.1.500 NMAC §264.601(b)]

Exposure of humans or other environmental receptors to hazardous waste or hazardous constituents via surface water, wetlands, or the soil surface is unlikely based on the following factors:

- Hazardous wastes treated at the OD Unit are in solid form and transported to the unit in their original containers or casings minimizing the potential for spills

- The maximum quantity of hazardous waste to be treated during any detonation event is limited to 20,000 pounds of net explosive weight (NEW)

- The OD Unit is located in a secure area within HAFB, and only authorized personnel have access to the unit

- There are no surface water bodies in the vicinity of the OD Unit. The nearest surface water body is Lake Holloman located approximately 10 miles (16 kilometers) from the OD Unit

- Soils at the OD Unit are sampled periodically and analyzed for constituents of concern. Historical analytical data (presented in Attachment H) indicate that analytical results are below New Mexico Soil Screening Levels

- There are no wetlands within the HAFB installation boundary

Based on these factors, the potential for adverse effects on human health and the environment, including damage to flora, fauna, and physical structures, due to migration of hazardous waste or hazardous constituents or exposure to the treatment events is not likely.

I.3.4 PROTECTION OF THE ATMOSPHERE [20.4.1.500 NMAC §264.601(c)]

Exposure of humans or other environmental receptors to hazardous waste or hazardous constituents via the air due to OD Unit operations is unlikely. This subsection presents information that supports this conclusion.

Potential for Emission

There is minimal potential for the release of any gases, aerosols, or particulates from the OD activities into the air that would adversely affect human health or the environment. At least a 5-mile (8-km) radius surrounding the OD treatment unit is barren, undeveloped, and uninhabited. The primary concern is the impact of the waste constituents on soil around the OD Unit.

However, since minimal potential exists for particulates in soil to be released into the air, perimeter soil samples will be collected surrounding the area of operation, as described in Attachment H, Sampling and Analysis Plan. If contaminant concentration levels above background are reported for soil samples, a risk assessment as described in the permit Module III, Section E, will be completed, and air and ground water monitoring will be conducted. The results of air modeling are presented in Attachment J.

Effectiveness of Control

Current OD operations are conducted in designated areas within the OD Unit. The destruction of the explosive and propellant devices is nearly 100 percent because they are designed to explode or burn. Unlike other installations that treat explosive contaminated materials, for example, this unit treats only explosive and propellant products. OD treatment efficiency is sufficient that these control systems should protect human health and the environment. To prove this, the Waste Analysis Plan and Sampling and Analysis Plan described in Permit Attachments B and H, respectively, will be implemented to establish soil quality and minimize the potential spread of contamination.

Operational Conditions

OD operations are conducted only during favorable wind conditions as described below.

No treatment operation will be conducted during an electrical storm or when such a storm is approaching within 10 miles (16 kilometers) of the OD Unit. Additionally, disposal by detonation using an electrical firing system will not be conducted during sand, dust, or snow storms.

It is recognized that weather factors are interdependent. The following safety precaution will be observed:

1. Wind speed will not be less than 3 miles per hour and will not exceed 15 miles per hour (5 and 24 kilometers per hour, respectively).

Existing Air Quality/Other Sources/Receptors

The air quality in Otero County, New Mexico where the subject site is located is in compliance with air quality standards. Otero County is in attainment with the NAAQS. The 20,000-Pound OD Unit at HAFB is in an attainment area, and the surrounding air quality is good.

Operations at the OD Unit are not expected to adversely impact the air quality of Otero County. OD treatment activities are very efficient and, particularly at this remote site, are not expected to degrade air quality so as to impact the environment or human health.

The potential public receptors in the area are far removed (at least 5 miles [8 kilometers]) from the site. The HAFB EOD team members who will conduct the treatment operations will be at safe distances for the OD Unit. Vehicle traffic due to OD operations has negligible impact on air quality.

In conclusion, OD operations are very efficient due to the reactive nature of the hazardous PEP, and there are no receptors in close proximity to the OD Unit. Current air quality is excellent and will not be significantly impacted by OD Unit operations.

I.3.5 MONITORING, INSPECTION, AND REPORTING [20.4.1.500 NMAC §264.602]

Monitoring, inspection, and reporting activities performed at HAFB in compliance with the regulatory requirements of 20.4.1.500 NMAC §264.602 are described in this section.

I.3.5.1 Monitoring

Monitoring activities performed at the OD Unit include routine inspections and sampling that is reported in annual environmental monitoring reports to the NMED. Quarterly soil sampling performed at the OD Unit during the past five years has not indicated contamination attributable to OD Unit operations.

The treatment process at the OD Unit effectively destroys the wastes. In order to monitor potential contamination from treatment residues, HAFB will continue to sample soils at the OD Unit as indicated in the Sampling and Analysis Plan (Attachment H).

I.3.5.2 Inspection

The OD Unit is inspected on a regular basis according to the the requirements of 20.4.1.500 NMAC §§264.15 and 264.33. The Inspection Schedule included as Attachment C of this application details the types and frequency of inspections performed to assure the integrity, maintenance and safe operation of the OD Unit.

I.3.5.3 Recordkeeping and Reporting [20.4.1.500 NMAC §264.602]

Operating records and documents associated with the OD Unit and required by 20.4.1.500 NMAC §264.602 are maintained at the HAFB Environmental Department office. The following is list of the documents:

- Operating log that describes the type and quantity of hazardous waste treated in the OD Unit and the date the waste was detonated
- Records and results of waste analyses performed as specified in 20.4.1.500 NMAC §264.13
- Reports of any incidents that required the activation of the contingency plan
- Facility closures, as specified in 20.4.1.500 NMAC §264.115
- Closure and Post-Closure Care Plan as required by 40 C.F.R. 264.1 18(b)(3)
- Inspection logs for the last three years
- Records of monitoring, testing, analytical data, and any corrective actions taken to prevent or mitigate releases of hazardous waste to the environment
- Disposal requests and Land Disposal Restriction Certifications for hazardous waste transported to a permitted facility
- A copy of the Contingency Plan
- A copy of the OD Unit permit
- Correspondence and other documents from governmental agencies that affect the OD Unit
- Biennial Report in accordance with 20.4.1.500 NMAC §264.75

Additionally, training records for EOD personnel are maintained at the EOD office.

I.4 REFERENCES

CH2MHill, 1992

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Frey and Yates, 1996

HAFB, 1998a (endangered species table)

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United States Department of Interior, 1996

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EXHIBIT I-1

Letter from the U.S. Fish and Wildlife Service Regarding Endangered Species

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-----Original Message-----
From: Eric_Hein@fws.gov [mailto:Eric_Hein@fws.gov]
Sent: Thursday, July 20, 2006 1:39 PM
To: Dye Jeanne L Civ 49 CES/CEV
Subject: Re: FW: Figure G-4(mod-For Jeanne).pdf

Ms. Dye:

I received your July 19, 2006, request for our review of the proposed permit renewal for Holloman AFB Open Detonation (OD) operation. It is my understanding this site has been operating for about 10 years and that surveys in the project area have not located any threatened or endangered species or their habitat.

You requested that we provide you with any concerns regarding environmental impacts from your proposed action. Based on the location of the proposed project we have no concerns regarding impacts to threatened and endangered species. There are no listed species or habitat present on or near the project location. However, we appreciate your asking for our input on this and other projects. If you have any questions in regard to our review of the project, please contact me.

Thank you.

Eric

Eric W. Hein
U.S. Fish and Wildlife Service
2105 Osuna NE
Albuquerque, New Mexico 87113
505-761-4735; 346-2542 (fax)

"Dye Jeanne L Civ 49 CES/CEV" <Jeanne.Dye@holloman.af.mil>

07/19/2006 03:56 PM

To: <Eric_Hein@fws.gov>

cc

Subject: FW: Figure G-4(mod-For Jeanne).pdf

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ATTACHMENT J

CORRECTIVE ACTION SITES

HOLLOMAN AIR FORCE BASE

Permit No. NM6572124422

ATTACHMENT J
CORRECTIVE ACTION

INTRODUCTION

The following information is provided in accordance with New Mexico Administrative Code (NMAC), Title 20, Chapter 4, Part 1, Subpart X (20.4.1.500 NMAC) incorporating Title 40 Code of Federal Regulations (CFR) §264.101. This Attachment outlines descriptions of the corrective action associated with the Holloman Air Force Base's (HAFB's) active Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs).

J.1 SWMU AND AOC UNIT DESCRIPTIONS [20.4.1.500 NMAC §264.101]

This Attachment contains descriptions of the corrective actions at the SWMUs and AOCs identified at HAFB. Investigations and remediation of SWMUs and AOCs at HAFB are conducted under both the Air Force Environmental Restoration Program (ERP) and the RCRA Corrective Action Program. The sites addressed in this application have been under investigation since the early 1990s.

Following the SWMU and AOC unit descriptions are three tables (Tables A, B, and C) from Appendix 4-A of HAFB's RCRA Permit summarizing the status of all corrective units at HAFB. Table A titled *List of Solid Waste Management Units / Areas of Concern* provides a listing of active SWMUs and AOCs that require further corrective action. On October 29, 2012, at the request of HAFB, the title of Table B was changed to *List of SWMUs/AOCs with Corrective Action Complete Without Controls* and Table C, *SWMUs/AOCs with Corrective Action Complete With Controls*, was added to subsequent permit modification requests. Table C was added pursuant to EPA Final Guidance on Completion of Corrective Action Activities at RCRA Facilities (Federal Register, Volume 68, Number 37) and the titles of Tables B and C were modified to be consistent with this guidance and the definitions found in 20.4.2.7 NMAC (*Hazardous Waste Permit and Corrective Action Fees*). It should be noted that Corrective Action Complete (CAC) status was formerly referred to as "no further action" (NFA) status and is used synonymously throughout this application. At this time, HAFB proposes the removal of the footnote found on Table B. Units with the footnote have been identified in the 1988 *RCRA Facility Assessment Preliminary Review/Visual Site Inspection Report* and were determined to require No Further Action as stated in the report (A.T. Kearney, 1988).

J.1.1 SWMU No. 4 (OW-519) Building 131 Oil/Water Separator

SWMU 4 is listed as the Building 131 Oil/Water Separator (OWS) in Table A, also identified as Environmental Restoration Program (ERP) Site OW-519. SWMU 4 is located in an industrial area within the northeastern section of the main base area at HAFB.

SWMU 4 was a former OWS which serviced a washrack located southwest of Building 195 and north of former Building 131 in the vehicle maintenance area. Building 131 was a small structure that was previously located at the SWMU 82 washrack and was moved to its current location during the early 1980s when the SWMU 82 washrack was closed. All that currently remains of Building 131 is the foundation which is located along the south side of the washrack. The SWMU 4 OWS was an underground 50-gallon single chamber OWS of steel and concrete construction which was never connected to the sanitary sewer system. During its use it drained to a former leach field reportedly located east of Building 195 (Foster Wheeler/Radian, 1995c).

The OWS was approximately 2.5 feet (ft) in diameter, 7 ft deep, and accepted wash water from a heavy equipment washrack located adjacent to the unit. The separator received rinsate containing water, oils, detergents, and fuels from the washrack. The SWMU 4 leach field is located approximately 240 ft east-southeast of the former Building 131 OWS and is rectangular in size measuring 30 ft by 60 ft.

A RCRA Facility Investigation (RFI) was conducted in 1994 and subsequent removal action was conducted in 1995. An Accelerated Corrective Measures (ACM) Work Plan was approved by the NMED on September 7, 2010 (NMED, 2010d). The primary objectives of the of the ACM ACM Work Plan was to obtain site-specific data to identify and characterize potential releases associated with the SWMU 4 leach field and drain pipe to meet the requirements for additional soil and groundwater characterization outlined in a letter from the NMED dated February 9, 2005 (NMED, 2005). The preparation and submittal of the ACM Report was delayed at the request of the NMED until the background levels for naturally occurring constituents (e.g. metals) at HAFB could be finalized (NMED, 2011c). The required analytical data results were collected and CAC status without controls was requested for SWMU 4 (NationView, 2012d). On August 14, 2014 the NMED approved the report and granted HAFB permission to initiate a Class 3 permit modification request (PMR) for SWMU 4 (NMED, 2014e). HAFB is currently working on the Class 3 PMR to provide opportunity for public comment for SWMU 4.

J.1.2 SWMU No. 8 (OW-520) Building 231 Oil/Water Separator

SWMU 8 is listed as Building 231 OWS in Table A, also identified as Site OW-520. SWMU 8 is located in an industrial area within the center of the main base area of HAFB.

SWMU 8 was a former OWS which accepted wash water, oil, and hydraulic fluid from the vehicle maintenance shop in Building 231. Over a period of years, the OWS released wash water rinsate containing oils, detergents, and fuels into the surrounding soil. The SWMU 8 OWS was located east of the covered walkway which connected Buildings 231 and 232 and was 4 feet wide, 8 feet long, and 4 feet deep.

In August of 1995 the in-ground OWS was removed, remedial excavation, confirmation sampling, and reclamation activities occurred at SWMU 8. Due to elevated total recoverable petroleum hydrocarbons (TRPH) detected further delineation and remediation of the remaining petroleum-contaminated soil (PCS) was recommended (EBASCO, 1995). Additional investigation and in-situ remediation activities were conducted in February 1996 and in April 1997 other excavation remedial actions were conducted. NFA status was requested due to the fact that 80-90 percent of the TRPH soil had been removed and because no further excavation was possible due to the covered walkway between Building 231 and 232 (FWENC, 1997a).

On April 14, 2006, NMED issued a Notice of Deficiency (NOD) letter to HAFB which stated that the Base needed to conduct additional site characterization activities prior to initializing

Phase III PCS excavation in SWMU-8 Voluntary Corrective Measure (VCM) Work Plan. On December 11, 2008 the final VCM Work Plan was approved by the NMED and VCM excavation was performed in October 2008. During the VCM the covered walkway that connected Buildings 231 and 232 was removed to allow for soil removal.

On April 16, 2010, HAFB submitted the RFI Work Plan (redline strikeout version) to address an additional data collection effort to determine the nature and extent of soil and groundwater contamination underneath Building 231 and 232 along with performing a site specific risk based evaluation. On April 30, 2012, the required analytical data results were collected and CAC status without controls was requested for SWMU 8 (NationView, 2013a). On February 5, 2014 the NMED approved the report and granted HAFB permission to initiate a Class 3 permit modification request (PMR) for SWMU 8 (NMED, 2014a). HAFB is currently working on the Class 3 PMR to provide opportunity for public comment for SWMU 8.

J.1.3 SWMU Nos. 19, 20, and 229 (SS-59) Building Nos. 638 and 639 OWS and Test Cell Fuel Spill Site

Table A lists SWMU 19 as the Building 638 OWS and SWMU 20 as the Building 639 OWS; both OWSs were removed in 1997. SWMU 229 is listed as the Test Cell Fuel Spill Site on Table A. The OWSs are located within the boundary of SWMU 229, also known as the T-38 Site which is the result of a jet propulsion fuel, Type 4 (JP-4) spill. Because of the overlapping nature of these three SWMUs and the inability to distinguish the contamination from the JP-4 fuel spill versus the OWSs, SWMUs 19, 20, and 229 are collectively known as the T-38 Site also identified as ERP Site SS-59. The T-38 Site covers a total of 11.5 acres located northwest of Taxiway A.

The test cell was used as an F-4 trim pad from 1966 through 1977. During this time, an underground storage tank (UST) and a power check pad were installed in the area. In 1977, the test cell was upgraded for T-38 aircraft and a temporary test cell was used in conjunction with the existing 1,000-gallon UST for approximately 3 years. In 1988 DynaCorp assumed operation of the T-38 Test Cell and in 1991 the operation was upgraded with the addition of a 5,000 gallon UST. After one week of nonuse, the tank level was checked and it was discovered that approximately 2,000 gallons had leaked from the underground line system leading to the test cell. Subsequently, the underground lines were replaced with aboveground lines.

Various investigations have been conducted by the Environmental Protection Agency (EPA) and U.S. Air Force (USAF) contractors since 1992. During these studies, monitoring wells were installed and soil and groundwater samples were collected to assist in the delineation of the jet fuel free product and characterization of the site parameters that would influence product recovery. It was discovered that more than 2,000 gallons of JP-4 has been released at the site and interim remediation activities such as phase-separated hydrocarbons (PSH) skimming and vapor extraction were initiated.

The remediation system used was a dual-phase extraction system (DPE). Extracted free product, groundwater, and soil vapors were treated aboveground. Soil vapors were treated in an onsite thermal oxidizing unit and treated groundwater was discharged through an infiltration gallery located northeast of the treatment system. Free product was stored in an aboveground storage tank (AST) for subsequent use as fuel for the Soil Vapor Extraction (SVE) unit located north of Building 638. The SVE unit was connected to 133 extraction wells operated from 1996 to 2001 (Bhate, 2005b).

A comprehensive study of the SVE system published in 2002 concluded that the extent of PSH and PCS could be greater than previously believed and estimated that the remediation activities could range from 52 to 77 years using the existing remedial methods (FWENC, 2002). This conclusion led HAFB to seek alternative methods to their remedial approach. The most cost effective and conclusive alternative was excavation and treatment of 11 acres of PCS in an adjacent land farm. This approach would enable easy removal of PSH using the existing treatment equipment, pumps, separators, holding tanks, and thermal oxidizer. As a result, the VCM Work Plan proposed excavation, soil treatment, and PSH removal methods as the simplest and most cost effective strategy with the added benefit of reducing the estimated site closure from a range of 52 to 77 years to a range of 5 to 7 years (Bhate, 2005b). On July 8, 2004 HAFB was granted temporary permission by the NMED to operate a petroleum hydrocarbon land farm at the T-38 Site. A permit was granted for the land farm on October 5, 2005 (DP-1479) and was last renewed on June 25, 2010; the permit requires semiannual monitoring and reporting. Currently this is the remediation method being employed; more product skimming and excavation is anticipated for continued site cleanup.

J.1.4 SWMU No. 82 (SD-08) Building 131 Washrack

SWMU 82 is listed as Building 131 Washrack on Table A, also identified as ERP Site SD-08. It consists of an asphalt cap, chain link fence, concrete washrack, OWS, and eight groundwater monitoring wells. SWMU 82 is located in the southeastern corner of the refuse collection yard, southwest of the Petroleum, Oil, and Lubricant (POL) Storage Area.

Refuse collection trucks (trash trucks) were routinely washed with soap and water at the washrack. Base records indicate that pesticides were sprayed inside the trucks during the 1970s for fly control; this practice ceased in 1982. Drains located at the north end of the washrack connected to a sewer line carrying wastewater to an OWS near the northwest corner of the washrack. According to site personnel, it was common for the sewer line to clog causing the sump and OWS to overflow onto the surrounding soil. The washrack contained cracks in the concrete and was replaced in 1992 with a new washrack in the same location. Subsequently, this OWS was abandoned in place.

Since 1991 SD-08 has been the subject of a series of environmental investigations and remedial actions related to pesticide contamination detected in the soil and groundwater. SD-08 was identified as a potential contaminant source during the Installation Restoration Program (IRP) Phase I Records Search (CH2M Hill, 1983). As a result, the site was investigated in 1991 and pesticide contamination in both shallow soil and groundwater was indicated (Radian, 1992). To mitigate the occupational health risk posed by pesticide contamination, the site entered the Feasibility Study/Corrective Measures Study (FS/CMS) process to establish cleanup criteria and identify areas exceeding this criteria; the installation of an impermeable cap was recommended as a remedial measure for the site (Radian, 1993b). In 1995 a Phase II RFI delineated the extent of organochlorine pesticide contamination in groundwater (Foster Wheeler/Radian, 1995b) and the entire yard area was covered with an asphalt cap measuring approximately 41,000 square feet (sq ft) with a chain link fence surrounding the area to restrict access. In 1996 long-term groundwater monitoring was recommended to prevent further degradation of groundwater. A risk assessment (RA) was conducted in 2007 to determine whether the residual soil and groundwater concentrations resulted in an unacceptable risk. A RFI report was submitted in July 2007 that included RA findings indicating that contaminant concentrations were anticipated to reduce in time due to natural attenuation processes further reducing the risk of exposure (Bhate, 2007d). Based on these findings HAFB requested two years of quarterly groundwater monitoring at SD-08 to demonstrate that natural attenuation is occurring which was approved by the NMED on November 22, 2011 (NMED, 2011b).

Groundwater data continues to be collected at SD-08 as part of the Long Term Monitoring (LTM) program covering the period of January 2012 through October 2014 to determine if natural attenuation of previously identified contaminants of concern (COCs) is occurring through sampling monitoring wells on a quarterly basis (NationView, 2013c&e). On October 5, 2012 the NMED requested that more sampling up gradient, down gradient, and cross-gradient from SD-08 be conducted to help delineate the groundwater contamination (NMED, 2012g). In November 2014 HAFB submitted a RFI report to the NMED requesting CAC status. The RFI report is currently under NMED review.

J.1.5 SWMU Nos. 101 and 109 (LF-10)
Building 121 Landfill and Old Main Base Landfill

Table A lists SWMU 101 as Building 121 Landfill and SWMU 109 as the Old Main Base Landfill also identified as ERP Site LF-10. Both SWMUs are frequently referred to as Old Main Base Landfill or LF-10. LF-10 is located in the southeastern portion of HAFB, southeast of the airfield. LF-10 consists of approximately 20 acres and currently encompasses the area adjacent to the present day Civil Engineer Squadron (CES) 316 complex (Building 121) and Building 120. A chain-link fence surrounds the CES complex and supporting lots and access is restricted to authorized personnel.

LF-10 was utilized from 1942 to 1958. During the time of use, the landfill received domestic solid waste from the base and possibly drums containing waste oils and solvents. A Base incinerator was located in the area and the ash from its operation was also buried in the landfill. Landfilling was conducted using trench and fill methods. The landfill was closed in 1958 in accordance with U.S. Department of Defense (DoD) protocols in place at that time.

LF-10 has been the subject of numerous investigations designed to define the boundaries of the former landfill, characterize the environmental media at LF-10 (i.e., soil, air, and groundwater), and characterize the waste material within LF-10. Compliance groundwater monitoring occurred from 1995 to 2005. Soil sampling activities have been conducted at LF-10 during three investigations. Numerous analytes have been detected in samples collected at LF-10 (Tetra Tech, 2011a). Only arsenic and manganese have been detected at concentrations that exceeded the NMED Soil Screening Levels (SSLs) or USEPA Regional Screen Levels (RSLs).

In 2007 and in 2011 Supplemental RFI activities were taken to further characterize and define the site, along with a passive soil gas survey, soil trench excavation, and methane monitoring. On December 1, 2011, HAFB submitted the Supplemental RFI Report Addendum for LF-10 Old

Main Base Landfill and Building 121 Landfill to the NMED for review and proposed CAC with controls for LF-10. On March 5, 2012, the NMED approved and issued a Certificate of Completion for CAC with Controls for LF-10 (SWMU 109 and 101). HAFB was granted permission to initiate a Class 3 PMR for LF-10 (NMED, 2012a). HAFB is currently working on the Class 3 PMR to provide opportunity for public comment for LF-10.

J.1.6 SWMU No. 104 (LF-29) Former Army Landfill

SWMU 104 is listed as the Former Army Landfill on Table A, also identified as ERP Site LF-29. It is a reported Munitions and Explosives of Concern (MEC) burial pit. LF-29 was used by the Army from the 1950s to 1975 for disposal of spent munitions and construction debris (HGL, 2007b). The site is located near the north industrial base area, approximately 450 ft northwest of Building 1001. Its boundaries are defined by a small berm that extends 400 ft north-south and 350 ft east-west covering an area of approximately three acres. Materials may have been dumped outside the berm along the southern border, so a buffer zone extending 45 ft to the north and south and 35 ft to the east and west of the berm has been created. The entire area encompasses 6 acres, including the buffer zone.

Previous investigations at LF-29 include a Preliminary Assessment (PA) and Site Investigation (SI) conducted in 1983, followed by a RI Report in 1992 that determined the extent of the site boundaries and initiated groundwater monitoring (Radian, 1992). A Phase II RFI was conducted in 1996 and the resultant report submitted in June 1997 recommended NFA status with the requirement of 10 years of LTM for the site. In 2005 the NMED issued an NOD based on the results of the December 2005 LTM report in which 1,2-DCA and TCA were detected above the New Mexico Groundwater Quality (NMGWQ) standard. A Supplemental RCRA Facility Investigation (SRFI) was initiated where additional site-specific physical and analytical data would be obtained characterizing LF-29. The NMED agreed to suspend LTM pending the results of the SRFI Report (HGL, 2007b).

The SRFI project was conducted between September 2005 and July 2006 in which no explosives were detected in the groundwater (HGL, 2007b). However, in 2006 during site reconnaissance for the SRFI project some biological warfare bomblets were tentatively identified. In June of 2007 Munitions Debris (MD) was removed from the surface of LF-29. In December 2007 more MD was discovered in addition to at least one partially-buried biological bomb along with M125 chemical bombs; some were fully intact while others may have been practice versions. All MD that was discovered were initially treated as MEC because there were no records available to indicate the nature of the bomb filler (USACE, 2009). Due to these discoveries and the fact that no subsurface investigation of anomalies had previously taken place, it was determined in January 2009 that further investigation was necessary at LF-29 (HGL, 2007b). A Final Work Plan for LF-29 was submitted to the NMED in 2009 (USACE, 2009). LF-29 is undergoing a LTM program and requires further remediation and investigative work.

J.1.7 SWMU No. 111 (RW-42) Radioactive Waste Disposal Area

SWMU 111 is listed as the Radioactive Waste Disposal Area on Table A, also identified as ERP Site RW-42. It is located approximately 6.5 miles northeast of the main base area. The site consists of a buried concrete cylinder surrounded by a three-strand barbed wire fence measuring

80 ft by 60 ft by 4 ft with a three-strand gate on a moveable fence post. Warning signs indicating radioactive waste disposal are posted outside of each side of the fence (Radian, 1992).

RW-42 was created in the early 1950s to bury radioactive waste in a concrete cylinder in accordance with Technical Order TO-00-110A-1. The exact type and quantity of radioactive materials disposed of at the site are not known. Suspected wastes include animal carcasses containing low-level radioactivity and contaminated pharmaceutical supplies (lab gowns, syringes etc.). The materials are buried in a concrete cylinder 10 ft in length and 5.5 ft in diameter located in the center of a fenced enclosure less than one-half acre in size. The cylinder is buried 2 to 4 ft below grade with a 4-inch thick concrete cover to indicate the exact cylinder location (Radian, 1992).

RW-42 was initially investigated in August 1988 during a RCRA Facility Assessment (RFA) Preliminary Review/Visual Site Inspection (VSI) where further investigation and subsurface soil sampling was recommended (A.T. Kearney, 1988). Based on the findings of a Preliminary Assessment (PA) RW-42 was included with the 29 Waste Sites RI completed in 1992 (Radian, 1992). Additional investigative activities were conducted in June and July 2007 to determine if the buried concrete cylinder is a hazardous/low level radioactive waste source and to evaluate groundwater conditions at the site as part of an ACM investigation (Bhate, 2007a). The results were reported in the *Final ACM Completion Report for Sites OT-32 and RW-42* (Bhate, 2012c) but the submittal of the report was substantially delayed at the request of the NMED until the background levels for naturally occurring constituents (e.g., metals) at HAFB could be finalized (NMED, 2011c). Based on soil and groundwater sample results from the ACM investigative work conducted, HAFB proposed that RW-42 be granted NFA status (Bhate, 2012c). On September 18, 2014, the NMED issued an NOD letter to HAFB stating that additional waste characterization and remediation activities are required for RW-42 (NMED, 2014j). HAFB is currently working to address the remaining concerns to achieve CAC status.

J.1.8 SWMU No. 113A (OT-20) Sludge Disposal Trenches Near Lagoons

SWMU 113A is listed as the Sludge Disposal Trenches near Lagoons in Table A, also identified as ERP Site OT-20. It is located east of Pond B at the former sewage lagoons in the south central area of the Base.

Historically, all settled solids from the grit chamber located at the head of the Sewage Treatment Lagoons have been buried in the three excavation pits just east of the fence surrounding the treatment system (or east of Pond B). Small amounts of solvents and heavy metals may have been associated with the grit material. This practice occurred from the beginning of Base operations to approximately 1984. The pits were reported to be approximately 2 ft wide, 5 ft deep, and 40 ft long and were dug perpendicular to the pond.

The site was investigated in September 1991 during RI activities. Several long narrow trenches were dug to locate the burial sites and soil samples were collected and analyzed to characterize the grit and surrounding soil. Further investigative VCM activities occurred in 2007. The objectives of the VCM investigation were to confirm the locations of the three sewage grit disposal trenches, characterize the sewage grit for potential source removal, and evaluate the current onsite groundwater conditions.

Further investigation was conducted under an ACM Work Plan. On April 18, 2008, based on soil and groundwater characterization, HAFB proposed CAC status in the ACM Completion Report. On June 27, 2012, the NMED approved the ACM Completion Report and issued a Certificate of Completion for CAC without Controls for SWMU 113A. HAFB was granted permission to initiate a Class 3 PMR for OT-20 (NMED, 2012d). HAFB is currently working on the Class 3 PMR to provide opportunity for public comment for OT-20.

J.1.9 SWMU No. 113B (DP-30/SD-33) Sludge Disposal Trenches Fire Train Area

SWMU 113B is listed as the Sludge Disposal Trenches Fire Train Area in Table A, also identified as ERP Sites DP-30/SD-33. Initially these sites were considered separately; the Grease Trap Disposal Pits (DP-30) and the Cooking Grease Disposal Trench (SD-33). The sites are located on opposite sides of an unpaved service road, approximately 80 ft apart; over time the two sites enlarged so that their borders have merged and are now considered as one SWMU. SWMU 113B is located in the southeastern area of HAFB encompassing approximately 2 acres.

The waste pits reportedly received wastes from HAFB grease traps, OWSs, and grit from the wastewater system. Occasionally the pits would also receive sludge from vacuum trucks used to unclog sewer lines at the Primate Research Laboratory. In a 1988 RFA small amounts of solvents and heavy metals were identified as potential contamination at these sites (A.T. Kearney, 1988). During a Phase I RI conducted in 1992, soil and waste sludge samples revealed volatile organic compounds (VOCs), metals, oils, and grease, and pesticides. Groundwater samples also revealed elevated levels of metals (e.g. antimony, beryllium, cadmium, etc) and toluene. Several soil analytes were also detected at elevated levels; a feasibility study and corrective measures study was recommended (Radian, 1992).

Other investigations conducted at DP-30/SD-33 included a Corrective Measure Study (CMS) which resulted in a Decision Document that was signed by the NMED and the Base Commander recommending NFA for groundwater in September 1995 (Radian, 1995). LTM was initiated in 1995 and in 2004 the NMED determined that additional characterization was necessary before NFA approval would be considered. Upon review of a Supplemental RFI Work Plan the NMED required that groundwater monitoring be conducted on a semi-annual basis as part of the LTM program (HGL, 2007a). Based on LTM groundwater sampling results in 2009, an ACM Work Plan was developed focusing on two additional rounds of groundwater monitoring in order to document trichloroethene (TCE) trends in the plume resulting in a conceptual model for the plume for assessing the TCE trend in groundwater (Tetra Tech, 2012a). In the resultant ACM report, HAFB recommended CAC status for the site with land use controls (LUCs) on the basis that the average plume concentration and mass has been declining over time through natural attenuation (Tetra Tech, 2013). An NMED determination is pending. It is anticipated that further remediation and additional corrective actions will be required before DP-30/SD-33 can achieve CAC status; however, HAFB is currently working additional actions to achieve clean closure.

J.1.10 SWMU No. 114 (OT-03) TEL Disposal Site

SWMU 114 is listed as the Tetraethyl Lead (TEL) Disposal Site in Table A, also identified as ERP Site OT-03. OT-03 is located outside the east perimeter fence of the POL storage facilities. It was utilized to dispose of the bottom sludge from fuel storage tanks containing aviation gasoline (AVGAS) and JP-4. From 1955 to 1975, wastes such as leaded fuel tank sludge, rusted metal fragments, rags, and hand tools were disposed of in the pit. The approximate extent of the disposal pit was thought to be 10 ft by 6 ft with an assumed depth of 4 ft.

In November 1991 an RI was conducted at the site. During that investigation, activities included trenching (two trenches 120 feet long) to locate and define the pit, characterization and analysis of sidewall samples from the pit, and installation of a deep soil boring and a monitoring well. PCS were identified at the site and the RI report recommended that the site proceed with remedial actions.

The August 2007 ACM operations consisted of excavation of the pit and confirmation sampling in order to obtain CAC for the site. PCS form OT-03 was excavated and transported for offsite disposal. On December 18, 2008, based on soil characterization, HAFB proposed CAC status without controls in the ACM Completion Report. On August 13, 2012, the NMED approved the ACM Completion Report and issued a Certificate of Completion for CAC without Controls for SWMU 114. HAFB was granted permission to initiate a Class 3 PMR for OT-03 (NMED, 2012f). HAFB is currently working on the Class 3 PMR to provide opportunity for public comment for OT-03.

J.1.11 SWMU Nos. 118, 132, and AOC A (OT-16)
Building No. 21 Pesticides Holding Tank; Entomology Leachfield; and Pesticide Rinse-water Spill Area

SWMU Nos. 118, 132, and AOC-A are listed as Building 21 Pesticides Holding Tank, Building 21 Entomology Leachfield, and Building 21 Pesticide Rinse-water Spill Area on Table A, respectively, also identified as ERP Site OT-16. OT-16 was located at former Building 21 in the southeastern portion of the Main Base Area and covered at area approximately 0.5 acres in size.

OT-16 encompasses former Building 21, a truck wash rack (SWMU 79), a pesticide plastic holding tank (SWMU 118), a disposal pit (SWMU 132), and a transformer pad (AOC-A). All listed concrete structures and features were demolished and removed in the mid-1990s. The site currently consists of a gravel and concrete-paved vehicle parking area and a large concrete pad used by the Honor Guard for training.

Prior to its conversion into an entomology shop in 1977, Building 21 was a power plant that contained six diesel generators and several transformers for power generation. After its conversion, Building 21 was utilized as the Base herbicide and pesticide storage facility. The weighing and mixing of the chemicals prior to application was conducted within the shop. From 1977 to 1980, rinse water from washing pesticide mixing equipment was discharged to a septic tank drain field located on the northwest side of the building. After 1980, rinse water and unused pesticides were collected in a 12-gal plastic aboveground holding tank (SWMU 118). Activities within the Entomology Shop ceased in 1992.

A Phase I RI was conducted in 1992. Based on the baseline risk assessment for OT-16, the RI concluded that no action was necessary, but recommended additional site characterization (Radian, 1992). A Phase II RFI conducted in 1994 included additional sampling and recommended a conditional NFA determination based on the remediation of total petroleum hydrocarbons (TPH) contaminated soils that were discovered during the RFI. In 1996, TPH contaminated soil and polychlorinated biphenyls (PCB) contaminated soil were excavated and removed from the site. Biennial LTM of the site monitoring wells began in 1997. In 2005, an LTM Report requested NFA status. The NMED requested additional quarterly groundwater sampling events.

On July 6, 2010, after eight additional groundwater sampling events, HAFB request CAC status in the April 2009 – January 2010 LTM Report. On May 24, 2012, the NMED approved the LTM report and issued a Certificate of Completion for CAC without Controls for OT-16. HAFB was granted permission to initiate a Class 3 PMR for OT-16 (NMED, 2012b). HAFB is currently working on the Class 3 PMR to provide opportunity for public comment for OT-16.

J.1.12 SWMU Nos. 122 and 123 (TU-521) Building Nos. 702 and 704 Waste Oil Tanks

SWMUs 122 and 123 are listed as Building 702 Waste Oil Tank and Building 704 Waste Oil Tank in Table A, respectively, are also identified as ERP Site TU-521. They are collectively addressed due to their proximity and shared historical background. SWMUs 122 and 123 are located near the northwestern and northeastern corners of the POL Washrack located within the fenced area of the POL Facility.

The two former underground waste oil tanks received oil and fuels removed from two underground OWSs (SWMUs 21 and 22, now CAC without controls) which collected wash water from the POL Washrack and were located along the north side of the washrack. During the early 1990s the two waste oil tanks (SWMUs 122 and 123) and OWSs were removed and replaced with a new waste oil tank and waste OWS when the POL Washrack was renovated.

The POL Washrack has historically generated wash water from cleaning vehicles and equipment. The two OWSs received the wash water containing oil, hydraulic fluid, fuels and soil from the wash water, skimmed the waste oil from wash water and transferred the waste oil by gravity to the two underground waste oil tanks. According to the RFA conducted in 1988, the waste oil tanks were not equipped with automatic fill controls or level monitoring devices; the standard operating procedure was to routinely remove the waste oil from the tanks to prevent overfills. Both tanks were below grade and covered with gravel. The tanks were approximately 5 ft long and 5 ft in diameter and the depth to the base of the tanks was estimated at 6.5 ft bgs.

Previous investigations have identified a number of contaminants that have impacted the soil and groundwater from petroleum hydrocarbon releases at SWMU 123. Approximately 1,882.5 cubic yards (CY) of petroleum contaminated soil (PCS) were removed from SWMU 123 through remedial excavations. Fifty (50) CY of PCS were removed in August 1995 (EBASCO, 1995); 132.5 CY of PCS was removed in March 1997 (FWENC, 1997); and 1,770 CY of PCS between October 2005 to January 2006 were removed through VCM (Bhate, 2005a). Prior to the RFI conducted in July 2009, no previous subsurface soil investigations had been conducted at

SWMU 122, therefore site contamination, extent, and characterization from any potential releases from SWMU 122 was unknown.

The primary objectives of the 2009 RFI Work Plan conducted at SWMUs 122 and 123 was to collect soil and groundwater data to fill in existing data gaps, identify potential releases from SWMU 122, delineate horizontal extent of volatile organic compound (VOC) groundwater contamination from SWMU 123, and collect proper data to meet data quality objectives (DQOs) to support closure of these two sites (NationView, 2009d &2012c). The data was presented in a RFI report that included comprehensive RAs using the soil and groundwater data that supports the recommended CAC status without controls for SWMUs 122 and 123. The submittal of this RFI Report was substantially delayed at the request of the NMED until background levels for naturally occurring constituents (e.g. metals) at HAFB could be finalized (NMED, 2011c). On August 14, 2014, the NMED issued an NOD letter to HAFB which stated that the Base needed to conduct additional site characterization activities (NMED, 2014f). HAFB is currently working to address the remaining concerns to achieve CAC status.

J.1.13 SWMU No. 137 (OT-38) Building 1166 Test Track Drain Field

SWMU 137 is listed as Building 1166 Test Track Drain Field on Table A, also identified as ERP Site OT-38. This site is small, covering less than one-quarter acre. OT-38 is located in an industrial area of the test track at HAFB.

From 1951 when the test track area became operational until 1979, waste oils, solvents and paint strippers utilized in the sled industrial maintenance area (Building 1166) were suspected of being discharged to a cesspool behind the building. The cesspool was described as an unlined cavity at least 6 ft deep and 10 ft long. In the late 1980s, a septic tank was installed replacing the cesspool. Since 1979, all waste POL products have been accumulated in 55-gallon drums and turned in to the DLADS.

In the 1991 RI, high concentrations of TPH, sulfate, chloride, nitrate, and TDS were detected in soil and groundwater sample results. Additional site characterization was performed in 2008 to determine the nature and extend of the contamination. Groundwater sampling results contained high levels of TAL metals, TDS, nitrate, and perchlorate. No RFI report has been submitted, however, only arsenic exceeded soil standards. Further investigation of this site is required.

J.1.14 SWMU No. 141 (SD-27) Pad 9 Drainage Pit

SWMU 141 is listed as Pad 9 Drainage Pit on Table A, also identified as ERP Site SD-27. SD-27 is an inactive washrack that consists of a circular concrete pad with sump and drainage gallery. SD-27 is located east of Taxiway F near Building T884 within the airfield.

The SD-27 Pad 9 Washrack Area was used to wash down drones and manned aircraft that had flown through clouds of nuclear blast materials in the late 1940s and early 1950s. Wash water would collect in the sump and discharge via the discharge pipe to the discharge pit (Radian, 1993a). No information on the exact year when washrack activities ceased is available; however, according to interviews with former military personnel, no aircraft maintenance activities have occurred at SD-27 since the cessation of the practice of washing down potentially radioactive contaminated drones and manned aircraft (Radian, 1993a).

In May 1976, a radiation site screening investigation was conducted at the SD-27 drainage pit. In 1993 a Preliminary Assessment/Site Investigation (PA/SI) was conducted which consisted of soil sampling only. As presented in the PA/SI Report, soil samples were collected from the bottom of the former drainage pit and submitted for analysis. The analytical results indicated no radiation above normal background was present within the former drainage pit. After the sampling event, the drainage pit was backfilled to grade (Radian, 1993a). Additional site characterization was conducted in 1994 with a Phase II RI and again no groundwater samples were collected as part of the RI (Foster Wheeler/ Radian, 1996).

In December 2001, HAFB requested NFA status for SD-27 based on the results of the PA/SI and Phase II RI. In March 2002, the NMED responded with a request for additional soil and groundwater characterization data and Supplemental RFI activities were conducted in May and June 2006. The sump and associated drainage gallery, a 0.5-foot (ft) wide by 0.5-ft deep concrete-lined trough running the radius of the concrete washrack, was nearly filled with accumulated sediments, grasses, and a cactus. Upon removal of the accumulated sediments, the base of the sump was determined to be in good condition. No soil staining, unusual solids or liquids, or unknown odors were noted in the sediment contained within the former sump and concrete trench. Based on the results from the Supplemental RFI report, further investigation of SD-27 was recommended to determine appropriate remedial actions (HGL, 2007a).

In March 2009, the Final ACM Work Plan was submitted to include activities such as sediment removal from the washrack trough, additional soil boring and excavation, and groundwater LTM; the remedial actions outlined are designed to lead to CAC status without LUC (Tetra Tech, 2009a). SD-27 requires further investigation and excavation before CAC status can be achieved.

J.1.15 SWMU Nos. 165, 177, 179, and 181 (SS-39) Building No. 1176 Pond and Sumps; Discharge Box; and Drainage Trough

The Missile Fuel Spill Area, also identified as ERP Site SS-39 consists of SWMU Nos. 165, 177, 179, and 181. These SWMUs are listed in Table A as: Building 1176 Pond; Building 1176 Sumps; Discharge Box; and Building 1176 Drainage Trough, respectively. SS-39 is located in the central portion of HAFB along the northern slope of the Lost River Drainage Basin immediately south of Building 1176.

Facilities at SS-39 were involved with the fueling, detanking, and routine maintenance of test sleds. The launch pad at the south end of the sled test track was constructed with a concrete collection basin (SWMU 167) and a water deluge system. Spilled oxidizers and fuels were delivered to separate drains diluted with water and flushed into the Lost River. In 1975, catch basins were installed to collect the spilled liquid fuels (Discharge Box, SWMU 179). Oxidizer vent lines from the engines were also installed and designed to discharge to into the catch basins. Since 1975, no propellants have been intentionally released to the open drains. Waste propellants were collected, treated, and disposed of in the treatment system located in Building 1176. Throughout the history of the test track, fuels have included at least the following: JP-4; UDMH;

aniline; IRFNA; liquid oxygen; JPX; dyes; solid rocket propellants; and other compounds. In addition to these fuels, solvents such as TCE were commonly used for sled maintenance in Building 1176 (FEC, 1997).

Phase I and II RFIs were conducted in 1991 through 1993 to delineated TCE contamination in this area (Radian, 1994). The site was added to the LTM program in 1997 and monitoring was conducted on a biennial basis. In 1998, in response to a NMED request, a supplemental groundwater investigation was performed to further delineate the extent of TCE contamination. After submittal of the Supplemental RFI work plan in 2005 (HGL, 2005a), the NMED requested that groundwater LTM activities be conducted more frequently, on a semi-annual basis, which has been ongoing since 2005 (NMED, 2006b).

Supplemental RFI activities were conducted in 2006 and an ACM Work Plan was submitted in 2009 (Tetra Tech, 2009b). ACM site investigation and remedial activities were conducted in November 2010 and the results were included in an ACM Work Plan Addendum (Tetra Tech, 2011b). Results from the final ACM Work Plan Addendum activities cited natural plume attenuation as the remedial method for this site and LTM as a way to assess that the remedial objectives are being achieved. Subsequently HAFB proposed CAC status with LUCs that would prevent construction near the TCE plume (Tetra Tech, 2012b). The NMED rejected this request and further excavation and investigation is required at SS-39 before CAC status can be achieved.

J.1.16 SWMU No. 183 Base-Wide Sewer System

SWMU 183 is listed as Base-Wide Sewer System on Table A. It is a subsurface system constructed in 1947 that comprises of approximately 165,000 linear ft of sewer line and serves both residential and industrial facilities at HAFB. The Base-Wide Sewer System is divided into 10 Sub-Basins and includes 715 active and 131 inactive (abandoned and removed) manholes, 24 lift (pumping) stations, and hundreds of variably contributing sources distributed throughout the entire base. Waste sources include direct discharges from industrial/operational facilities and domestic structures, as well as pass-through discharges from additional waste management systems such as OWSs. The sewer collects and transports both sanitary and mixed industrial wastes to the HAFB’s wastewater treatment plant (WWTP), which was constructed in 1996 to process 1.5 million gallons per day (gpd), and is located at the central-southern boundary of HAFB (Radian, 1998).

Historically industrial operation facilities at HAFB produced a variety of wastes, many of which were discharged into the sewer system. In a prior industrial wastewater pretreatment study the industrial wastewater discharges of 55 industrial facilities were assessed to identify chemicals of potential concern (COPCs) that were being introduced into the wastewater system. Common waste generating activities had included vehicle, aircraft, equipment, and floor washing; x-ray and photo processing; and fuel canister rinsing. Many of these facilities used pretreatment features such as grit chambers, grease traps, holding ponds, and OWSs before wastes were discharged into the sewer system (Ecology & Environment, 1998). In April 1995 a Phase II RFI Work Plan was developed in response to an EPA policy wherein sewer systems were to be treated and characterized as SWMUs (FWENC/Radian, 1995a).

A series of remedial actions to remove OWS units, removal and/or capping of associated piping, contaminated soil excavation, and OWS system removal throughout HAFB associated with the base-wide sewer system has occurred since the mid-1990s (EBASCO, 1995). In 1997 an industrial wastewater pretreatment study was conducted in support of developing an Industrial Wastewater Pretreatment Management Plan (IWPMP) and Customer Concept Document (CCD) (Ecology & Environment, 1998). In 1998 an infiltration and inflow study was conducted on the HAFB sewer system to determine if the system had excessive groundwater infiltration or storm water inflow that could potentially lead to regulatory noncompliance. Structural and hydraulic problems were identified; more significantly, the main problem identified was excessive inflow into the system (Radian, 1998).

In 2005 the Air Force conducted an Environmental Assessment to analyze and evaluate the possibility of selling the HAFB wastewater collection and treatment system to an outside private entity. No significant environmental impacts were identified, however, it was determined that the transfer could potentially cause significant regulatory, economic, and/or mission risk and was not sold (NationView, 2012b). In April through August 2010, Phase I and II field activities were conducted at SWMU 183 in order to identify potential releases to subsurface soil at the most probable sewer line locations and to collect sufficient analytical data for a human health and ecological RA. In the May 2012 RFI report, it was identified that no source area above the current NMED SSLs was detected; therefore, excavation of contaminated soil was not required for SWMU 183. Based on the analytical data findings, HAFB submitted a request to the NMED for CAC status (NationView, 2012b). On June 13, 2014 the NMED approved the report and granted HAFB permission to initiate a Class 3 permit modification request (PMR) for SWMU 183 (NMED, 2014b). HAFB is currently working on the Class 3 PMR to provide opportunity for public comment for SWMU 183.

J.1.17 SWMU No. 197 (OT-14) Former Entomology Shop

SWMU 197 is listed as Former Entomology Shop on Table A, also identified as ERP Site OT-14. It is located adjacent to Building 66 and occupies approximately two-tenths (0.2) of an acre in the northwestern corner of the Civil Engineer yard of HAFB.

Historically pesticides and spray equipment for HAFB application use were mixed, stored, and maintained onsite from 1968 to 1977. Mixing and maintenance activities that included equipment rinsing were performed in an area outside of Building 66 (Radian, 1992).

In 1992, Phase I RFI activities were conducted at OT-14 as part of the 29 Sites RI (Radian, 1992). In 1993, as part of the Phase I RFI, a RA was performed in which pesticide contamination was indicated at OT-14 and it was determined that further investigation to characterize the extent of contamination was necessary (Radian, 1995). In 1994, Phase II RFI activities were conducted; as part of the investigation a Feasibility Study (FS) was performed at the site to determine the appropriate Remedial Action Operation (RAO). The site entered the Feasibility Study/Corrective Measures Study (FS/CMS) process which determined that an estimated 740 CY of soil was contaminated by pesticides. Containment through the installation of an impermeable asphalt cap was recommended rather than excavation of the contaminated soil (FWENC/Radian, 1995a). The cap was installed in 1996 (FWENC, 1997).

The final VCM Work Plan was approved by the NMED in 2008 under which further site characterization was performed. The resultant VCM report was delayed at the request of the NMED until background concentrations at HAFB could be finalized (NMED, 2011c). Based on the analytical data and characterization findings, it appears that the asphalt cap, which has remained intact since installation, coupled with warm temperatures and shallow groundwater has created an environment favorable to the degradation of pesticides. Therefore, HAFB has submitted a request to the NMED that SWMU 197 be considered for CAC status (Bhate, 2012b); this request is under review by NMED.

J.1.18 AOC-1 (DP-64) Chemical Agent Site

AOC-1 is listed as Chemical Agent Site on Table A and is also identified as ERP Site DP-64. It is located in the central part of HAFB in an industrial area. The total area of the DP-64 site is approximately 5.5 acres and is partially surrounded by a chain-link fence.

During the 1950s, the Chemical Test Squadron from Edgewood Maryland flew missions to HAFB, although, no documentation has been found to indicate the testing of any chemical agents occurred at DP-64, M4 sulfur mustard vapor detection kits and detonation chemical agent identification sets (CAIS) were historically used at HAFB. CAIS kits were widely used by the Army for training purposes. In the *1996 Survey and Analysis Report, Second Edition*, (U.S. Army Program Manager for Chemical Demilitarization, 1996) Alamogordo Army Air Base was identified as a location where CAIS had been recovered.

DP-64 site was discovered in 2000 when a pedestrian walking in the area discovered several broken vials and two intact vials containing a clear to yellowish liquid. In 2004, investigative and removal activities were conducted at DP-64 and the results were submitted in the Site Specific Final Report (SSFR). During the SSFR activities, all CAIS components, munitions, and debris were classified and recovered by HAFB Explosive Ordnance Disposal (EOD) personnel (Zapata, 2005).

On April 14, 2006, the NMED responded to the SSFR with an NOD and requested additional sampling be conducted at DP-64 (NMED, 2006a). In August 2006 HAFB submitted the RFI Work Plan for DP-64. On January 30, 2008, the NMED responded with a Notice of Disapproval, requesting additional groundwater monitoring wells be installed and addition constituents be analyzed in the samples (NMED, 2008b).

On February 15, 2012, the required analytical data results were collected and submitted in the RFI Report. CAC status without controls was requested for AOC-1 (Bhate, 2012a). On October 8, 2013 the NMED approved the report and HAFB was granted permission to initiate a Class 3 PMR for AOC-1 (NMED, 2013e). HAFB is currently working on the Class 3 PMR to provide opportunity for public comment for AOC-1.

J.1.19 AOC-3 (DP-63) Ammunition Yard Disposal Pit

AOC-3 is listed as Ammunition Yard Disposal Pit on Table A and is also identified as ERP Site DP-63. It is located on the eastern side of HAFB to the northeast of the runway area, in the north portion of the Ammunition Storage Facility. Site DP-63, is comprised of three separate disposal areas designated as the East, West, and North disposal pits. Originally, the disposal pit areas were located immediately north and outside of the facility, but during an expansion of the storage yard in the 1960s, DP-63 became part of the Ammunition Storage Facility (with the exception of the North Area).

During past operations, munitions were placed into the disposal pits with diesel fuel and wood pallets and ignited to render the ordnance inert. Fuel may have seeped into the soil directly below the disposal areas. The types of ordnance that were treated include munitions ranging from 20-caliber to 50-caliber small arms rounds and grenades. Base environmental personnel performed a visual inspection of the area during the summer of 1997 and found scrap metal munitions exposed on the ground surface throughout the area as a result of erosion.

In 2000 a PA/SI at DP-63 was performed to evaluate any contamination at the site. The PA/SI field activities included a geophysical survey to locate buried metal debris and site characterization. Further site investigation was conducted during RI activities performed in 2001-2002. In 2005-2006 ACM activities included MEC, asbestos, and PCS removal, site confirmation sampling and additional site characterization for the East, West, and North Pits.

On January 28, 2008, the analytical data results were submitted in the ACM Completion Report. HAFB proposed CAC status without controls for DP-63. On June 7, 2012 the NMED approved the report and issued a Certificate of Completion for CAC without Controls for DP-63. HAFB was granted permission to initiate a Class 3 PMR for DP-63 (NMED, 2012c). HAFB is currently working on the Class 3 PMR to provide opportunity for public comment for DP-63.

J.1.20 AOC-4 West POL Fuel Spill Site

AOC-4 is listed as West POL Yard Fuel Spill on Table A. It is located on the western portion of the Main Base Area adjacent to Building 871. The site consists of four 50,000-gallon ASTs housed within a secondary containment concrete berm, and aboveground and underground product transmission lines. The facility was used to store and distribute JP-8 jet fuel to tanker trucks.

In August 1999, the West POL Yard facility's leak-detection system indicated that JP-8 was leaking underground south of the ASTs. A subsequent pressure test performed on an 8-inch underground feed line confirmed the presence of a leak beneath the concrete pad of the fueling area. As a result, the fueling pad was shut down by draining fuel lines and closing valves. Upon shutting down the fueling pad two test pits were excavated and soil samples were collected and analyzed for TPH. During the excavation free product was also observed on the groundwater surface.

In October and November 1999, RI activities were conducted to delineate the extent of TPH in soil and the extent of free product in groundwater. During sampling in October, older residual contamination was discovered as dark gray stained soil. Analysis of the stained soil indicated that the petroleum was JP-4 and that the contamination was older than previously believed. As a result soil excavation and free product removal from groundwater was recommended.

Excavation and removal activities were conducted in January 2003. The original scope required the excavation of approximately 500 cubic yards of soil for offsite disposal, but additional excavation was required because unexpected contamination was discovered in the area of the concrete driveway. Approximately 1,300 cubic yards of soil was removed, stockpiled, and sampled. Approximately 1,200 cubic yards (1,430 tons) of soil which contained TPH was transported offsite for disposal. In October 2005, a soil sampling event was conducted to characterize the extent of potential PCS beneath the southern half of the secondary containment structure. In October 2006 additional soil was excavated from the site during the ACM and further confirmation sampling was performed.

In July 2008 the analytical data results were submitted in the ACM Completion Report. The NMED sent HAFB an NOD on May 14, 2009. In response HAFB submitted a final ACM report with the associated responses in June 2010. In the final ACM Completion Report HAFB again requested that AOC-4 be granted CAC status. The report and associated request was approved by the NMED on January 26, 2011 (NMED, 2011a). HAFB is currently working on the Class 3 PMR to provide opportunity for public comment for AOC-4.

J.1.21 AOC-1001 (SS-61) Building 1001 Fuel Spill Site

AOC-1001 is listed as Building 1001 Fuel Spill Site on Table A and is also identified as ERP Site SS-61. It is located in the central part of HAFB in an industrial area. The site is located north of two hangars, Buildings 1079 and 1080, and is divided into two study areas by Dezonia Drive. The northern section of the site consists of a concrete pad, located southeast of Building 1001 and immediately west of Building 1072; this area may have been used for fuel dispensing. In addition, a debris pile that covered approximately 1,500 square ft was located northwest of this concrete pad. The pile contained concrete pieces, asphalt rubble, and some piping. To the northeast the ground surface rises approximately 10 ft toward the site of two former aboveground storage tanks (ASTs).

The SS-61 site also consists of approximately two acres of petroleum contaminated soil (PCS). The source of the PCS is believed to be associated with an abandoned east-west trending underground fuel pipeline connecting two concrete vaults with the former AST system and/or the adjacent debris pile. The former AVGAS pipeline that traverses approximately 1,200 ft through the site historically leaked at two locations, a pipeline T-junction located north of Building 1072 and the pipeline terminus near Building 1071 (Bhate, 2011). Groundwater sampling has revealed the presence of 1,2-DCA or ethylene dichloride, a commonly used additive in AVGAS fuel to prevent lead oxide deposit build up, suggesting the timeframe for the pipeline leak to be during the 1950-60s (Bhate, 2009a).

Contamination at AOC-1001 was first discovered as a result of a Phase II RFI at SWMU 104 during groundwater monitoring activities (Radian, 1995), subsequent Phase I and II RFIs were conducted during 1996 and 1997 (FWENC/ GTI, 1997). As a result of these investigations, AOC-1001 was designated as an ERP site in December 1997 (FWENC, 2000). In 1999 and 2000, Phase I and II RIs were performed to further characterize the extent of soil and groundwater contamination north and south of Dezonia Drive (FWENC, 1999& 2000). In 2004 a monitored natural attenuation study was conducted (Bhate, 2005c) and then in 2007 a VCM investigation was conducted to identify the specific source area for the PCS that was not identified in the previous RFI and RI studies (Bhate, 2007b).

During a VCM investigation in 2007 the PCS source was determined to be associated with the former AVGAS underground pipeline (Bhate, 2008c). The volume of PCS was calculated to be 12,000 CY and soil excavation was conducted (Bhate, 2007b). Investigative work was performed in November/December 2008 in accordance with the *Final Voluntary Corrective Measures Work Plan Addendum Site SS-61 Soil Remediation, Holloman Air Force Base, New Mexico* to determine the groundwater flow direction and horizontal hydraulic gradient (Bhate, 2009a). An addendum to the VCM Work Plan was submitted in 2008 to characterize and delineate the quantity, concentration, and the horizontal and vertical extent of the PCS at the two identified source areas at SS-61 (Bhate, 2008c). Subsurface soil and groundwater sampling was conducted under the VCM Addendum and was reported to NMED in 2009. The horizontal and vertical delineation of the PCS was estimated to be over 170,000 CY with a vertical extent of an average of 18 ft bgs (Bhate, 2009a).

Groundwater sample results indicated a benzene and 1,2-DCA plume larger than previously anticipated (17.5 acres and 28 acres respectively), therefore the planned area of excavation was determined to be a much larger scale than what was previously anticipated in the Final VCM Work Plan. Based on the larger scale, the frequency of excavation soil screening and confirmation soil sampling was updated in the Memorandum Revision to Existing Approved VCM Work Plan (Bhate, 2009b) and approved on September 2, 2009, when the NMED issued a Notice of Conditional Approval (NMED, 2009a). In May 2011 the Final Supplemental VCM (SVCM) Work Plan was submitted for remedy in place (RIP) where excavation and land farming was determined to be inaccessible. The purpose of the SVCM is to serve as the primary working document for remedial actions where remediation through Aerobic In-situ Enhanced Bioremediation (AISEB) treatment using horizontal air injection wells may be accomplished (Bhate, 2011).

On December 10, 2012 the NMED approved the Supplemental VCM Work Plan under the condition that performance monitoring be accomplished on a quarterly and semiannual basis (NMED, 2012h). It is anticipated that remediation through excavation and land farming activities at accessible locations and through AISEB activities at inaccessible locations are to continue as corrective measures until CAC status is approved for Site SS-61.

J.1.22 AOC-B (SS-65) Building 807 Test Cell Surface Spill Area

AOC-B is listed as Building 807 Test Cell Surface Spill Area on Table A and is also identified as ERP Site SS-65. The 1988 RFA identified SS-65 as a suspected surface spill of petroleum hydrocarbons located approximately 25 ft north of Building 807 Test Cell. It is located in an industrial area of HAFB.

Former Building 807 was identified as a cinder block building that was constructed in 1977. It is believed to have been used as a support facility for test personnel use during the period when the site was used to test F-15 and F-4 fighter crafts in the 1970s and 1980s. According to personnel, the test cell area consisted of two trim pads and one engine test stand. Spills of jet fuel were known to occur after the engine was shut down following a test. The test cell area was abandoned in the 1990s when the F-117s were phased in and a new testing facility was built approximately 300 yards southeast of the site. SS-65 was identified during the 1988 RFA; however, no investigation had been carried out beyond the visual inspection until 2006.

In 2006, during preparation of the RFA Work Plan it was determined that site SS-65 and TU-71 were co-located. TU-71, thought to be a leaking UST was also believed to be located immediately north of Building 807; however, there was no evidence to support the existence of a UST as this location. Therefore, on November 2, 2006 during a conference call with NMED HWB, HAFB proposed TU-71 be combined into the SS-65 investigation and treated as one investigation for SS-65. The NMED approved the proposal (Bhate, 2007e) and as a result, site TU-71 is not listed on either Table A or Table B of the permit.

In 2007 a RFA investigation was conducted. Soil and groundwater samples were taken to characterize site conditions and support site closure. On August 21, 2013, analytical data results for SS-65 were included in a RFA Confirmatory Report submitted to the NMED. Preparation and submittal of the RFA report was substantially delayed at the request of the NMED until the background levels for naturally occurring constituents (e.g., metals) at HAFB could be finalized (NMED, 2011c). In the report HAFB proposed CAC status without controls for SS-65 (NationView, 2013d). This RFA report is currently under review by the NMED.

J.1.23 AOC-C (SS-66) Building 835 Spills

AOC-C is listed as Building 835 Spills on Table A and is also identified as ERP Site SS-66. It is located in a vacant lot on the north end of the flight line, on the western portion of the Main Base Area, 65 ft west of the former Building 835. The site had been identified as an oil and rust-stained area approximately 20 ft by 30 ft in size, located on the north side of Building 835.

Building 835 was built in 1954 and was demolished in 2001. At the facility, metal parts were heated and quenched in oil for the purpose of hardening or softening the metals. At times the quenching oil would drip onto the concrete both inside and outside the building. Oil stains on the concrete pads outside the north side of the building were visible in the aerial photograph taken in 1996. During RFI activities in 2006, no visible signs of hydrocarbon staining or rust were apparent at the site during a site visit made. This was most likely due to site disturbance from the building demolition that took place in 2001.

In 2007, based on guidance from the NMED, soil and groundwater samples were taken to characterize site conditions and support site closure. The analytical results did not exceed the NMED SSLs, NMWQCC, or USEPA Maximum Contaminant Levels (MCLs). Therefore, on June 27, 2008, HAFB submitted the RFA report and requested CAC status for SS-66 (Bhate, 2008b). On July 18, 2012 the NMED approved the report and issued a Certificate of Completion for CAC without Controls for SS-66. HAFB was granted permission to initiate a Class 3 PMR for SS-66 (NMED, 2012e). HAFB is currently working on the Class 3 PMR to provide opportunity for public comment for SS-66.

J.1.24 AOC-E (SS-67) Buildings 903-909 Sand Blast Residues

AOC-E is listed as Buildings 903-909 Sand Blast Residues on Table A and is also identified as ERP Site SS-67. SS-67 is a suspected spill or pile of sand blasting residuals located between Building 903 and 905. It is approximately 180 ft west of Building 903 and 110 ft east of Building 909. SS-67 is located in the western portion of industrial area of HAFB. The site reportedly consisted of blasting residue containing a mixture of materials including silica shot, metal, and old paint.

In the 1988 RFA, SS-67 was identified as a corrective action site based on a pile of blasting residuals reportedly staged along the south side of Buildings 903 and 905 from blasting activities at these buildings. During a site visit conducted on July 12, 2006, a 6 ft by 6 ft area of black grit or sandblast residue was observed along the south side Building 905; however, in April 2007 during the SS-67 RFA, the area had been graded and covered with landscaping gravel.

In 2007 a RFA investigation was conducted. Soil and groundwater samples were taken to characterize site conditions and support site closure. At the request of NMED, a surface soil sample containing the black grit/ sandblast residue which had been observed in the 6 ft by 6 ft area located south of Building 905 was collected. Based on the analytical results which indicated target analyte list (TAL) metals in exceedence of SSLs, NMWQCC standards or USEPA MCLs and direction from the NMED, the residual sandblasting debris around the telephone pole located along the south side of Building 905 was excavated for off-site disposal in April 2013. Based on the analytical results the sandblast residue/soil was determined to be non-hazardous and suitable for disposal at the Rio Rancho Waste Management Landfill. Additional confirmation samples were collected to determine the effectiveness of the soil removal action.

On August 21, 2013, analytical data results for SS-67 were included in a RFA Confirmatory Report submitted to the NMED. Preparation and submittal of the RFA report was substantially delayed at the request of the NMED until the background levels for naturally occurring constituents (e.g., metals) at HAFB could be finalized (NMED, 2011c). In the report HAFB proposed CAC status without controls for SS-67 (NationView, 2013d). This RFA report is currently under review by the NMED.

J.1.25 AOC-H (SS-18) Chromic Acid Spill Area

AOC-H is listed as Chromic Acid Spill Area on Table A and is also identified as ERP Site SS-18. It is located along the south side of Building 281 within the eastern portion of the main base industrial area at HAFB.

The 479th Component Repair Squadron (CRS) maintained a chrome plating shop in Building 281 until the late 1970s. When the operation was discontinued, the full chromic acid vats were temporarily stored along the south wall inside Building 281. It was estimated that 500 gallons of chromic acid were spilled on the ground in this storage area with some of the acid reaching the surface drainage ditch just west of the storage area. The chromic acid spill covered an area of approximately 30 ft by 30 ft. In 1982, 10 yellow stained surface soil samples were collected and composited for hexavalent chromium extraction procedure toxicity analysis (CH2M Hill, 1983).

In 2007 ACM investigations were conducted in 2007 to delineate the potential chromium contaminated soil source area along the southeast side of Building 281 to evaluate and characterize the groundwater of the site. Based on the results it was apparent that VOC constituents had migrated down gradient. In July 2012 a Supplemental ACM Work Plan was submitted to present a soil and groundwater sampling strategy (NationView, 2012e). Further site investigation and remediation is required at Site SS-18.

J.1.26 AOC-I (SS-69) Fighter Wing Flight Line Spill

AOC-I is listed as Fighter Wing Flight Line Spill on Table A and is also identified as ERP Site SS-69. The site is located approximately 200 ft southwest of Building 868. Building 868 has served as a maintenance hangar for both F-117s and F-15s. It has been in existence for approximately 25 years and had additions made to it over the years. The flight line is covered with reinforced concrete and serves as a taxi-way for heavy aircraft. The site is located in an industrial area of HAFB.

In the 1988 RFA SS-69 was identified as a suspected corrective action site based on a fuel-stained area of soil observed during the VSI. The RFA identified a surface spill of approximately 275 gallons of TCE and 200 gallons of carbon tetrachloride (CCl4) that occurred in the general area of Building 868. Although, the reported release of TCE and CCl4, was believed to occur on the flight line surface in the 1980s, no record of the spill could be located from records searches or during interviews with site personnel during the investigation that took place in 2006.

In 2007 a RFA investigation was conducted. Soil and groundwater samples were taken to characterize site conditions and support site closure. On August 21, 2013, analytical data results for SS-69 were included in a RFA Confirmatory Report submitted to the NMED. Preparation and submittal of the RFA report was substantially delayed at the request of the NMED until the background levels for naturally occurring constituents (e.g., metals) at HAFB could be finalized (NMED, 2011c). In the report HAFB proposed CAC status without controls for SS-69 (NationView, 2013d). This RFA report is currently under review by the NMED.

J.1.27 AOC-J (SS-13) Herbicide Sodium Arsenite Spill Area

AOC- J is listed as Herbicide Sodium Arsenite Spill Area on Table A and is also identified as ERP Site SS-13. It is located in the Civil Engineer Complex next to the DLADS Storage Facility in the main base area at HAFB.

The site is a 2-ft deep depression that was used to store sodium arsenite, a weed killer used to sterilize runway areas. Approximately eighty-three 30-gallon containers of sodium arsenite were stored at this location in 1979. In August 1979, one of the cans was found empty with a hole in the bottom. It is assumed that approximately 30 gallons of sodium arsenite was released at the site. The depression was backfilled and capped with asphalt in the early 1990s. The site is currently used as a storage area.

The release was identified in the 1983 records search; however, site cleanup operations could not be confirmed at that time (CH2M HILL, 1983). In 1987, two soil borings and one monitoring well were installed and sampled during a Phase II IRP investigation. Phase II IRP results identified arsenic in groundwater and arsenic in five soil samples. Based on the low levels of arsenic found at the site, the Phase II IRP recommended no further action (Dames and Moore, 1987).

A 1993 decision document concluded that the SS-13 site did not present a significant threat to the environment; the NFA status recommendation was approved by the NMED in April 1993 (EA, 1993). However, in 1999, a petition to close the SS-13 site was rejected by the NMED due to lack of characterization data and delineation of the site. Data gap analysis, removal of contaminants, and documentation of site conditions were required prior to closure of the site.

The final ACM Work Plan was approved by NMED on December 30, 2008 (NMED, 2008f). The ACM Work Plan outlined objectives for collecting soil and groundwater samples for additional site characterization, establishing groundwater monitoring wells for periodic monitoring, and excavating and removing contaminated soils from the site (North Wind, 2008). The ACM Completion Report concluded that the soil did not contain constituents at concentrations above residential SSLs and that the groundwater does not exceed regulatory limits, therefore it was recommended that SS-13 be granted NFA status (North Wind, 2011). On October 1, 2013 the NMED issued a NOD for the ACM Completion Report (NMED, 2013d). Further investigation and remediation is required at Site SS-13.

J.1.28 AOC-K (SS-12) Northeast Fuel Line Spill Site # 1

AOC-K is listed as Northeast Fuel Line Spill Site #1 on Table A and is also identified as ERP Site SS-12. It is located immediately east of the main housing area at HAFB.

In 1975, approximately 2,000 gallons of JP-4 were spilled at the site as a result of a line rupture due to excessive pressure in the main pipeline that serves the HAFB POL area. The majority of fuel was reportedly collected in a pit and pumped into a truck shortly after the spill. Then in 1992, petroleum product was allegedly encountered while installing a utility trench west and upgradient of the pipeline.

In 1992-1993 an SI was conducted. It focused on two principal areas of possible contamination. A passive soil-gas survey was conducted at the site. During the installation of the samplers, visibly contaminated soil was observed along the pipeline at a depth of 1 ft bgs. A second, real-time soil-gas survey was also conducted to characterize the site further. Kerosene was detected in a sample; however, TPH was not detected in any soil samples collected at the site. Based on the SI sample results, HAFB requested site closure; however, the NMED requested additional sampling. Additional sampling was conducted during the 1994 but a more comprehensive site investigation was requested by the NMED in order for HAFB to obtain site closeout.

In 2007, ACM activities were conducted at SS-12 to delineate any potential PCS source area and to evaluate the current groundwater conditions. On April 18, 2008 analytical results were presented in the ACM report and HAFB requested CAC status for SS-12 (Bhate, 2008a). On June 27, 2012 the NMED approved the report and issued a Certificate of Completion for CAC without Controls for SS-12. HAFB was granted permission to initiate a Class 3 PMR for SS-12

(NMED, 2012d). HAFB is currently working on the Class 3 PMR to provide opportunity for public comment for SS-12.

J.1.29 AOC-L (OT-37) Early Missile Test Site

AOC- L is listed as Early Missile Test Site on Table A and is also identified as ERP Site OT-37. It is located in the northeast area of the base along Tula Peak Road.

The Early Missile Test Site was used to develop rocket and guided missile systems from 1947 to 1955. The test site covers an area of approximately 160 acres and the AOC includes three block houses used as communication and observation points, the inclined test track, three vertical launch pads, a large pit northwest of Blockhouse 1142, and four transformer concrete pads (transformers have been removed). Fuels used at these sites included JP-4, kerosene, and solid rocket propellants; PCBs were contained in the transformer dielectric fluid. Solid rocket fuel propellants were thought to have been primarily utilized including nitrocellulose, nitroglycerine, potassium perchlorate, and polysulfide.

In 2007 an ACM investigation was conducted, the initial objective of the investigation was to review available historical information, and to collect additional soil and groundwater analytical data to fill data gaps for identifying potential hazardous source areas. The investigation then focused on determining the extent of PCB and TPH soil contamination associated with each of the four former transformers for potential excavation and removal, evaluate the subsurface conditions of the soil and groundwater at the three vertical launch pads and inclined test track (Bhate, 2007a). The NMED also requested that a tar-like substance in the vicinity of the inclined test track be analyzed for PCBs. Based on analytical results of the 2007 ACM investigation the primary COCs were perchlorate, nitrate, and arsenic. Soil sampling conducted during the investigation did not confirm PCB soil contamination. In January 2010 the Final OT-37 ACM Work Plan Addendum was submitted to fill in the missing data gaps in order to characterize the source area, concentration, and delineate the vertical and horizontal extent of perchlorate, nitrate, and arsenic contamination previously detected in the soil and groundwater at each of the launch pad facilities, through an expanded investigation including additional soil and groundwater sampling and monitoring activities and to determine if previous detections of nitrate in groundwater are from a geogenic (natural) or anthropogenic (human) source (NationView, 2010).

The analytical results from the initial ACM investigation conducted in 2007 and from ACM Addendum expanded investigation conducted in 2010 were presented in the Final Release Assessment Report submitted to NMED in February 2011 demonstrating widespread distribution of perchlorate and nitrate which suggested the possibility of a geogenic source for those contaminants (NationView, 2011b). Recent research at the New Mexico Institute of Mining and the U. S. Geological Survey has shown that subsoil nitrate in desert soils ranges from 2,000 to 10,000 kilograms per hectare (kg/ha). The researchers concluded that this naturally occurring vadose zone nitrogen reservoir had the potential to become mobilized thereby leaching large amounts of nitrate to groundwater (Motzer, 2006).

Additional groundwater sampling was required up gradient of OT-37 within the upper tributaries (Malone and Ritas Draw) of the Lost River Basin (AOC-U). HAFB submitted a Release

Assessment Report on June 12, 2013 addressing these characterization activities which is under NMED review (NMED, 2013a). HAFB is currently awaiting NMED determination for AOC-U before further investigation activities are determined for AOC-L.

J.1.30 AOC-M (RW-70) Building 18 Product Storage Tank

AOC-M is listed as Building 18 Product Storage Tank on Table A and is also identified as ERP Site RW-70. The site is located in a densely populated portion of HAFB across from the Base Medical Facility. The site was identified as a gasoline leak from an underground gasoline storage tank located next to Building 18 at the Old BX Service Station (AOC-Q). The UST was located 50 feet northwest of Building 18. It had previously been included in the remediation activities conducted at AOC-Q.

The BX Service Station operated from the early 1950s until 2000. It featured a gas station, convenience store, and a car wash. In 1981, gas leaks from the USTs were discovered and an investigation was initiated that led to the removal of five underground tanks in 1992. These underground tanks were replaced with three aboveground tanks. In 2000, a new BX Station was built further north on First Street. The original BX Station was taken out of service that same year so that the entire area could be remediated through PCS excavation and removal activities.

In 2003, Building 18 was demolished and the associated above ground structures, tanks, and auxiliary equipment were removed. Soil in the vicinity RW-70 was excavated and removed during the remediation of the USTs associated with AOC-Q and confirmatory sampling was performed. On June 27, 2008 HAFB submitted the results of the sampling and requested CAC status for RW-70 in the RFA Confirmatory Sampling Report (Bhate, 2008b). On July 18, 2012 the NMED approved the report and issued a Certificate of Completion for CAC without Controls for RW-70. HAFB was granted permission to initiate a Class 3 PMR for RW-70 (NMED, 2012e). HAFB is currently working on the Class 3 PMR to provide opportunity for public comment for RW-70.

J.1.31 AOC-O (OT-45) Building 296 Old AGE Refueling Station

AOC-O is listed as Building 296 Old Aerospace Ground Equipment (AGE) Refueling Station on Table A and is also identified as ERP Site OT-45 (formerly Site 51). The site is located near the intersection of West Delaware Avenue and West Fourth Street, south of the Building 296 parking lot in a densely populated portion of HAFB.

The Old AGE Refueling Station consisted of three USTs (two 12,500 gallon tanks and one 10,000 gallon tank) that stored Motor Gasoline/ Mobility Gasoline (MOGAS), diesel, and JP-4. The site was also equipped with a pump island and fuel dispensing station. The site including the three USTs was removed in the 1980s during the renovation of Building 296. It was replaced with a parking lot and landscaped area. During the excavation of a utility trench at the site, liquid hydrocarbons were discovered floating on the water table.

In September 1984, the site was investigated during the Phase II SI. At the time of the SI soil was noted to have a strong odor of fuel. Site characterization sampling was conducted as part of RI activities in 1988 and 1989. In September 1991, remedial action excavation of PCS was performed. Following the excavation, the pit was backfilled with clean fill. In 1994 subsurface confirmation sampling determined that TPH-GRO and TPH-DRO exceeded Base-specific cleanup levels, however, HAFB requested site closeout because the contamination was believed to be limited. The NMED rejected HAFB's request and recommended a complete delineation and remediation of the remaining PCS that was above the NMED SSL.

ACM activities were conducted in 2007 and 2008 to delineate the extent of the remaining PCS contamination and for source removal. Further excavation took place and confirmation samples and risk assessment was performed on remaining constituents in soil and groundwater to determine if site closure had been achieved. In the ACM Completion Report submitted on December 18, 2008, HAFB requested OT-45 be granted CAC status without controls. On August 13, 2012, the NMED approved the report and issued a Certificate of Completion for CAC without Controls for OT-45. HAFB was granted permission to initiate a Class 3 PMR for OT-45 (NMED, 2012f). HAFB is currently working on the Class 3 PMR to provide opportunity for public comment for OT-45.

J.1.32 AOC-Q (SS-17) BX Gas Station Fuel Line Leaks

AOC- Q is listed as Base Exchange (BX) Gas Station Fuel Line Leaks on Table A and is also identified as ERP Site SS-17. The site is located in a densely populated portion of HAFB across from the Base Medical Facility. The gas station had occupied approximately one and one-half (1.5) acres and previously contained five USTs. The gas station had been in that location since the early 1950s until 2001 when a new BX Gas Station was built 0.5 miles to the north.

In January 1981, discrepancies in the MOGAS storage tank inventories prompted an investigation of Site SS-17. Excavation of the area showed that fuel had been leaking through two corroded tanks and several fuel lines. An estimated 100,000 to 150,000 gallons of MOGAS had leaked from the fuel system. The underground fuel lines were replaced and a tank pressure testing program was implemented.

In 1983, a Phase I evaluation identified SS-17 as the site with the highest potential for environmental impact at HAFB. In 1984, a Phase II investigation was performed to further characterize the extent of the suspected gasoline plume; the estimated amount of gasoline contamination was 71,000 gallons (WHA, 1992). Product recovery operations occurred from January to December 1987. In 1988, a comprehensive Technical Report was prepared in which the extent of gasoline contamination was further characterized and recovery efforts resumed in 1989.

A RFI Investigation/Feasibility Study (RI/FS) occurred in 1990 and 1991. In 1992, the USTs at the site were removed and replaced with ASTs. In 1993, a Soil Vapor Extraction (SVE) pilot test was conducted on site and full scale construction of a SVE/bioremediation system began in September 1995. The SVE system was in operation until May 2002. SS-17 was added to the LTM program in 1997 for groundwater. From 2001 through 2002 the former BX Gas Station was demolished and these services relocated to a new facility in its present location on the east side of First Street.

A RFI was conducted in 2006 to review available information and to collect additional soil and groundwater data to fill data gap requirements identified by the NMED and to include a risk based evaluation (Bhate, 2006). This RFI concluded that residual soil and groundwater concentrations were protective of future onsite receptors and recommended a no further action (NFA) status for SS-17 (Bhate, 2006). The NMED rejected HAFB's proposal and further investigation and monitoring to characterize contamination at SS-17 was required.

Well installation and sample analyses were performed under the *Memorandum Work Plan for SS-17 Groundwater Characterization Work Plan, HAFB, New Mexico* (NationView, 2011d). The primary objective of the investigation was to delineate the extent of PCS where data gaps existed and to characterize and evaluate the water quality at SS-17. Subsequently, more monitoring wells were added and installation efforts were completed in May and June 2011 to obtain additional soil and groundwater data. Several fuel related contaminants were detected above the groundwater standards and serve as a baseline for future assessments to assist in evaluating the effectiveness of future remedial actions (NationView, 2011g).

In 2009, an ACM Work Plan was submitted specifically to address the off-site area immediately northeast of the former BX Gas Station and address the residual low concentrations of hydrocarbons (Tetra Tech, 2009c). In the pre-design characterization study in January 2010 it was determined that the corrective measures proposed in the ACM Work Plan were insufficient. In February 2013 the SACM Work Plan was submitted to NMED to address using AISEB techniques on PCS soil and groundwater contamination inaccessible by excavation (NationView, 2013a). Corrective measures are currently in progress and further remedial actions and LTM are anticipated.

J.1.33 AOC-T (SS-02/05) POL Storage Tank Spill Sites 1 & 2

AOC- T is listed as POL Storage Tank Spill Sites 1 and 2 on Table A and is also identified as ERP Site SS-02/05 and occupies approximately one-third acre in the northeastern portion of the POL storage yard, approximately 900 ft west of the HAFB boundary. Because of the proximity of the two spill sites, they were combined together as one AOC.

The POL storage site was previously occupied by fourteen 25,000-gallon aboveground diesel and jet fuel storage tanks that were located within the former bermed area. AOC-T consists of two petroleum spill sites, Spill Site No. 1 (ERP SS-02) and Spill Site No. 2 (ERP Site SS-05). At Spill Site No. 1, spills of JP-4 and aviation gasoline (AVGAS) occurred from the early 1960s to the late 1970s within the unlined bermed area when the fuel tanks were periodically overfilled. At Spill Site No. 2, approximately 30,000 gallons of JP-4 were spilled in 1978 when a drain valve for a 4-inch fuel line was accidentally left open. Approximately 95 percent (28,500 gallons) of the spilled fuel was recovered while the remaining fuel seeped into the gravel base of the bermed area. In 1987 the 14 storage tanks were removed; the tank saddles were left in place and covered with 4 ft of soil previously used for the berm that surrounded the tanks.

Site SS-02/05 was part of the 29 Waste Sites RI conducted in 1991 (Radian, 1992) and in 1993, during the Pre-Design Investigation (PDI) it was determined that an approximate area of 9,200 sq ft and a volume of 5,100 cubic yards (CY) of soil beneath the mounded area covering the former tank saddles had TPH concentrations above the cleanup criterion. The Feasibility Study recommended a soil vapor extraction (SVE) system and biodegradation for the remediation of the petroleum contaminated soil (PCS) (Radian, 1993b).

In 1994, a Phase II RFI was conducted to determine the extent of groundwater contamination down gradient from SS-02/05. Conditional NFA status was recommended for SS-02/05; conditions involved soil remediation and a long-term groundwater monitoring program of the site (FWENC/ Radian, 1995). The NMED approved the recommendation on November 2, 1992 and an approved SVE system was installed in late 1994 which became operational in April 1995 (NationView, 2011c). As a result of the conditional NFA status, SS-02/05 was added to the HAFB LTM program in 1995. The LTM program resulted in the approval of NFA status by the NMED in 1998 with the condition that if groundwater contamination occurred as a result of discharge from AOC-T that the corrective actions would be considered inadequate and further investigation would be required (NationView, 2011c). Based on free-phase product found in the groundwater in 1999, additional sampling occurred in 2002 to further characterize contamination under the Final Letter Work Plan (FWENC, 2002). In 2004 and 2005, further PCS excavation and landfarming treatment remedial actions were conducted under a VCM Work Plan (Bhate, 2003b). Then as part of the 2005 LTM Report, additional VOC groundwater contamination characterization was recommended (Bhate, 2006).

On October 4, 2006 the NMED requested further investigation activities to address groundwater contamination (NMED, 2006b). Results of continued site investigation and remedial actions were reported in the 2011 ACM Completion Report which presented the recommended NFA status for SS-02/05 (NationView, 2011c). On September 20, 2013 citing insufficient groundwater monitoring data the NMED issued a letter of Disapproval of the ACM Report (NMED, 2013b). Further investigation is required at Site SS-02/05.

J.1.34 AOC-U Lost River Basin

AOC-U is listed as Lost River Basin on Table A. AOC- U is located within the northern portion of HAFB. It is considered an environmentally sensitive area under agreement between HAFB, White Sands Missile Range (WSMR), the National Park Service (NPS), the U.S. Fish and Wildlife Service (USFWS), and the New Mexico Department of Game and Fish (NMDGF) for the protection of the threatened White Sands pupfish.

The Lost River Basin is a large intermittent drainage basin that receives annual runoff from six ERP sites that include nine SWMUs and AOCs sites located along its perimeter, some of which are CAC without controls. Based on their proximity to the Lost River Basin and its tributaries several of these ERP sites may have contributed contaminants via surface water runoff and/or groundwater infiltration into the Basin over time. The six potential contributing ERP sources listed below:

- OT-04 (SWMU 102) – Acid Trailer Disposal Site – CAC without controls
- OT-37 (AOC-L) – Early Missile Test Site
- OT-38 (SWMU 137) – Test Sled Maintenance Area
- SS-39 (SWMUs 165, 177, 179, and 181) – Missile Fuel Spill Area
- LF-40 (SWMU 103) – Causeway Rubble Disposal Area – CAC without controls
- DP-62 (AOC-RD) – Rita Draw Disposal Pit – CAC without controls

Due to the potential for contamination from multiple sites and the size of the area contributing to AOC-U, the nature and extent of soil and groundwater contamination resulting from historical releases from up gradient ERP sites had not been completely defined. Further RFI activities were conducted in 2011 at AOC-U. The primary objective of the RFI activities performed at AOC-U in 2011 was to determine if the adjacent ERP sites had impacted the soil and water quality within the Lost River Basin watershed (NationView, 2013b).

Initially AOC-U had been identified as an AOC that warranted further investigation during the 1988 RFA Report based on visual observations of releases of constituents to the soil from the adjacent test sled launch area identified as SS-39. The results from the RI conducted at 29 different waste sites in 1992 were used to establish the analytical sampling requirements for the each of the drainages (Radian, 1992). Based on the contaminants identified at the up gradient source areas, soil samples were analyzed for AOC-U and it was concluded that it was unlikely that this AOC posed a significant risk to human health or the environment (Radian, 1994).

In May 2011 the *Technical Memorandum RFI Groundwater and Surface Water Sampling, Lost River Basin (AOC-U) Holloman AFB, New Mexico* report was submitted to the NMED, presenting the results of groundwater and surface water samples collected (NationView, 2011e). Although the RFI Work Plan (NationView, 2009b) had been under review at the time of sampling, in a meeting with the NMED on January 24, 2010, HAFB was directed to proceed with groundwater and surface water sampling events (NMED, 2010b). The RFI Completion Report was submitted to the NMED in March 2013. Based on the soil, surface soil, groundwater, and surface water characterization results gathered from the RFI activities, HAFB has proposed that the NMED grant the Lost River Basin NFA status. Currently the 2013 RFI Completion Report is under NMED review.

J.1.35 AOC-UST-221 (TU/US-C503) Building 221 UST

AOC-UST-221 is listed as Building 221 UST on Table A and is also identified as ERP Site TU/US-C503. Records for former UST site TU503 indicate a 300-gallon steel diesel UST (URS, 2009) associated with Building 221 was removed in 1991 (Shaw, 2012b). The tank had no known internal or external tank protection and the associated piping was bare steel. The tank had been in service for 5 years (estimated) prior to closure. Upon removal it was discovered that the soil directly beneath the tank contained elevated TPH contamination and as part of the UST removal, that soil was removed. However, it was determined that it would still be necessary to determine the lateral extent of contaminated soils. Approximately 42 CY of soil were excavated from the site and an additional trench was excavated to delineate the contamination based on visual inspection (Shaw, 2012a). Monitoring wells were installed and sampling results from wells down gradient did not exceed the New Mexico Water Quality Control Commission (NMWQCC) water quality standards (URS, 2014). On April 22, 2014, HAFB submitted an Interim Measures Work Plan the NMED which included further investigation activities for AOC-UST-221. On August 6, 2014, the NMED issued approval of the work plan (NMED, 2014c). HAFB is currently working under this work plan to conduct investigation activities at AOC-UST-221.

J.1.36 AOC-UST-298 (TU/US-C508) Building 298 UST

AOC-UST-298 is listed as Building 298 UST on Table A and is also identified as ERP Site TU/US-C508. Records for former UST site TU508 indicate three USTs associated with Building 298 were removed in 1996. The three USTs were each constructed of fiberglass reinforced plastic (URS, 2009). Two of the tanks had a capacity of 5,000 gallons each; one held jet fuel (JP4/8) and the other held gasoline. A third tank had a capacity of 3,000 gallons and held diesel fuel. There was no internal or external tank protection and the associated piping was also fiberglass reinforced plastic. Soil samples were collected from the walls and floor of the excavation and from the resultant soil stockpile following soil removal. Analytical results for the soil samples taken from the stockpile indicated TPH-DRO contamination. As a result, additional soil (600 CY) was excavated from the UST site at the time of UST closure and removal (URS, 2009). Monitoring wells were installed and soil and groundwater samples were collected as part of the VCM (URS, 2014). On April 22, 2014, HAFB submitted an Interim Measures Work Plan the NMED which included further investigation activities for AOC-UST-298. On August 6, 2014, the NMED issued approval of the work plan (NMED, 2014c). HAFB is currently working under this work plan to conduct investigation activities at AOC-UST-298.

J.1.37 AOC-UST-889 (TU/US-C515) Building 889 UST

AOC-UST-889 is listed as Building 889 UST on Table A and is also identified as ERP Site TU/US-C515. The former UST was located near Building 889 in an industrial area of HAFB. Records indicate that a UST associated with Building 889 was closed in 1992. There are no records available to identify the size, contents, or possible contaminants associated with the tank (Shaw, 2012d).

AOC-UST-889 was included in the 2012 RFI Work Plan for Group 2 that was submitted concurrently with a VCM Request to remove 40 cubic yards of soil at the site as part of an accelerated corrective action (Shaw, 2012d). The RFI Work Plan was to be implemented if additional soil removal, greater than the requested 40 CY, was to be removed from the site (Shaw, 2012c). No RFI Report has been submitted to NMED for review for this site. AOC-UST-889 requires further investigation.

J.1.38 AOC-UST-901 (TU/US-C506) Building 901 UST

AOC-UST-901 is listed as Building 901 UST on Table A and is also identified as ERP Site TU/US-C506. Records for former UST site TU506 indicate a 250-gallon bare steel UST used for storing diesel or used oil associated with Building 901 was removed in 1991. The tank had been in service for 31 years and was in poor condition exhibiting severe corrosion at the time of closure. There was no known internal or external tank protection and the associated piping was bare steel. Soil contamination was noted during closure; a soil sample taken below the tank had a revealed elevated TPH. There are no records to demonstrate that soil remediation was performed at that time (URS, 2014). On April 22, 2014, HAFB submitted an Interim Measures Work Plan the NMED which included further investigation activities for AOC-UST-901. On August 6, 2014, the NMED issued approval of the work plan (NMED, 2014c). HAFB is currently working under this work plan to conduct investigation activities at AOC-UST-901.

J.1.39 AOC-UST-7003 (TU/US-C518) National Radar Test Facility UST

AOC-UST-7003 is listed as National Radar Test Facility UST on Table A and is also identified as ERP Site TU/US-C518. Records for former UST site TU518 at Building 7003 indicate that the associated UST was removed from the National Radar Testing Facility in 2008 (URS, 2009). During excavation, contamination was evident from the top of the excavation down toward the UST, indicating that the contamination was due to repeated overfills. Sample results confirmed TPH contamination. According to Base personnel, the NMED was on site and verified that the tank was in sound condition and that the contamination was due to overfilling. The UST removal project was not funded for remediation; therefore, the excavation was filled with clean soil without removing all contamination. Soil excavation was performed as a VCM activity to remove polynuclear aromatic hydrocarbons (PAH) impacted soil; as a result additional petroleum hydrocarbon impacted soil was exposed. Approximately 45.5 CYs of soil were excavated and removed for off-site disposal; TPH-DRO soil contamination was delineated. Additionally, monitoring wells were installed and soil samples were collected; however, groundwater was not investigated due to direct push technology (DPT) refusal (URS, 2014).

As part of a Defense Environmental Restoration Account (DERA) study for AFCEC, a number of sites were evaluated to determine eligibility for cleanup funding under DERA. The DERA Evaluation Report included historical site information and recommended that these sites be further investigated (URS, 2009). The sites were previously investigated under the VCM program conducted in 2012 with the intention of concurrently conducting a RFI; however, the RFI Work Plan and Completion Report have not been reviewed by the NMED. The VCM activities and analytical results were instead compiled in a Sample Completion Report (Shaw, 2013) and rolled into the DERA Draft Interim Measures Work Plan to subsequently be included in an IM Completion Report (URS, 2014). On April 22, 2014, HAFB submitted the Interim Measures Work Plan to the NMED. On August 6, 2014, the NMED issued approval of the work plan (NMED, 2014c). HAFB is currently working under this work plan to conduct investigation activities at AOC-UST-7003.

J.1.40 AOC-UST-300 (TU/US-C500) Building 300 UST

AOC-UST-300 is listed as Building 300 UST on Table A and is also identified as ERP Site TU/US-C500. The former UST site is located near Building 300 (a jet engine maintenance shop) in the main base area at HAFB. Closure records for the Building 300 UST indicate that it was a 10-ft diameter by 30-ft long diesel UST made of fiberglass with a capacity of approximately 15,000 gallons that was removed from near Building 300 in 1990. The tank closure report indicates that the UST was located below the water table level and that groundwater samples were collected at the time of site closure; however, groundwater analytical results were not provided in the closure report. There are also no records to indicate whether contamination was found or if soil samples were taken at the time of site closure (Shaw, 2012b).

There are no records to indicate that any other investigative or remedial activities took place at the site prior to the investigative activities that were performed under the 2012 RFI Work Plan for Group 3 that was submitted concurrently with a VCM Request to remove 40 cubic yards of soil at the site as part of an accelerated corrective action (Shaw, 2012b). The RFI Work Plan was to be implemented if additional soil removal, greater than the requested 40 CY, was to be removed from the site (Shaw, 2012a). The RFI Work Plan employed the approach outlined in the Basewide Septic Tank SWMUs, RFI Work Plan (URS, 2010).

Monitoring wells were installed and soil and groundwater samples were collected during the 2012 RFI and the nature and extent of potential soil contamination was defined. On October 7, 2013 the September 2013 RFI Report was submitted to the NMED. Two groundwater COPCs, arsenic and manganese, were identified. CAC without controls was recommended if HAFB continued its present practice of having off-site water supplied to HAFB. Should that scenario change, the RFI Report recommended that the site maintain CAC status but reevaluate whether or not land use controls would be necessary (Shaw, 2013b). This RFI Report is currently under review by the NMED.

J.1.41 AOC-UST-301 (TU/US-C504) Building 301 UST

AOC-UST-301 is listed as Building 301 UST on Table A and is also identified as ERP Site TU/US-C504. The former UST site is located near Building 301 in the main base area at HAFB. Closure records for the Building 301 UST indicate that is was a 10-ft diameter by 40-ft long diesel UST made of fiberglass with a capacity of approximately 25,000 gallons that was removed from former Building 301 in 1990. Upon removal the tank showed signs of leaking. There are no records to indicate whether samples were taken or if remediation was conducted at the time of site closure (Shaw, 2012b).

There are no records to indicate that any other investigative or remedial activities took place at the site prior to the investigative activities that were performed under the 2012 RFI Work Plan for Group 3 that was submitted concurrently with a VCM Request to remove 40 cubic yards of soil at the site as part of an accelerated corrective action (Shaw, 2012b). The RFI Work Plan was to be implemented if additional soil removal, greater than the requested 40 CY, was to be removed from the site (Shaw, 2012a). The RFI Work Plan employed the approach outlined in the Basewide Septic Tank SWMUs, RFI Work Plan (URS, 2010).

Monitoring wells were installed and soil and groundwater samples were collected during the 2012 RFI and the nature and extent of potential soil contamination was defined. On October 7, 2013 the September 2013 RFI Report was submitted to the NMED. Two groundwater COPCs, arsenic and manganese, were identified. CAC without controls was recommended if HAFB continued its present practice of having off-site water supplied to HAFB. Should that scenario change, the RFI Report recommended that the site maintain CAC status but reevaluate whether or not land use controls would be necessary (Shaw, 2013c). This RFI Report is currently under review by the NMED.

J.1.42 AOC-UST-684 (TU/US-C516) Building 684 UST

AOC-UST-684 is listed as Building 684 UST on Table A and is also identified as ERP Site TU/US-C516. The former UST was located near Building 684 in an industrial area of HAFB. Records from the Tank Closure Report indicate that a 150-gallon diesel fuel UST associated with Building 684 was closed in 1991. The UST was constructed of a bare steel tank and associated steel piping. There was no indication that soil was removed during tank closure. Four soil samples were collected in December 1991 and analyzed for TPH; no TPH was detected in any of the samples (Shaw, 2013d).

AOC-UST-684 was included in the 2012 RFI Work Plan for Group 2 that was submitted concurrently with a VCM Request to remove 40 cubic yards of soil at the site as part of an accelerated corrective action (Shaw, 2012d).

On September 17, 2012 soil samples were collected during the 2012 RFI, however, no water bearing zone was detected in any of the soil borings. As a result a groundwater investigation was not performed. No COPCs were detected in the soil above the New Mexico Residential Soil criteria nor were they identified in the risk based assessment; therefore, it was determined that no action is needed for soil at Building 684 (Shaw, 2013d). On October 7, 2013 the September 2013 Final RFI Report was submitted to the NMED; CAC without controls was recommended for the site. On August 6, 2014, the NMED approved the report and granted HAFB permission to initiate a Class 3 permit modification request (PMR) for AOC-UST-684 (NMED, 2014d). HAFB is currently working on the Class 3 PMR to provide opportunity for public comment for AOC-UST-684.

J.1.43 AOC-UST-882 (TU/US-C514) Building 882 UST

AOC-UST-882 is listed as Building 882 UST on Table A and is also identified as ERP Site TU/US-C514. The former UST was located near Building 882 in an industrial area of HAFB. Records from the Tank Closure Report indicate that a 110-gallon gasoline fuel UST associated with Building 882 was closed in 1990. The tank had no external protection. There was no indication that soil was removed during tank closure, although a gasoline odor was reported during the closure. Soil sampling indicated the presence of xylene but there are no records to indicate that site remediation was performed (Shaw, 2013e).

AOC-UST-882 was included in the 2012 RFI Work Plan for Group 2 that was submitted concurrently with a VCM Request to remove 40 cubic yards of soil at the site as part of an accelerated corrective action (Shaw, 2012d).

Monitoring wells were installed and soil and groundwater samples were collected during the 2012 RFI. No COPCs were detected in the soil and groundwater samples; therefore no COPCs were selected for the Risk-based health evaluation. Based on these results it was determined that the site did not pose a threat and recommended that no action is needed for soil or groundwater at Building 882 (Shaw, 2013e). On October 7, 2013 the September 2013 Final RFI Report was submitted to the NMED; CAC without controls was recommended for the site. On August 14, 2014, the NMED approved the report and granted HAFB permission to initiate a Class 3 permit modification request (PMR) for AOC-UST-882 (NMED, 2014g). HAFB is currently working on the Class 3 PMR to provide opportunity for public comment for AOC-UST-882.

J.1.44 AOC-UST-898 (TU/US-C513) Building 898 UST

AOC-UST-898 is listed as Building 898 UST on Table A and is also identified as ERP Site TU/US-C513. The former UST was located near Building 898 in an industrial area of HAFB. Closure records indicate that the 3.5-ft by 9-ft diesel UST associated with Building 898 was removed in 1991. Closure Worksheet Comments indicate that the tank had several corrosion pits that were leaking and that sampled soil had elevated TPH contamination as stated in the Tank Closure Report.

Closure records for Building 898 UST indicate that no other investigative or remedial activities took place at the site prior to the investigative activities that were performed under the 2012 RFI Work Plan for Group 3 (Shaw, 2012b). The 2012 RFI Work Plan for Group 3 was submitted concurrently with a VCM Request to remove 40 cubic yards of soil at the site as part of an accelerated corrective action.

One COPC was detected in the soil samples, thallium, that was determined a potential health risk for future residential exposure, while it is not a health risk for current and/or future commercial/industrial worker and construction worker (Shaw, 2013f). Based on these results it was determined that the site did not pose a threat and it was recommended that no action be taken for this location (Shaw, 2013f).

Three groundwater monitoring wells were installed in the vicinity of the former UST and were sampled October 2012 and again in December 2012. Two groundwater COPCs, arsenic and manganese, were identified. CAC without controls was recommended if HAFB continued its present practice of having off-site water supplied to HAFB. Should that scenario change, the RFI Report recommended that the site maintain CAC status but reevaluate whether or not land use controls would be necessary (Shaw, 2013f). On October 7, 2013, the September 2013 Final RFI Report was submitted to the NMED; CAC without controls was recommended for the site. This RFI Report is currently under review by the NMED.

J.1.45 AOC-UST-1097 (TU/US-C505) Building 1097 UST

AOC-UST-1097 is listed as Building 1097 UST on Table A and is also identified as ERP Site TU/US-C505. The former UST was located near Building 1097 in an industrial area of HAFB. Records from the Tank Closure Report indicate that a 500-gallon diesel fuel UST associated with Building 1097 was closed in February 1991. The UST was steel, 4-ft diameter, and 6-ft long. The tank was reportedly in poor condition and showed signs of leakage. Soil sample results taken beneath the tank indicated an elevated TPH concentration; however there are no records to show that remediation was completed (Shaw, 2013g).

AOC-UST-1097 was included in the 2012 RFI Work Plan for Group 3 that was submitted concurrently with a VCM Request to remove 40 cubic yards of soil at the site as part of an accelerated corrective action (Shaw, 2012b). The RFI Work Plan was to be implemented if additional soil removal, greater than the requested 40 CY, was to be removed from the site (Shaw, 2012a). The RFI Work Plan employed the approach outlined in the Basewide Septic Tank SWMUs, RFI Work Plan (URS, 2010). Although a monitoring well was installed at the site, on August 10, 2012 the well was determined to be dry. As a result, a groundwater investigation was not performed. No COPCs were detected in the soil samples and therefore no COPCs were selected for the Risk-based health evaluation. Based on these results it was determined that the site did not pose a threat and it was recommended that no action be taken for this location (Shaw, 2013g).

On October 7, 2013, the September 2013 Final RFI Report was submitted to the NMED; CAC without controls was recommended for the site. This RFI Report is currently under review by the NMED.

J.1.46 AOC-UST-1113 (TU/US-C501) Building 1113 UST

AOC-UST-1113 is listed as Building 1113 UST on Table A and is also identified as ERP Site TU/US-C501. The former UST was located at Building 1113 in an industrial area of HAFB. Records from the Tank Closure Report indicate that a 250-gallon diesel fuel UST associated with Building 1113 (former radar relay facility) was closed in 1996. According to the records there was no internal tank protection, the exterior of the UST was paint covered, and the associated piping was made of copper. Records indicated no evidence of leakage or a spill (Shaw, 2013h). Soil excavation and removal of the UST was conducted in March 1996. The analytical results from soil sampling revealed the presence of elevated TPH-DRO concentrations.

AOC-UST-1113 was included in the 2012 RFI Work Plan for Group 3 that was submitted concurrently with a VCM Request to remove 40 cubic yards of soil at the site as part of an accelerated corrective action (Shaw, 2012b).

A soil investigation at Building 1113 was conducted on July 24 and 25, 2012. The soil samples showed no detections of constituents at concentrations exceeding screening levels, with the exception of arsenic in three samples (which were consistent with background ratios and most likely naturally occurring). Therefore, migration of contamination from soil to the groundwater was not believed to be occurring at the site. As a result, a groundwater investigation was not performed due to a lack of water-bearing zone at the site during the RFI. Based on these results of the RFI and the RA for soil it was determined that the site did not pose a threat and it was recommended that no action be taken for this location (Shaw, 2013h).

On October 7, 2013 the September 2013 Final RFI Report was submitted to the NMED; CAC without controls was recommended for the site. This RFI Report is currently under review by the NMED.

J.1.47 AOC-UST-1272 (TU/US-C507) Building 1272 UST

AOC-UST-1272 is listed as Building 1272 UST on Table A and is also identified as ERP Site TU/US-C507. The former UST was located at Building 1272 in an industrial area of HAFB. Records from the Tank Closure Report indicate that a 600-gallon diesel fuel UST associated with Building 1272 was closed in 1991. The UST was used for fuel storage for a backup generator. The bare steel tank was in good condition with no evidence of soil contamination. A soil sample collected directly below the tank was analyzed for TPH (Shaw, 2013i).

AOC-UST-1272 was included in the 2012 RFI Work Plan for Group 2 that was submitted concurrently with a VCM Request to remove 40 cubic yards of soil at the site as part of an accelerated corrective action (Shaw, 2012d).

The soil investigation at Building 1272 was conducted on July 24 and 25, 2012; however, no water bearing zone was detected in any of the soil borings; therefore, a groundwater investigation was not performed. In one sample, one COPC (Arsenic) was detected in the soil above the New Mexico Residential Soil criteria; however it was not expected to be a risk to human health. Based on the results of the RFI and the RA for soil it was determined that the site did not pose a threat and it was recommended that no action be taken for this location (Shaw, 2013i).

On October 7, 2013 the September 2013 Final RFI Report was submitted to the NMED; CAC without controls was recommended for the site. On August 14, 2014, the NMED approved the report and granted HAFB permission to initiate a Class 3 permit modification request (PMR) for AOC-UST-1272 (NMED, 2014h). HAFB is currently working on the Class 3 PMR to provide opportunity for public comment for AOC-UST-1272.

J.1.48 AOC-UST-2395 (TU/US-C502) Building 2395 UST

AOC-UST-2395 is listed as Building 2395 UST on Table A and is also identified as ERP Site TU/US-C502. The former UST was located at Building 2395 in an industrial area of HAFB. Records from the Tank Closure Report indicate that a 1000-gallon UST associated with Building 2395 was closed in 1991. The bare steel tank was in poor condition with extensive contamination noted in the tank closure records. Records also indicate that the tank was used for both gasoline and diesel storage. There was no indication that soil was removed during tank closure but three soil samples were collected following tank removal and were analyzed for TPH (Shaw, 2013a).

AOC-UST-2395 was included in the 2012 RFI Work Plan for Group 2 was submitted concurrently with a VCM Request to remove 40 cubic yards of soil at the site as part of an accelerated corrective action (Shaw, 2012d). The RFI Work Plan was to be implemented if additional soil removal, greater than the requested 40 CY, was to be removed from the site (Shaw, 2012a). The RFI Work Plan employed the approach outlined in the Basewide Septic Tank SWMUs, RFI Work Plan (URS, 2010).

The soil investigation at Building 2395 was conducted on September 26, 2012. Groundwater was not encountered in amounts sufficient for installation and collection of groundwater samples. Based on the results of the RFI and the RA for soil it was determined that the site did not pose a threat and it was recommended that no action be taken for this location (Shaw, 2013a).

On October 7, 2013, the September 2013 Final RFI Report was submitted to the NMED; Corrective Action Complete without Controls status was recommended for the site. On August 14, 2014, the NMED approved the report and granted HAFB permission to initiate a Class 3 permit modification request (PMR) for AOC-UST-2395 (NMED, 2014i). HAFB is currently working on the Class 3 PMR to provide opportunity for public comment for AOC-UST-2395.

J.1.49 AOC-UST-838 (SS-72) TCE Groundwater Contamination Upgradient of LF-21

AOC-UST-838 is listed as TCE Groundwater Contamination Upgradient of LF-21 on Table A and is also identified as ERP Site SS-72. SS-72 is located in an industrial area of HAFB. Site

SS-72 is identified as the area just north of groundwater monitoring well MW21-01which is an upgradient well for LF-21.

TCE groundwater contamination was discovered during the sampling of monitoring wells MW-21-01, -02, -03, and -04 that were installed as part of the 10 year LTM Program. The four wells were installed to meet monitoring commitments for LF-21.

Aerial photographs taken in 1945, 1972, 1979, 1984, 1996, and 2004 from the area upgradient of monitoring well MW-21-01 were reviewed for signs of spills or maintenance facilities that operated in earlier periods. This review only indicated that the area stretching approximately 800 ft north of this well has remained cleared and undeveloped since 1945. The nearest buildings (800, 806, 816, and 817) where maintenance activities occurred which likely used TCE as a degreaser are near the flight line about 900 ft to the northeast as noted on a site visit made on August 14, 2006.

In April 2007, a SI was conducted to determine if any soil, and/or groundwater contamination existed at the site, and if present, delineate the extent of the contamination. The intention of the investigation was to also collect the proper data to support site closure. In the RFA Confirmatory Sampling Report submitted to the NMED on June 27, 2008, HAFB requested SS-72 be granted CAC status without controls based on the analytical results. On July 18, 2012, the NMED approved the report and issued a Certificate of Completion for CAC without Controls for SS-72. HAFB was granted permission to initiate a Class 3 PMR for SS-72 (NMED, 2012e). HAFB is currently working on the Class 3 PMR to provide opportunity for public comment for SS-72.

J.1.50 AOC-UST-1088 (SS-73) TCE Groundwater Contamination Upgradient of SS-61

AOC-UST-1088 is listed as TCE Groundwater Contamination Upgradient of SS-61 on Table A and is also identified as ERP Site SS-73. It is located in the central part of HAFB in an industrial area. SS-61 is located north of two hangars, Buildings 1079 and 1080. Site SS-73, is generally known to be an open area located about 150 ft east of the concrete pad that is part of Site SS-61.

Site SS-73 results from the occurrence of TCE that was measured in well SS61-MW02 on several occasions as part of Phase I and II RFIs conducted in 1996 and 1997 for SS-61. The source of contamination at SS-61 was determined to be from an AVGAS distribution system that had existed at the site consisting of ASTs, USTs, and leaking distribution lines. The site has undergone extensive remediation including excavation and treatment of PCS, and in-situ remediation of remaining PCS and groundwater with an enhanced bio-remediation system.

In 1999, during groundwater sampling and analysis conducted for RI activities at SS-61, TCE was discovered in well SS61-MW02. This was a location where there was no known source for TCE. As a result, SS-73 was designated to be investigated separately as its own site.

In 2006 and 2007, sampling was conducted to determine if any soil, and/or groundwater contamination existed at the site, and if present, delineate the extent of the contamination. The intention of the investigation was also to collect the proper data to support site closure. The maximum detected TCE concentration in groundwater did not exceed the target levels for indoor inhalation of vapors from groundwater for the future resident or for outdoor inhalation of vapors from groundwater for the future construction workers. In the RFA Confirmatory Sampling Report submitted to the NMED on June 27, 2008, HAFB requested SS-73 be granted CAC status without controls based on the analytical results. On July 18, 2012, the NMED approved the report and issued a Certificate of Completion for CAC without Controls for SS-73. HAFB was granted permission to initiate a Class 3 PMR for SS-73 (NMED, 2012e). HAFB is currently working on the Class 3 PMR to provide opportunity for public comment for SS-73.

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APPENDIX 4-A

TABLE A
LIST OF SOLID WASTE MANAGEMENT UNITS / AREAS OF CONCERN

The Following is the Prioritized list of Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) Requiring Corrective Action.

SERIAL NO.	SWMU/AOC	ERP SITE ID	UNIT NAME
1	4	OW-519	Building 131 Oil/Water Separator
2	8	OW-520	Building 231 Oil/Water Separator
3	19	SS-59	Building 638 Oil/Water Separator
4	20	SS-59	Building 639 Oil/Water Separator
5	82	SD-08	Building 131 Washrack
6	101	LF-10	Building 121 Landfill
7	104	LF-29	Former Army Landfill
8	109	LF-10	Old Main Base Landfill
9	111	RW-42	Radioactive Waste Disposal Area
10	113A	OT-20	Sludge Disposal Trenches near Lagoons
11	113B	DP-30/SD-33	Sludge Disposal Trenches Fire Train Area
12	114	OT-03	TEL Disposal Site
13	118	OT-16	Building 21 Pesticides Holding Tank
14	122	TU-521	Building 702 Waste Oil Tank
15	123	TU-521	Building 704 Waste Oil Tank
16	132	OT-16	Building 21 Entomology Leachfield
17	137	OT-38	Building 1166 Test Track Drain Field
18	141	SD-27	Pad 9 Drainage Pit
19	165	SS-39	Building 1176 Pond
20	177	SS-39	Building 1176 Sumps
21	179	SS-39	Discharge Box
22	181	SS-39	Building 1176 Drainage Trough
23	183	N/A	Base-Wide Sewer System
24	197	OT-14	Former Entomology Shop
25	229	SS-59	Test Cell Fuel Spill Site
26	AOC-1	DP-64	Chemical Agent Site
27	AOC-3	DP-63	Ammunition Yard Disposal Pit
28	AOC-4	N/A	West POL Fuel Spill Site
29	AOC-1001	SS-61	Building 1001 Fuel Spill Site
30	AOC-A	OT-16	Building 21 Pesticide Rinse-water Spill Area
31	AOC-B	SS-65	Building 807 Test Cell Surface Spill Area
32	AOC-C	SS-66	Building 835 Spills
33	AOC-E	SS-67	Buildings 903-909 Sand Blast Residues
34	AOC-H	SS-18	Chromic Acid Spill Area
35	AOC-I	SS-69	Fighter Wing Flight Line Spill
36	AOC-J	SS-13	Herbicide Sodium Arsenite Spill Area
37	AOC-K	SS-12	Northeast Fuel Line Spill Site # 1
38	AOC-L	OT-37	Early Missile Test Site
39	AOC-M	RW-70	Building 18 Product Storage Tank

SERIAL NO.	SWMU/AOC	ERP SITE ID	UNIT NAME
40	AOC-O	OT-45	Building 296 Old AGE Refueling Station
41	AOC-Q	SS-17	BX Gas Station Fuel Line Leaks
42	AOC-T	SS-02/05	POL Storage Tank Spill Sites 1 & 2
43	AOC-U	N/A	Lost River Basin
44	AOC-UST-221	TU/US-C503	Building 221 UST
45	AOC-UST-298	TU/US-C508	Building 298 UST
46	AOC-UST-300	TU/US-C500	Building 300 UST
47	AOC-UST-301	TU/US-C504	Building 301 UST
48	AOC-UST-684	TU/US-C516	Building 684 UST
49	AOC-UST-882	TU/US-C514	Building 882 UST
50	AOC-UST-889	TU/US-C515	Building 889 UST
51	AOC-UST-898	TU/US-C513	Building 898 UST
52	AOC-UST-901	TU/US-C506	Building 901 UST
53	AOC-UST-1097	TU/US-C505	Building 1097 UST
54	AOC-UST-1113	TU/US-C501	Building 1113 UST
55	AOC-UST-1272	TU/US-C507	Building 1272 UST
56	AOC-UST-2395	TU/US-C502	Building 2395 UST
57	AOC-UST-7003	TU/US-C518	National Radar Test Facility UST
58	AOC-UST-838	SS-72	TCE Groundwater Contamination Upgradient of LF-21
59	AOC-UST-1088	SS-73	TCE Groundwater Contamination Upgradient of SS-61

TOTAL OF CORRECTIVE ACTION SITES = 59 [i.e., 25 SWMUSs + 34 AOCs].

APPENDIX 4-A

TABLE B

LIST OF SOLID WASTE MANAGEMENT UNITS / AREAS OF CONCERN WITH CORRECTIVE ACTION COMPLETE WITHOUT CONTROLS

The following is a list of Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) Not Currently Requiring Corrective Action.

SWMU/AOC	DESCRIPTION	COMMENT
1	Building 55 Oil/Water Separator	Site NFAd in February 2001
2	Building 121 Oil/Water Separator	Site NFAd in February 2001
3	Building 130 Oil/Water Separator	Site NFAd in February 2001
5	Building 137 Oil/Water Separator	Site NFAd in February 2001
6	Building 193 Oil/Water Separator	Site NFAd in February 2001
7	Building 198 Oil/Water Separator	Site NFAd in February 2001
9	Building 282 Oil/Water Separator	Site NFAd in February 2001
10	Building 283 Oil/Water Separator	Site NFAd in February 2001
11	Building 300 Oil/Water Separator	Site NFAd in February 2001
12	Building 304 Oil/Water Separator	Site NFAd in February 2001
13	Building 304A Oil/Water Separator	Site NFAd in February 2001
14	Building 306 Oil/Water Separator	Site NFAd in February 2001
15	Building 309 Oil/Water Separator	Site NFAd in February 2001
16	Building 315 Oil/Water Separator	Site NFAd in February 2001
17	Building 316 Oil/Water Separator	Site NFAd in February 2001
18	Building 500 Oil/Water Separator	Site NFAd in February 2001
21	Building 702 Oil/Water Separator	Site NFAd in February 2001
22	Building 704 Oil/Water Separator	Site NFAd in February 2001
23	Building 800 Oil/Water Separator	Site NFAd in February 2001
24	Building 801 Oil/Water Separator	Site NFAd in February 2001
25	Building 805 Oil/Water Separator	Site NFAd in February 2001
26	Building 809 Oil/Water Separator	Site NFAd in February 2001
27	Building 810 Oil/Water Separator	Site NFAd in February 2001
28	Building 822 Oil/Water Separator	Site NFAd in February 2001
29	Building 827 Oil/Water Separator	Site NFAd in February 2001
30	Building 830 Oil/Water Separator	Site NFAd in February 2001
31	Building 855 Oil/Water Separator	Site NFAd in February 2001
32	Building 868 Oil/Water Separator	Site NFAd in February 2001
33	Building 869 Oil/Water Separator	Site NFAd in February 2001
34	Building 902 Oil/Water Separator	Site NFAd in February 2001
35	Building 903 Oil/Water Separator	Site NFAd in February 2001
36	Building 1000 Oil/Water Separator	Site NFAd in February 2001
37	Building 1080 Oil/Water Separator	Site NFAd in February 2001
38	Building 1080A Oil/Water Separator	Site NFAd in February 2001
40	Building 1166 Oil/Water Separator	Site NFAd in February 2001
41	Building 1266 Oil/Water Separator	Site NFAd in February 2001
42	Building 1 Waste Accumulation Area	Site NFAd in February 2001

SWMU/AOC	DESCRIPTION	COMMENT
43	Building 55 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
44	Building 121 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
45	Building 195 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
46	Building 198 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
47	Building 280 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
48	Building 282 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
49	Building 300 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
50	Building 301 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
51	Building 308 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
52	Building 500 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
53	Building 638 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
54	Building 702 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
55	Building 702A Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
56	Building 807 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
57	Building 809 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
58	Building 822 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
59	Building 837 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
60	Building 844 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
61	Building 851 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
62	Building 855 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
63	Building 867 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
64	Building 869 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
65	Building 901 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
66	Building 901 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
67	Building 909 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
68	Building 910 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.

SWMU/AOC	DESCRIPTION	COMMENT
69	Building 807 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
70	Building 1119 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
71	Building 1778A Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
72	Building 1178A Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
73	Building 1266 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
74	Building 7005 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
76	DRMO Non-Hazardous Waste Drain	EPA listed the site in 1988 as a SWMU with no further action required.
77	RATSCAT Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
78	Trim Pad 3 WAA	EPA listed the site in 1988 as a SWMU with no further action required.
79	Building 21 Wash rack	EPA listed the site in 1988 as a SWMU with no further action required.
80	Building 55 Wash rack	EPA listed the site in 1988 as a SWMU with no further action required.
81	Building 121 Wash rack	EPA listed the site in 1988 as a SWMU with no further action required.
83	Building 134 Wash rack	EPA listed the site in 1988 as a SWMU with no further action required.
84	Building 137 Wash rack	EPA listed the site in 1988 as a SWMU with no further action required.
85	Building 283 Wash rack	EPA listed the site in 1988 as a SWMU with no further action required.
86	Building 304A Wash rack	EPA listed the site in 1988 as a SWMU with no further action required.
87	Building 306 Wash rack	EPA listed the site in 1988 as a SWMU with no further action required.
88	Building 309 Wash rack	EPA listed the site in 1988 as a SWMU with no further action required.
89	Building 703 Wash rack	EPA listed the site in 1988 as a SWMU with no further action required.
90	Building 801 Wash rack	EPA listed the site in 1988 as a SWMU with no further action required.
91	Building 816 Wash rack	EPA listed the site in 1988 as a SWMU with no further action required.
92	Building 822 Wash rack	EPA listed the site in 1988 as a SWMU with no further action required.
93	Building 827 Wash rack	EPA listed the site in 1988 as a SWMU with no further action required.
94	Building 830 Wash rack	EPA listed the site in 1988 as a SWMU with no further action required.
95	Building 902 Wash rack	EPA listed the site in 1988 as a SWMU with no further action required.
96	Building 1080 Wash rack	EPA listed the site in 1988 as a SWMU with no further action required.

SWMU/AOC	DESCRIPTION	COMMENT
97	Building 1119 Wash rack	EPA listed the site in 1988 as a SWMU with no further action required.
98	Building 1166 Wash rack	EPA listed the site in 1988 as a SWMU with no further action required.
99	Building 1266 Wash rack	EPA listed the site in 1988 as a SWMU with no further action required.
100	Pad 9 Wash rack	EPA listed the site in 1988 as a SWMU with no further action required.
102	Acid Trailer Burial Site	EPA listed the site in 1988 as a SWMU with no further action required.
103	Causeway Rubble Disposal Area	EPA listed the site in 1988 as a SWMU with no further action required.
105	LF-19 Golf Course Landfill	Site CACd in March 2013
106	Main Base Landfill	Site NAFd in November 2005
107	Main Base Substation PCB Disposal Area	EPA listed the site in 1988 as a SWMU with no further action required.
108	LF-23 MOBSS Landfill Disposal Trench	Site CACd in March 2013
110	POL Rubble Disposal Area	EPA listed the site in 1988 as a SWMU with no further action required.
112	RATSCAT Disposal Area	EPA listed the site in 1988 as a SWMU with no further action required.
115	LF-22 West Area Landfill #1 PCB Disposal Area	Site CACd in March 2013
116	LF-21 West Area Landfill #2	Site CACd in March 2013
117	Wire Spool Disposal Area	EPA listed the site in 1988 as a SWMU with no further action required.
119	Building 121 Waste Oil Tank	Site NFAd in February 2001
120	Building 309 Waste Oil Tank	Site NFAd in February 2001
121	Building 316 Waste Oil Tank	Site NFAd in February 2001
124	Building 752 Waste Oil Tank	Site NFAd in February 2001
125	Building 868 Waste Oil Tank	Site NFAd in February 2001
126	Building 1000 Waste Oil Tank	Site NFAd in February 2001
127	Building 1092 Waste Oil Tank	Site CACd in March 2013
128	Building 1166 Waste Oil Tank	Site NFAd in February 2001
129	Building 1191 Waste Oil Tank	Site NFAd in February 2001
130	Taxiway 4 Tank 28 JP-4 Underground Waste Tank	Site CACd in March 2013
131	Waste Oil Bowsers	Site NFAd in February 2001
133	Building 703 Wash rack Discharge Pit	Site NFAd in February 2001
134	Buildings 902-924 Drainage Ditch	Site NFAd in February 2001
135	Building 1092 O/W Separator Drainage Pit (FT-31)	Site CACd in March 2013
136	Building 1119 Washrack Drainage Area	Site NFAd in November 2005
138	Building 1166 Oil/Water Sep Drainage Pit	Site NFAd in February 2001
139	SWMU 139 Lake Holloman	Site NFAd in November 2005
140	SWMU 140 Lake Stinky	Site NFAd in November 2005
142	Wastewater Influent Chamber	Site NFAd in February 2001
143	Bar Screen	Site NFAd in February 2001
144	Comminutor	Site NFAd in February 2001
145	Grit Chamber	Site NFAd in February 2001
146	Parshall Flume and Wet Well	Site NFAd in February 2001
147	Splitter Box	Site NFAd in February 2001

SWMU/AOC	DESCRIPTION	COMMENT
148	Sewage Lagoon A	Closed June 30, 2000
149	Sewage Lagoon B	Closed June 30, 2000
150	Sewage Lagoon C	Closed June 30, 2000
151	Sewage Lagoon D	Closed June 30, 2000
152	Sewage Lagoon E	Closed June 30, 2000
153	Sewage Lagoon F	Closed June 30, 2000
154	Sewage Lagoon G	Closed June 30, 2000
155	Sludge Drying Beds	Site NFAd in February 2001
156	Imhoff Tanks (5)	Site NFAd in February 2001
157	ABLE 51 PCB Storage Area	Site NFAd in February 2001
158	PCB Storage Bunker	Site NFAd in February 2001
159	Building 500 Pb Storage Shelves	Site NFAd in February 2001
160	Building 500 NiCd Battery Storage Area	Site NFAd in February 2001
161	Building 844 Battery Storage Area	Site NFAd in February 2001
162	DLADS Scrap Metal Storage Area	EPA called this site a SWMU in 1988, but did not require corrective action.
163	DLADS Wood Pile	EPA called this site a SWMU in 1988, but did not require corrective action.
164	Building 1080 Pond	Site NFAd in February 2001
165	Building 1176 Pond	Site NFAd in February 2001
166	SD-25 MOBSS Drainage Lagoon	Site NFAd in November 2005
167	Test Shed Launch Area Collection Basin	EPA listed the site in 1988 as a SWMU with no further action required.
169	Burn Kettle	EPA listed the site in 1988 as a SWMU with no further action required.
170	Fire Department Training Area 1 (FT-31)	Site CACd in March 2013
171	Fire Department Training Area 2 (FT-31)	Site NFAd in February 2001
173	Building 198 Sand Trap	EPA listed this as a SWMU in the 1988 RFA Report
174	Building 231 Hobby Shop Silver Recovery Unit	EPA listed this as a SWMU in the 1988 RFA Report
176	Building 844 Sand Trap	EPA listed this as a SWMU in the 1988 RFA Report
178	Building 1191 Fuel Runoff Pits	Site NFAd in February 2001
180	Building 301 Outdoor Drainage Flume	Site NFAd in February 2001
182	Building Floor Drains	Site NFAd in February 2001
184	Wastewater Re-circulation Line	Site NFAd in February 2001
185	Building 322 Silver Recovery Unit	EPA identified this site as a SWMU in 1988.
186	Hospital Silver Recovery Unit	EPA identified this site as a SWMU in 1988.
187	West Area Silver Recovery Unit	EPA identified this site as a SWMU in 1988.
188	Building 161 Acid Neutralization Unit	EPA identified this site as a SWMU in 1988.
189	Building 282 Recycling Area	EPA identified this site as a SWMU in 1988.

SWMU/AOC	DESCRIPTION	COMMENT
190	Building 500 Battery Neutralization Unit	EPA identified this site as a SWMU in 1988.
191	Building 855 Concrete pad	EPA identified this site as a SWMU in 1988.
192	Coco Block House Disposal Well	EPA identified this site as a SWMU in 1988.
193	Trash Dumpster	EPA identified this site as a SWMU in 1988.
194-228	SWMUs which no Longer Exist or Could not be located	EPA identified this site as a SWMU in 1988.
212	Former north Area Wash Rack	Site NFAd in February 2001
230	Building 828 Fuel Spill Site	Site NFAd in February 2001
231	Incinerator/Landfill	Site NFAd in February 2001
194-228	SWMUs which no Longer Exist or Could not be located	EPA listed the site in 1988 as a SWMU with no further action required.
AOC-2	Sewage Drainage Pit NE of Building 864	Site CACd in March 2013
AOC-BBMS	Bare Base Mobility Squadron Spill Area	EPA called this site a SWMU in 1988, but did not require corrective action .
AOC-D	SD-26 Building 882 Spills	EPA called this site a SWMU in 1988, but did not require corrective action .
AOC-F	Asphalt Tank Spill Area (SS-68)	Site CACd in March 2013
AOC-FST837	Building 837 Fuel Spill Site	Site NAFd November 2005
AOC-G	Atlas Substation PCB Spill	EPA called this site a SWMU in 1988, but did not require corrective action .
AOC-N	SS-48 Building 137 Military Gas Tank Leak	Site CACd March 2013
AOC-P	OT-44 Building 301 Fuel Tank Leak	Site CACd March 2013
AOC-R	JP-4 Fuel Line Spill Site (SS-06)	Site CACd March 2013
AOC-RD	DP-62 Rita’s Draw Disposal Pit	Site NAFd November 2005
AOC-RR	Buried RR Cars.	EPA called this site a SWMU in 1988, but did not require corrective action.
AOC-S	Leaking Underground Storage Tank (BHUST)	Site CACd in March 2013
AOC-V	SS-57 Officer’s Club	Site CACd in March 2013
AOC-PRI-A	Sewer Line from Primate Research Laboratory	EPA listed the site in 1988 as a SWMU with no further action required.
AOC-PRI-S	Primate Research Lab Borehole Disposal Site.	EPA called this site a SWMU in 1988, but did not require corrective action.
AOC-PRI-1	Primate Research Institute (PRI) Building 1264: Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
AOC-PRI-2	PRI Building 1264 Solvent Burn Area (OT-35)	Site CACd in March 2013
AOC-PRI-3	PRI Building 1264 Biological Incinerator	EPA listed the site in 1988 as a SWMU with no further action required.
AOC-PRI-4	PRI Building 1264 Quarantine Area Incinerator	EPA listed the site in 1988 as a SWMU with no further action required.
AOC-PRI-5	PRI Building 1264 Solvent Burn Area (OT-35)	Site CACd in March 2013

OPERATING/CLOSED UNIT	DESCRIPTION	COMMENT
20,000-Pound Open Detonation (OD) Treatment Unit/SWMU # 168.	The OD Unit	Site undergoing closure.
Container Storage Unit/SWMU # 75	Hazardous Waste Management Unit	Site closed. NMED approved Closure on January 5, 2015..
300-Pound Open Burn (OB) Unit. This site was listed in the 1988 RFA Report as SWMU 172.	The OB Unit	The OB Unit was under Interim from 1965 to 1979. HAFB conducted risk-based closure as per approved Work Plan of 1997. NMED approved Closure of this site on February 3, 1997.

APPENDIX 4-A

TABLE C

LIST OF SOLID WASTE MANAGEMENT UNITS / AOCS WITH CORRECTIVE ACTION COMPLETE WITH CONTROLS

The following is a list of Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) with Corrective Action Complete with Controls.

SWMU/AOC	**Control(s) Needed**	**Comment**