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

ENTERED

FEB 13 2012

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Holloman AFB NM 88330-5840

FEB 2012

New Mexico Environment Department
Attn: Mr. John Kieling (Acting Chief)
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe NM 87105-6303

Dear New Mexico Environment Department

Holloman Air Force Base is pleased to submit the Expanded Closure and Post-Closure Care Plan 20,000 Pound Open Detonation Unit for your review.

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 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.

If you have any questions, please contact Mr. David Scruggs of our Asset Management Flight at (575) 572-5395.

Sincerely

20120214

A. DAVID BUDAK, GS-14, DAFC

Attachment:
Expanded Closure and Post-Closure Care Plan 20,000 Pound Open Detonation Unit

cc:

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7011 1570 0001 7951 5127

EXPANDED CLOSURE AND POST-CLOSURE CARE PLAN
20,000-POUND OPEN DETONATION UNIT
NMED PERMIT NO. NM6572124422

Prepared For:

49 CES/CEAN
Holloman Air Force Base
New Mexico

Under Contract To:
U.S. Army Corps of Engineers-
Albuquerque District
HTRW Branch
4101 Jefferson Plaza NE
Albuquerque, New Mexico 87109-3435

Contract No. W912PP-09-D-0003 DO. 0010
NationView Project No.: 8091003.010

February 2012

Holloman Air Force Base

EXPANDED CLOSURE AND POST-CLOSURE PLAN FOR THE 20,000-POUND OPEN DETONATION TREATMENT UNIT

HOLLOMAN AIR FORCE BASE, NEW MEXICO

NMED Permit No. NM6572124422

Prepared for:

49 CES/CEAN
Holloman Air Force Base
New Mexico

Under Contract To:

U.S. Army Corps of Engineers-
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Contract No. W912PP-09-D-0003
Delivery Order No. 0010

February 2012

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EXPANDED CLOSURE AND POST-CLOSURE PLAN FOR THE 20,000-POUND OPEN DETONATION TREATMENT UNIT

HOLLOMAN AFB, NEW MEXICO

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EXPANDED CLOSURE AND POST-CLOSURE PLAN FOR THE 20,000-POUND OPEN DETONATION TREATMENT UNIT

HOLLOMAN AFB, NEW MEXICO

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Attachments

NMED Notice of Deficiency to Holloman AFB, 29 August 2011

Holloman AFB Correspondence to NMED, 22 September 2011

Acronyms

20K OD	20,000-Pound Open Detonation
ANSI	American National Standards Institute
CFR	Code of Federal Regulations
DLA	Defense Logistics Agency
DRMO	Defense Reutilization and Marketing Office
EOD	Explosive Ordnance Demolition
EPA	Environmental Protection Agency
HAFB	Holloman Air Force Base
HASP	Health and Safety Plan
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NOD	Notice of Deficiency
OD	Open detonation
OSHA	Occupational Safety and Health Administration
PE	Professional Engineer
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
SSL	Soil Screening Level
UXO	Unexploded ordnance

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1 INTRODUCTION AND BACKGROUND

Holloman Air Force Base (HAFB) operated an open detonation (OD) unit for the destruction of ordnance, munitions, incendiaries, and propellants from 1996 through March 2011. The 20K OD Treatment Unit was operated under New Mexico Environment Department (NMED) Permit No. NM6572124422, issued in 1997, and updated in 1998. Permit Attachment F, Closure and Post-Closure Care Plans, prescribes the general requirements for OD unit closure. This *Expanded Closure and Post-Closure Plan for the 20,000-Pound Open Detonation Treatment Unit* (Expanded Closure and Post-Closure Plan) expands upon the permit requirements and standards and provides a specific plan of action for the OD unit closure.

This Expanded Closure and Post-Closure Plan is designed to parallel the specific Sections of Attachment F of the Permit, augmenting the general text as appropriate with specific processes, standards, and requirements. In the sections that follow, 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, describes how HAFB will meet the requirement, or provides additional detail for the requirement.

This Expanded Closure and Post-Closure Plan includes changes that were warranted based on the NMED Notice of Deficiency (NOD) dated 29 August 2011 and Holloman AFB's response to the NOD dated 22 September 2011. The 29 August 2011 NOD and 22 September 2011 Response to Comments are included as an Attachment to this Expanded Closure and Post-Closure Plan.

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2 CLOSURE PLANS

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."

No further clarification is required.

2.2 Summary of Activities Conducted During Active Life

This section clarifies the permit text in Section 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 Section F, "Summary of Closure Activities", summarizes the closure process. Each of the specific tasks and requirements are discussed and detailed in this Expanded Closure and Post-Closure Plan.

2.4 Partial and Final Closure Activities

Text under Section F, "Partial and Final Closure Activities" states: "There will be no partial closure of the OD treatment unit." No clarification of the permit text is needed. The OD Treatment unit will be permanently closed.

2.5 Maximum Waste Inventory

Section 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 OD treatment unit occurred on March 4, 2011. Wastes munitions are not stored at the site.

2.6 Inventory, Removal, Disposal, and Decontamination of Equipment

Text in Section F, under heading "Inventory, Removal, Disposal, and Decontamination of Equipment", presents general steps to achieve the closure standard and requires that appropriate personal protective equipment (PPE) 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 Section F.

Decontamination of sampling equipment is addressed in the *Sampling and Analysis Plan for the Closure of the 20,000-Pound Open Detonation Treatment Unit* (included as Appendix A to this Expanded Closure and Post-Closure Plan).

Project Health and Safety practices will adhere to the *Basewide Health and Safety Plan* (Bhate, 2003a) (Basewide HASP) for closure inspection and sampling activities. All work must be conducted in accordance with the U.S. Army Corps of Engineers (USACE) *Safety and Health Requirements Manual, EM 385-1-1.* It is anticipated that no greater than level D PPE will be required to complete the site inspection and 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.

2.6.1 Site Reconnaissance

This section clarifies the permit text in Section F under the heading "Site Reconnaissance."

A pre-final visual site inspection (as required by Appendix F of the Permit) will be performed to determine whether any surficial debris, scrap, or other substances remain in the 20K OD Treatment Unit that requires removal in order for the closure to proceed. Debris to be identified will include metal fragments and remnants. The volume of materials to be removed may need to be estimated if a significant volume of debris is present.

The pre-final inspection will be documented using photographs and notes in a bound, water-resistant field logbook. If no debris or fragments are observed during the pre-final inspection, this will be noted in the logbook, and the final Inspection may be immediately completed.

2.6.2 Removal of Scrap Materials and Debris

This section clarifies the permit text in Section F under the heading "Removal of Scrap Materials and Debris."

The pre-final inspection will be followed by the debris removal task. Depending on the volume of debris identified, this may occur immediately following the pre-final inspection.

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.

In accordance with past practice, the debris and metal fragments will be collected by HAFB 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.

2.6.3 Closure Sampling and Analysis

This section clarifies the permit text in Section F under the heading "Closure Sampling and Analysis."

Soil sampling will be conducted to compare soil concentrations of identified analytes against the NMED Soil Screening Levels (SSLs) and EPA Regional Screening Levels (RSLs) (as appropriate) for residential soil. The *Sampling and Analysis Plan for the Closure of the 20,000-Pound Open Detonation Treatment Unit* (included as Appendix A of this Expanded Closure and Post-Closure Plan) details the methodology for collecting and analyzing soil and ground water samples, and the standards to which they will be compared.

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 managed from 1996 through 2011 was reviewed by a New Mexico Registered Professional Engineer (PE). Appendix B provides the lists of materials destroyed at the 20K OD Treatment Unit. The PE findings are also included as Appendix B. As a result of the records review, the list of chemical constituents of concern in the *Sampling and Analysis Plan for the Closure of the 20,000-Pound Open Detonation Treatment Unit* (included as

Appendix A to this Expanded Closure and Post-Closure Plan) was augmented to accurately reflect the review findings.

Soil and ground water will be analyzed for the following parameters (see the *Sampling and Analysis Plan for the Closure of the 20,000-Pound Open Detonation Treatment Unit*, included as Appendix A of this Expanded Closure and Post-Closure Plan for details):

- Metals (see full list in SAP (Appendix A to this Plan))
- Explosives (see full list in SAP (Appendix A to this Plan))
- Perchlorate
- Nitrate
- Phosphorus

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.

2.7 Background Comparison and Risk-Based Screening

This section clarifies the permit text in Section F under the heading "Risk-Based Screening."

Residential SSLs established in NMED's *Technical Background Document for Development of Soil Screening Levels* (NMED, August 2009) will be used as the action levels for detections in soil. If NMED does not have an SSL for a particular parameter in soil, it will be compared to its respective EPA RSL (June 2011).

In the event an SSL or RSL is exceeded, HAFB will notify NMED via certified letter. The letter will detail the exceedances, including the concentrations, parameters, and locations. The letter will also summarize HAFB's proposed course of action (e.g., risk-based closure, further remediation, etc.). A Human Health and Ecological Risk Assessment will be performed if an exceedance of a standard for closure (see the *Sampling and Analysis Plan* in Appendix A of this Expanded Closure and Post-Closure Plan) is identified through the evaluation of existing conditions. The risk assessments will be performed only on the parameter(s) that exceed a standard for closure.

2.8 Corrective Action

This section clarifies the permit text in Section F under the heading "Corrective Action."

An ecological risk assessment and a human health risk assessment will be performed *if* an exceedance of a standard for closure (see the *Sampling and Analysis Plan* in Appendix A of this Expanded Closure and Post-Closure Plan) 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 identifies an unacceptable risk, then the Permittee will prepare a Corrective Action Work Plan, which may include confirmation sampling, delineation of the extent of exceedance, analysis of corrective measures, and/or corrective measures implementation.

2.9 Surface Grading

This section clarifies the permit text in Section F under the heading "Surface Grading."

The OD Unit will be graded as required in the permit and follow natural contours. The area will be allowed to revegetate naturally.

2.10 Decontamination

This section clarifies the permit text in Section F under the heading "Decontamination."

All field equipment (large and small field instruments and tools) will be properly decontaminated in accordance with HAFB Standard Operating Procedure (SOP) No. 2*, Sampling Equipment Decontamination* (included in the *Basewide Quality Assurance Project Plan (QAPP)* (Bhate, 2003b)), prior to use and in between sampling to eliminate cross contamination of soil samples and minimize contamination leaving the site.

Small equipment such as sampling tools will be decontaminated using laboratory-grade detergent and water using a brush, followed by tap water rinse and two distilled water rinses. If necessary, 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.

2.11 Schedule for Closure

This section clarifies the permit text in Section F under the heading "Schedule for Closure."

The schedule for closure was modified to include this Expanded Closure and Post-Closure Plan and its subsequent review and probable approval by NMED. It is also modified to reflect that HAFB notified NMED on March 30, 2011, that the OD Treatment Unit would be closed. We note that the last waste was treated on March 3, 2011.

The schedule for closure is anticipated to be as follows:

Table 2-1. Proposed Closure Schedule

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

Closure Activity	Closure Period
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
Remove debris	April 2012
Soil and groundwater sampling and analysis and sampling equipment decontamination	May 2012
Analytical quality control (QC) (to ensure sampling and analysis is sufficient to demonstrate clean closure)	June 2012
Site grading and equipment decontamination	July 2012
Prepare closure certification/post-closure documentation (includes HAFB review period)	July 2012 – October 2012
Submit closure certification to NMED	October 2012
NMED review of closure certification	November 2012 – January 2013
NMED issues post-closure permit	February 2013
Periodic post-closure visual checks	30 years after issuance of post-closure permit
Conduct other post-closure care activities	To be determined
Note that this schedule does not include any notification to NMED of any closure standard exceedances. If concentrations are found to exceed the standards for closure listed in the *Sampling and Analysis Plan*, included in Appendix A of this Expanded Closure and Post-Closure Plan), the schedule will be modified to include the notification and the development and implementation of a Corrective Action Work Plan. The schedule assumes that only one revision was required after the initial NMED review of the Expanded Closure and Post-Closure Plan and that only one revision will be required for the closure certification and post-closure documentation.	

2.12 Certification of Closure

This section clarifies the permit text in Section F under the heading “Certification of Closure.”

Within 240 days after initiating closure of the treatment unit, HAFB will submit by registered mail a closure report (Report) for the treatment unit to the NMED for review and approval. The Report will document that the treatment unit has been closed in compliance with the Permit and the approved Expanded Closure and Post-Closure Plan. A certification will be included with the Report that is signed by HAFB 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. The 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 Expanded Closure and Post-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 (QA)/QC 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 Assessment, 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 Section F under the heading “Other Activities.”

Following site closure, HAFB will perform visual checks of the site to ensure naturalization, the need for regarding, and to verify posting and security measures. Checks will be performed as follows:

- Quarterly for the first 5 years
- Semi-annually for the remaining 25 years

The checks will be documented in a logbook specific to the 20K OD Treatment Unit.

3 CONTINGENT POST-CLOSURE PLAN

Attachment F of the Permit includes a Contingent Post-Closure Plan in the event residues remain in place, to describe activities that may be conducted to ensure long-term reliability and effectiveness of the closure.

In the following subsections, the Permit text is followed by details and clarifications that may be necessary.

3.1 Post-Closure Care and Use of Property

Text in Section F, under the heading "Post-Closure Care and Use of Property" is introductory information. No supplemental text or clarification is necessary.

3.2 Post-Closure Care Period

The text in Section F under the heading "Post Closure Care Period" requires long-term actions to be taken in the event waste residues are left in place.

At this time, the only activities anticipated after closure are the periodic inspections. Periodic inspections will begin after the issuance of the Closure Certification.

3.3 Post-Closure Security

The text in Section F under the heading "Security" prescribes measures to take to maintain long-term security during the post-closure period. No clarification is required. The periodic visual checks of the site during the post-closure period will check for the continued adequacy of signage and the condition of the fencing.

3.4 Post-Closure Use of Property

The text in Section F under the heading "Post-Closure Use of Property" limits the use of the closed treatment unit. No clarification is required. The periodic visual checks of the site during the post-closure period will check for potential site disturbance.

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4 POST-CLOSURE CARE PLAN AND GROUND WATER MONITORING

In the event that the site is able to be closed without meeting closure standards (see the *Sampling and Analysis Plan* in Appendix A of this Expanded Closure and Post-Closure Plan), as appropriate, HAFB will propose a course of action (e.g., risk-based closure, further remediation, etc.) and the site will be will be managed according to this Section. Based on the results of the additional courses of action, modifications to the ground water monitoring requirement may be requested.

The introductory text in Section F under heading "Post Closure Care Plan and Ground Water Monitoring" states that "post-closure care of the OD Treatment Unit will be conducted when it has been established that clean closure cannot be achieved," and requires the installation and monitoring of groundwater monitoring wells.

In the event that the site is able to be closed even though the closure standards are exceeded, monitoring of the existing four wells, as detailed on Figure G-5 of the Permit, will be performed periodically, as follows:

- Quarterly for the first 5 years
- Semi-annually for the second 10 years
- Annually for the remaining 15 years

Ground water samples will be collected and analyzed for the following parameters:

- Metals (full list of analytes is shown in the SAP, included as Appendix A to this Plan)
- Explosives (full list of analytes is shown in the SAP, included as Appendix A to this Plan)
- Perchlorate
- Nitrate
- Phosphorus

Ground water monitoring will begin after the issuance Closure Certification. Ground water will be sampled and analyzed using the methodology provided in the *Sampling and Analysis Plan for the Closure of the 20,000-Pound Open Detonation Treatment Unit* (included as Appendix A to this Expanded Closure and Post-Closure Plan).

At any time, HAFB may request a reduction in the ground water sampling effort if sufficient quarterly data show concentrations of parameters below risk-based levels. This may include a change in analyses, analysis method, and/or sampling frequency.

When groundwater monitoring is no longer required, the wells will be abandoned in accordance with NMED Ground Water Quality Bureau Monitoring Well Construction and Abandonment Guidelines and applicable New Mexico Administrative Code requirements in effect at the time of abandonment.

4.1 Post-Closure Maintenance Requirements

The text in Section F under the heading "Post-Closure Maintenance Requirements" lists post-closure maintenance requirements and a schedule. Maintenance activities as described in the Permit will begin after the issuance of the Closure Certification.

4.2 Certification of Post-Closure Care

The text in Section F under the heading "Certification of Post-Closure Care" requires certification by HAFB that all post-closure activities were performed in accordance with the approved Post-Closure Care Plan. HAFB assumes that the Post-Closure Care Plan will be implemented for 30 years after issuance of the Closure Certification. Based on the results of the additional courses of action, modifications to Post-Closure Care Plan may be requested.

5 SURVEY PLAT AND POST-CLOSURE NOTICES

This section clarifies the text in Section F under the heading "Survey and Post-Closure Notices."

NMED issued the Permit in 1997. The referenced regulations were repealed on June 14, 2000, and replaced with 20 NMAC 4.1, Hazardous Waste Management, effective June 14, 2000. Included in this revised regulation is the incorporation of 40 CFR Part 264 by reference. The regulatory text presented in 40 CFR §264.116 and 40 CFR §265.119 as of the date of this Expanded Closure and Post-Closure Plan (February 2012) shall apply at the time of all closure activities (at the end of the post-closure period).

As of January 25, 2012, 40 CFR §264.116 reads as follows:

> ***"§ 264.116 Survey plat.***
>
> No later than the submission of the certification of closure of each hazardous waste disposal unit, the owner or operator must submit to the local zoning authority, or the authority with jurisdiction over local land use, and to the Regional Administrator, a survey plat indicating the location and dimensions of landfill cells or other hazardous waste disposal units with respect to permanently surveyed benchmarks. This plat must be prepared and certified by a professional land surveyor. The plat filed with the local zoning authority, or the authority with jurisdiction over local land use, must contain a note, prominently displayed, which states the owner's or operator's obligation to restrict disturbance of the hazardous waste disposal unit in accordance with the applicable subpart G regulations.
>
> [51 FR 16444, May 2, 1986, as amended at 71 FR 40272, July 14, 2006]"

As of January 25, 2012, 40 CFR §264.119 reads as follows:

> ***"§ 264.119 Post-closure notices.***
>
> (a) No later than 60 days after certification of closure of each hazardous waste disposal unit, the owner or operator must submit to the local zoning authority, or the authority with jurisdiction over local land use, and to the Regional Administrator a record of the type, location, and quantity of hazardous wastes disposed of within each cell or other disposal unit of the facility. For hazardous wastes disposed of before January 12, 1981, the owner or operator must identify the type, location, and quantity of the hazardous wastes to the best of his knowledge and in accordance with any records he has kept.
>
> (b) Within 60 days of certification of closure of the first hazardous waste disposal unit and within 60 days of certification of closure of the last hazardous waste disposal unit, the owner or operator must:
>
> (1) Record, in accordance with State law, a notation on the deed to the facility property—or on some other instrument which is normally examined during title search—that will in perpetuity notify any potential purchaser of the property that:
>
> (i) The land has been used to manage hazardous wastes; and
>
> (ii) Its use is restricted under 40 CFR part 264, subpart G regulations; and
>
> (iii) The survey plat and record of the type, location, and quantity of hazardous wastes disposed of within each cell or other hazardous waste disposal unit of the facility required by §§264.116 and 264.119(a) have been filed with the local zoning authority or the authority with jurisdiction over local land use and with the Regional Administrator; and

(2) Submit a certification, signed by the owner or operator, that he has recorded the notation specified in paragraph (b)(1) of this section, including a copy of the document in which the notation has been placed, to the Regional Administrator.

(c) If the owner or operator or any subsequent owner or operator of the land upon which a hazardous waste disposal unit is located wishes to remove hazardous wastes and hazardous waste residues, the liner, if any, or contaminated soils, he must request a modification to the post-closure permit in accordance with the applicable requirements in parts 124 and 270. The owner or operator must demonstrate that the removal of hazardous wastes will satisfy the criteria of §264.117(c). By removing hazardous waste, the owner or operator may become a generator of hazardous waste and must manage it in accordance with all applicable requirements of this chapter. If he is granted a permit modification or otherwise granted approval to conduct such removal activities, the owner or operator may request that the Regional Administrator approve either:

(1) The removal of the notation on the deed to the facility property or other instrument normally examined during title search; or

(2) The addition of a notation to the deed or instrument indicating the removal of the hazardous waste.

[51 FR 16444, May 2, 1986, as amended at 71 FR 40272, July 14, 2006]”

6 REFERENCES

Bhate, December 2003a. *Final Basewide Health and Safety Plan, Holloman Air Force Base, Alamogordo, New Mexico*.

Bhate, November 2003b. *Final Basewide Quality Assurance Project Plan, Holloman Air Force Base, New Mexico*.

New Mexico Environment Department (NMED), February 3, 1997. Hazardous Waste Facility Permit No. NM6572124422. Amended 1998.

NMED, August 2009. *New Mexico Environment Department Technical Background Document for Development of Soil Screening Levels*, Revision 5.0.

U.S. Army Corps of Engineers, 2008. *Safety and Health Requirements Manual, EM 385-1-1*.

USEPA, November 2011. Regional Screening Level (RSL) Summary Table.

USEPA, May 2009. List of Contaminants and their Maximum Contaminant Levels.

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APPENDIX A

SAMPLING AND ANALYSIS PLAN FOR THE CLOSURE OF THE 20,000-POUND OPEN DETONATION TREATMENT UNIT

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SAMPLING AND ANALYSIS PLAN FOR THE CLOSURE OF THE 20,000-POUND OPEN DETONATION TREATMENT UNIT

HOLLOMAN AIR FORCE BASE, NEW MEXICO

NMED Permit No. NM6572124422

Prepared for:

49 CES/CEAN
Holloman Air Force Base
New Mexico

Under Contract To:

U.S. Army Corps of Engineers-
Albuquerque District
HTRW Branch
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Contract No. W912PP-09-D-0003
Delivery Order No. 0010

February 2012

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SAMPLING AND ANALYSIS PLAN FOR THE CLOSURE OF THE 20,000-POUND OPEN DETONATION TREATMENT UNIT

HOLLOMAN AIR FORCE BASE, NEW MEXICO

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SAMPLING AND ANALYSIS PLAN FOR THE CLOSURE OF THE 20,000-POUND OPEN DETONATION TREATMENT UNIT

HOLLOMAN AFB, NEW MEXICO

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ACRONYMS AND ABBREVIATIONS

ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
Bhate	Bhate Environmental Associates, Inc.
CES/CEAN	Civil Engineering Squadron/Environmental Flight
CFR	Code of Federal Regulations
DLA	Defense Logistics Agency
DRMO	Defense Reutilization and Marketing Office
EDD	Electronic Data Deliverable
EOD	Explosive Ordnance Demolition
ERPIMS	Environmental Restoration Program Information Management System
ESRI	Environmental Systems Research Institute
GIS	Geographical Information System
GPS	Global Positioning System
HAFB	Holloman Air Force Base
HASP	Health and Safety Plan
HMX	Cyclotetramethylenetetranitramine
IDW	Investigation-Derived Waste
LIMS	Laboratory Information Management System
MCL	Maximum Contaminant Level
mg/kg	Milligrams per kilogram
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NEW	Net explosive weight
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Criteria
OD	Open detonation
OSHA	Occupational Safety and Health Administration
PETN	Pentaerythritol tetranitrate
PPE	Personal protective equipment
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RDX	Cyclotrimethylenenitramine
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
SSLs	Soil Screening Levels
TNT	2,4,6-Trinitrotoluene
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
UXO	Unexploded ordnance

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1 INTRODUCTION

NationView, LLC (NationView), has been retained by the U.S. Army Corps of Engineers (USACE), Albuquerque District under contract W912PP-09-D-0003, Delivery Order No. 0010, to conduct closure sampling, as required by New Mexico Environment Department (NMED) Permit No. NM6572124422, at the 20,000-Pound Open Detonation Treatment Unit (20K OD Treatment Unit) at Holloman Air Force Base (HAFB), New Mexico.

HAFB operated an open detonation (OD) unit for the destruction of explosive ordnance from February 1997 through March 2011. The OD unit was operated under NMED Hazardous Waste Facility Permit No. NM6572124422, issued February 3, 1997. Permit Attachment F, Closure and Post-Closure Care Plans, prescribes the general requirements for the 20K OD Treatment Unit closure. As part of the closure process, sampling and analysis are required. This Sampling and Analysis Plan (SAP) provides the detailed sampling and analysis requirements for the 20K OD Treatment Unit closure.

As part of the Permit, Attachment J, Sampling and Analysis Plan, quarterly sampling throughout the operating life of the unit was required. Results of quarterly sampling were available from the first quarter of 2003 through the first quarter of 2011 for the preparation of this SAP. These results were reviewed and evaluated, and the permit conditions were reviewed to develop an appropriate sampling and an analysis approach.

1.1 SAP Organization

This SAP will serve as the primary working document for the closure sampling for the 20K OD Treatment Unit. The SAP is organized as follows:

- Section 1 presents a summary of the closure approach and project objectives.
- Section 2 presents the detailed Sampling and Analysis Plan for the characterization of soil for the closure, as well as the specific data quality objectives, sampling procedures, sample analysis, and related sample quality assurance/quality control (QA/QC) measures to be employed during the conduct of the investigation.
- Section 3 describes the data management plan that will be used to support this SAP.
- Section 4 describes the Health and Safety requirements to be followed during the sampling effort.
- Section 5 identifies the full reference information for the documents cited throughout this SAP.
- The figures and tables referenced throughout this SAP are included under separate tabs following the text.

1.2 Project Objectives

The primary project objectives of this SAP are to:

- Collect data to demonstrate site conditions at the time of closure.

- Collect data to compare results to NMED residential Soil Screening Levels (SSLs) and/or EPA Regional Screening Levels (RSLs) to demonstrate clean closure.
- Collect the proper data to support closure of the 20K OD Treatment Unit.

1.3 Facility Description and Operational History

1.3.1 Holloman Air Force Base

HAFB is located on approximately 50,700 acres of land in Otero County, south-central New Mexico. HAFB 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. HAFB 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 HAFB 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 20,000-Pound OD Unit is located adjacent to the northern boundary of HAFB. The area to the north is part of the White Sands Missile Range.

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 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 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.

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 20K OD Treatment 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 20K OD Treatment Unit, and operating procedures is provided in other attachments to the Permit.

The 20K OD Treatment 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 20K OD Treatment Unit to prevent carryover of fragments towards the test track area.

All waste that was treated at the 20K OD Treatment 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, ensured that incompatible wastes were not mixed. The reactive wastes treated at the 20K OD Treatment Unit were solid in nature and contained no free liquid.

HAFB has never been used for the research and development of nuclear, chemical warfare, or other exotic warfare types of weapons. The 20K OD Treatment 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 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.

1.4 Historical Sampling

Samples were collected from the 20K OD Treatment Unit quarterly throughout the life of the unit. Quarterly sampling data from the first quarter of 2003 through the first quarter of 2011 was available and reviewed for the preparation of this SAP. Samples were collected and analyzed for the following parameters:

1. Explosive compounds (by U.S. Environmental Protection Agency [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
- 2,4,6-Trinitrotoluene (TNT)
- Pentaerythritol tetranitrate (PETN)
- 2-Amino-4,6-dinitrotoluene
- 4-Amino-2,6-dinitrotoluene
- 2-Nitrotoluene
- 3-Nitrotoluene
- 4-Nitrotoluene
- Nitroglycerin

2. Toxic metals (by USEPA Method 6010, unless otherwise noted)
   - Antimony
   - Arsenic
   - Barium
   - Beryllium
   - Cadmium
   - Chromium
   - Copper
   - Lead
   - Mercury (Method 7471)
   - Nickel
   - Selenium
   - 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 regraded and 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 compound.

1.5 Sample Analysis Rationale

This section addresses the parameters of concern for wastes that were treated at the 20K OD Treatment Unit. The rationale for the selection of these parameters, sampling methods, analytical protocols, and frequency of analysis are described.

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 20K OD Treatment 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 CO_2, CO, H_2O, N_2, and, to some degree, NO_x. 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 ($NaNO_2$, KNO_2). 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 SAMPLING AND ANALYSIS PLAN

This section presents the SAP for the closure of the 20K OD Treatment Unit, including:

- Pre-Sampling Events
- Closure Sampling Strategy
- Sample Analysis

The SAP for this closure has three primary objectives. The first goal is to characterize the site at the time of closure. The second objective is to demonstrate that the concentrations of residual materials remaining at the site do not exceed NMED residential SSLs. The third goal of this SAP is to evaluate the groundwater condition in the immediate area surrounding the treatment unit.

Soil and groundwater sampling procedures will utilize industry standard methods to ensure sample quality and provide a platform for efficient collection. Sample analysis includes field screening methods and offsite analysis to provide an efficient means of identifying subsurface conditions.

2.1 Pre-Sampling Events

Before sampling can begin, there are several activities that must occur, including a pre-final inspection, debris removal (if necessary), site security measures, and facility manager notification of the intended operations. The Project Manager will coordinate project requests for Base installation support services through the 49th Civil Engineering Squadron/Environmental Flight (CES/CEAN).

2.1.1 Preparation Meeting

Prior to the start of activities, a preparation meeting and site walk-through of the 20K OD Treatment Unit will be conducted with the Contract Officer Representative, HAFB 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 reviewed at this time will be project procedures in accordance with the schedule and planned activities.

Site security is concerned with safety at the 20K OD Treatment Unit during all sampling activities, and areas surrounding the sampling activity, and will be addressed as outlined in the *Basewide Health and Safety Plan* (HASP) (Bhate Environmental Associates, Inc. [Bhate], 2003b).

2.1.2 Pre-Final Inspection

A pre-final visual site inspection (as required by the Permit, Appendix F) will be performed to determine whether any surficial debris, scrap, or other substances remain in the 20K OD Treatment Unit that requires removal in order for the closure to proceed. Debris to be identified

will include metal fragments and remnants. The volume of materials to be removed may need to be estimated if a significant volume of debris is present.

The pre-final inspection will be documented using photographs and notes in a bound, water-resistant field logbook. If no debris or fragments are observed during the pre-final inspection, this will be noted in the logbook, and the final Inspection may be immediately completed.

The pre-final inspection may occur immediately following, or simultaneously with, the preparation meeting.

2.1.3 Removal of Scrap Materials and Debris

The pre-final inspection will be followed by the debris removal task. Depending on the volume of debris identified, this may occur immediately following the pre-final inspection.

According 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."

According to the 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 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 [New Mexico Administrative Code] NMAC 4.1, Subpart V, 40 [Code of Federal Regulations] CFR SS 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." It should be noted that Permit Attachment J, Sampling and Analysis Plan, does not identify specific tests or analytes for debris and metal fragments.

In accordance with past practice, the debris and metal fragments are collected by HAFB 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 will be performed to confirm that all surficial fragments debris have been removed. The final inspection will be documented using photographs and notes in the field logbook.

2.2 Closure Sampling Strategy

2.2.1 Applicable or Relevant and Appropriate Requirements

2.2.1.1 Soil

The residential SSLs established in NMED's *Technical Background Document for Development of Soil Screening Levels* (NMED, August 2009) will be used as the action levels for detections in soil. If NMED does not have an SSL for a particular parameter in soil, it will be compared to its respective USEPA Regional Screening Level (RSL) (November 2011). Table 1 shows the soil parameters and their appropriate standard (SSL or RSL).

2.2.1.2 Groundwater

Groundwater results will be compared to USEPA Maximum Contaminant Levels MCLs (for drinking water) and New Mexico Water Quality Control Commission (NMWQCC) groundwater protection standards. The lower of the available standards will be used. Table 2 shows the available standards.

2.2.2 Sampling Location Design and Rationale

2.2.2.1 Soil

Representative soil samples will be collected from the 20K OD Treatment 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 is important to verify that the entire area of the OD Unit has been 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 have been selected for analysis of explosives, metals, nitrate, perchlorate, and phosphorus. Because no samples were previously analyzed for perchlorate, additional soil sample locations have been selected for analysis of perchlorate only.

Table 3 provides the coordinates, sample identification, and analyses for all the proposed sample locations.

2.2.2.2 Groundwater

Representative water samples will be collected from the four groundwater monitoring wells around the 20K OD Treatment Unit and analyzed to determine the concentrations of toxic metals, explosive compounds, perchlorate, nitrate, and phosphorus. See Table 3 for a full list of analytes.

Figure 4 shows the groundwater monitoring well locations around the 20K OD Treatment Unit as surveyed in 1993 at the time of installation (Labat-Anderson, 1993).

2.2.3 Sampling Procedures

2.2.3.1 Soil

A hand auger will be used to collect soil from the surface interval (0-1 foot) at each of the selected locations. Specific sampling procedures and technologies to be used during the project are described in the following references:

- *Final Basewide Quality Assurance Project Plan* (Bhate, 2003a)
- HAFB Standard Operating Procedures (SOPs) from Appendix A of the *HAFB Basewide QAPP*

The specific HAFB SOPs for this sampling event are listed below:

- HAFB SOP-1: Documentation, Sample Handling, Chain-of Custody, and Shipping
- HAFB SOP-2: Sampling Equipment Documentation
- HAFB SOP-5: Soil Sampling for Chemical Analysis
- HAFB SOP-9: Field Management of Investigation-Derived Waste (IDW)

A Global Positioning System (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.

2.2.3.2 Groundwater

The groundwater monitoring wells were installed in 1993 and were developed at the time of installation (Labat-Anderson, October 2003). Therefore, the wells will need to be developed and the integrity of the wells will need to be determined prior to sampling.

Groundwater monitoring wells will be developed, and the process documented, in accordance with the HAFB Basewide Quality Assurance Project Plan (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 may be required due to the age and inactivity of the wells). Monitoring well development will take place by over-pumping each well until at least five well volumes have been removed, and the turbidity, pH, specific conductivity, and temperature have stabilized by +/- 10 percent for at least 3 consecutive readings.

One set of groundwater samples will be collected from the four monitoring wells for the parameters shown in Table 3. Groundwater samples will be 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 will be placed at mid-screen and purged until field parameters are stabilized. The groundwater samples will be collected from mid-screen interval.

The samples will be labeled, handled, and prepared for shipment in accordance with HAFB SOP-1 of the HAFB Basewide QAPP (Bhate, 2003a). The samples will be 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 will be managed in accordance with HAFB SOP-1 of the HAFB Basewide QAPP (Bhate, 2003a).

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 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 will be entered in the log book on dated, initialed, and serially-numbered pages. Corrections will be made to entries by initialed and dated line-out deletions. A diagonal line will be drawn across the remaining blank space of the last page of each day's entry. Each day's entry will be signed and dated by the author.

The date and time of sample preparation, collection, and personnel who conducted sampling will be 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 will also be recorded in the field log book. Sampling personnel will record 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 3.2.1 of this SAP.

2.2.5 Decontamination

Sampling equipment will be decontaminated as described in HAFB SOP-2 of the HAFB Basewide QAPP (Bhate, 2003a).

2.2.6 Management of Investigation-Derived Waste

Investigation-Derived Waste (IDW) generated during this project may include used personal protective equipment (PPE), decontamination fluids and solids (e.g., paper towels, rags, etc.), and groundwater monitoring well development and purge water.

IDW will be managed and characterized in accordance with HAFB SOP-9 of the HAFB Basewide QAPP (Bhate, 2003a). 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.

2.3 Sample Analysis

This section describes the objectives and procedures associated with the analytical program. The analytical strategies for the 20K OD Treatment 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 will be reviewed according to the HAFB Basewide QAPP (Bhate, 2003a).

Qualifiers may be applied to data that fails to satisfy the acceptance criteria as detailed in the HAFB 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 will be analyzed as follows:

- Metals by USEPA Method 6010B (except mercury by USEPA Method 7471A)
- Explosives by USEPA Method 8330 (except N-nitrosodimethylamine (NDMA) by USEPA Method 8270C-SIM)
- Perchlorate by USEPA Method 6860
- Nitrate by USEPA Method 300
- Phosphorus by USEPA Method 365.3
- Soil Moisture by USEPA Method 3550

The groundwater samples will be analyzed as follows:

- Metals by USEPA Method 6010B (except mercury by USEPA Method 7470A)
- Explosives by USEPA Method 8330 (except NDMA by USEPA Method 8270C-SIM)
- Perchlorate by USEPA Method 6860
- 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 HAFB 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 this SAP 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, will be used.

Samples selected for laboratory analysis will be labeled, handled, and prepared for shipment in accordance with HAFB SOP-1 of the HAFB Basewide QAPP (Bhate, 2003a). The samples will 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 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.

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3 DATA MANAGEMENT PLAN

This section describes the overall data management strategy and plan for the 20K OD Treatment Unit closure sampling and associated report.

3.1 Data Management System and Strategy

The data management plan will be used to accommodate and manage fixed-based laboratory generated data at standard turnaround time (2 weeks). Data to be generated includes chemical analytical data, as well as spatial and features information, and various supporting data, such as photographs and standard daily forms information.

3.2 Data Type

Analytical data will be generated by offsite laboratory analysis. Analytical data generated by the offsite laboratory will be initially managed by the laboratory's laboratory information management system (LIMS) and transferred to the project team for use via EDD and hard copy. Prior to project startup, formats for the offsite laboratory EDDs will be approved to ensure smooth transfer and importation of the data.

Upon project completion, the data management system will be used to perform final spatial analysis, as well as to support tabular and graphic report development for deliverables and miscellaneous project communications as needed.

3.2.1 Sample Identification System

Each soil, groundwater, and QA/QC sample collected will be identified on the sample label and chain-of-custody records, regardless of type. Sample documentation, handling, and shipping will be in accordance with HAFB SOP-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 sample collection activities at the treatment unit. The field duplicate samples will appear in sequence with the other samples.

The sample nomenclature for soil samples collected will be as follows:

20KOD-SO04

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:

20KOD-MW01

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

3.2.2 Data Recording

The following paragraphs describe the data recording activities that will be performed for field data, offsite and onsite laboratory analytical data, and photographs.

3.2.2.1 Field Data

All information pertinent to a field and/or sampling survey will be recorded on appropriate data sheets, or in the project field logbook as described Section 10.5 of the HAFB Basewide QAPP (Bhate, 2003a). Specific data sheets are required by certain SOPs. Samplers use a bound field logbook with consecutively numbered pages. Entries in the logbook will be made using indelible ink and will include 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 is made on the document or in the logbook, corrections will be made simply by crossing a line through the error in such a manner that the original entry can still be read, and the correct information added as the change. All corrections will be initialed by the author and dated.

Each page in the logbook will be signed or initialed by the person making the entries. In addition to the information entered into the logbook, the appropriate data forms must be filled out as each activity is completed.

3.2.2.2 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 will contain 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 will be presented in hard copy, if requested, and in Electronic Data Deliverable (EDD) formats (on CD). Electronic data shall be delivered in an appropriate format such that the data can be manipulated for archiving and presentation.

3.2.2.3 Photographs

Any photographic documentation will be 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

3.3 Data Reporting

Data obtained during sampling activities will be reported according to the HAFB Basewide QAPP (Bhate, 2003a). The data will be generated using rigorous, analyte-specific analytical methods where analyte identifiers and quantitations are confirmed and QA/QC requirements have been satisfied. For this project, regular, field duplicate, and MS/MSD samples are to be collected concurrently. The data will meet 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. Sampling results will be tabulated and summarized in the closure report for the treatment unit. An Environmental Restoration Program Information Management System (ERPIMS) submittal is not required for the closure of the 20K OD Treatment Unit.

3.3.1 Tabular Displays

Analytical results will be presented using summary tables, as appropriate, for clear presentation in the closure report. Complete analytical results will be provided in the laboratory report(s).

3.3.2 Graphical Displays

During the field effort, Figure 3 and Table 1 will be used by the field team to guide the sampling activities. Staff will hand-annotate the figure for interim documentation of notable spatial information, such as indicating which locations have been sampled and documenting in-field sample location adjustments.

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.

3.3.3 Data Archiving

Hardcopy and electronic data shall 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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4 HEALTH AND SAFETY REQUIREMENTS

Project Health and Safety practices will adhere to the Basewide HASP (Bhate, 2003b) for closure inspection and sampling activities. All work must be conducted in accordance with the USACE *Safety and Health Requirements Manual, EM 385-1-1*, 2008. It is anticipated that no greater than Level D PPE will be required to complete the site 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 will be completed. This is discussed in the Basewide HASP (Bhate, 2003b).

The perimeter of the site is already secured by fencing and caution signs. This fenced area will be considered the Exclusion Zone. The Support Zone will be located outside the fenced area. The Contaminant Reduction Zone and Support Zone will be established as guided by the Basewide HASP (Bhate, 2003b) and site prevailing conditions during the pre-final inspection.

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5 REFERENCES

Bhate Environmental Associates, Inc. (Bhate), November 2003a. *Final Basewide Quality Assurance Project Plan, Holloman Air Force Base, New Mexico*.

Bhate, December 2003b. *Final Basewide Health and Safety Plan, Holloman Air Force Base, Alamogordo, New Mexico*.

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NationView, 2009. NationView *Standard Operating Procedure, No. 10, Subsurface Water Investigation*.

NMED, February 3, 1997. Hazardous Waste Facility Permit No. NM6572124422. Amended 1998.

NMED, August 2009. *New Mexico Environment Department Technical Background Document for Development of Soil Screening Levels*, Revision 5.0.

U.S. Army Corps of Engineers, 2008. *Safety and Health Requirements Manual, EM 385-1-1*.

United States Department of Defense, October, 2000. *Quality Systems Manual for Environmental Laboratories*, Version 1.

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USEPA, June 2008. Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review. 540-R-08-01.

USEPA, 2008. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.

USEPA, May 2009. List of Contaminants and their Maximum Contaminant Levels.

USEPA, January 2010. *Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review.* 540-R-10-011.

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FIGURES

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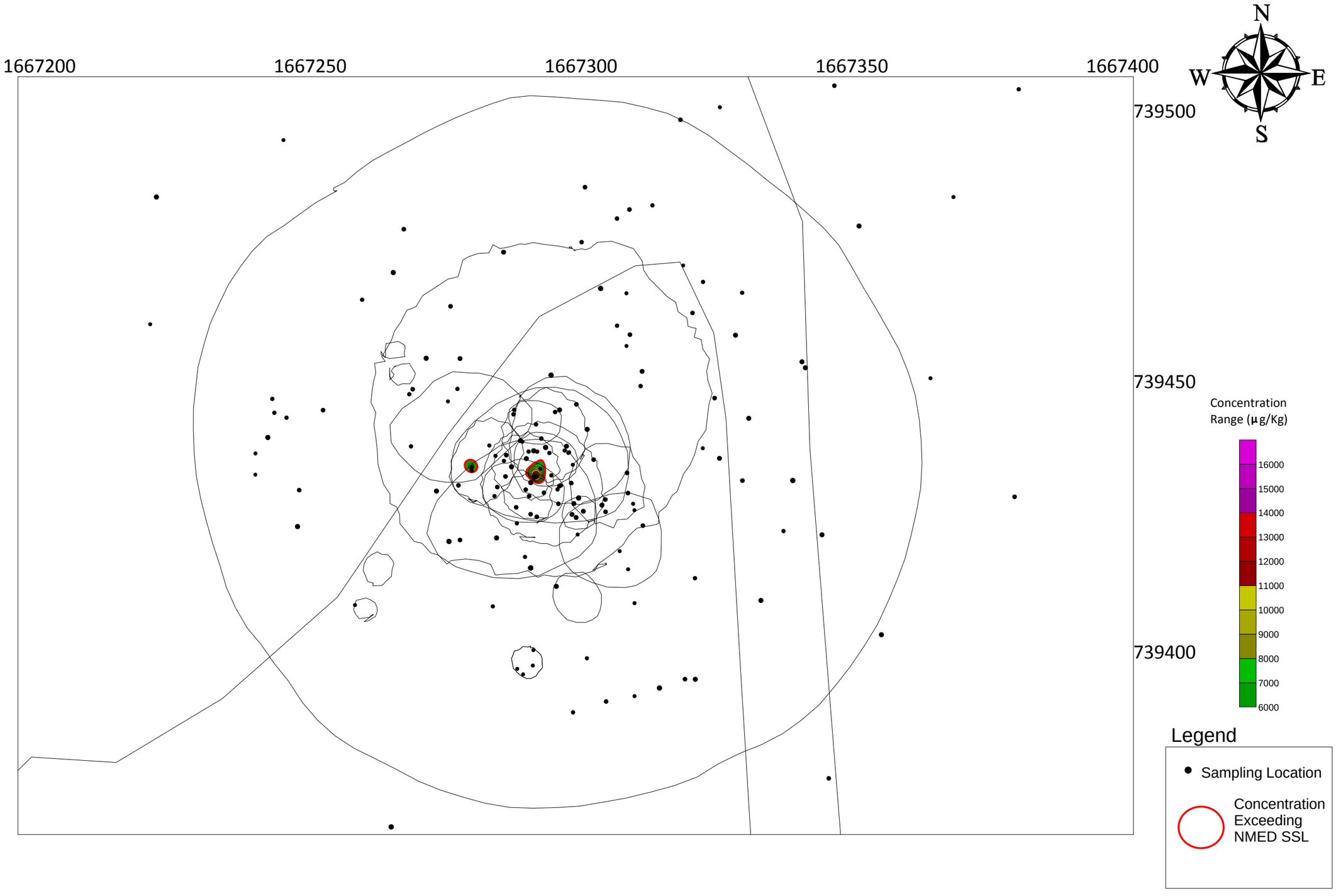


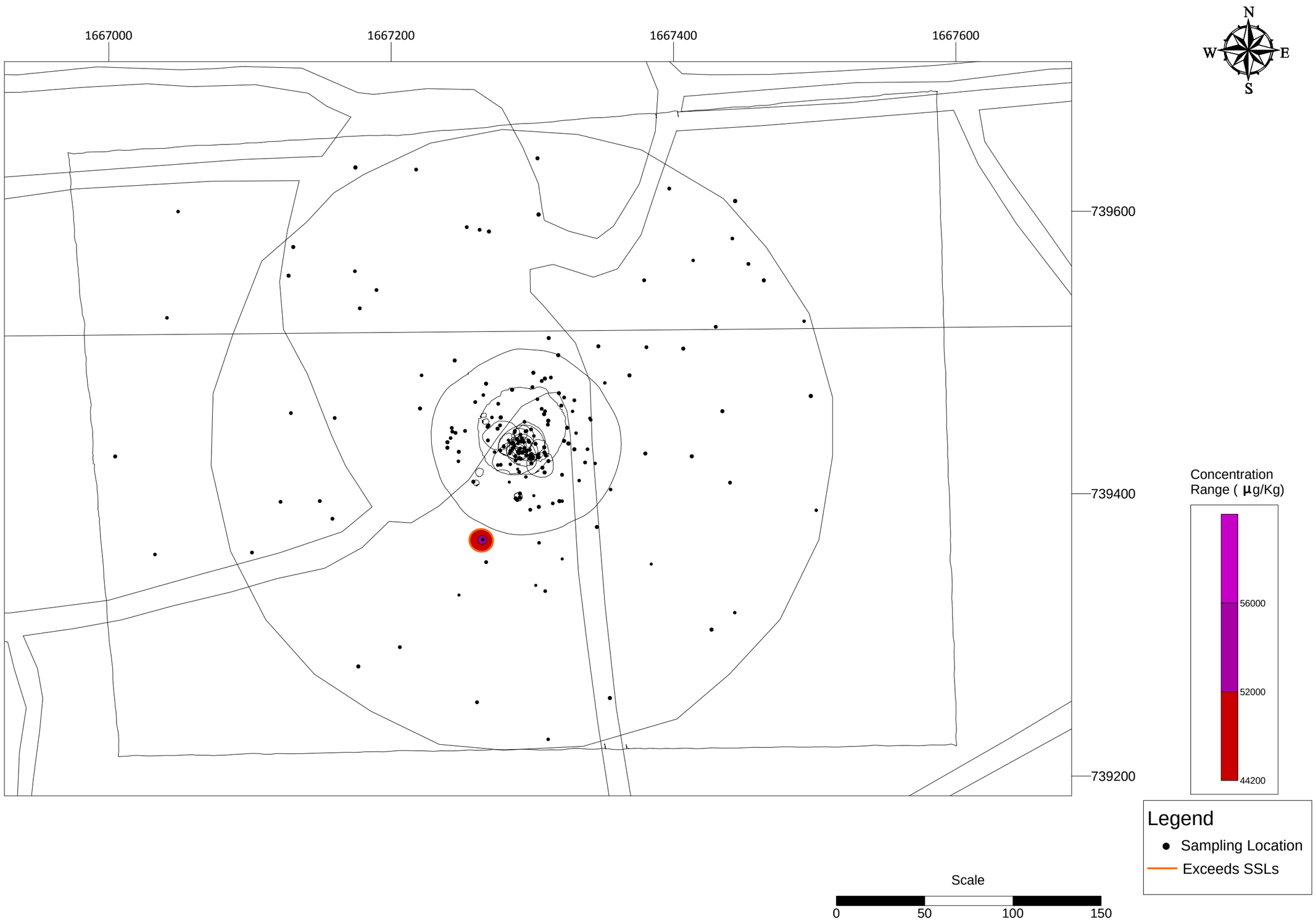
SAMPLING AND ANALYSIS PLAN
FOR THE CLOSURE OF THE 20,000-POUND
OPEN DETONATION TREATMENT UNIT
HOLLOMAN AIR FORCE BASE, NEW MEXICO

Figure 1

Historic Nitroglycerin Concentrations Exceeding SSLs at the 20K OD Treatment Site

PROJECT NO.	SCALE	DATE	DRAWN BY:	DRAWING NO:
8080013	No Scale	2/1/2012	JMS	

NATIONVIEW



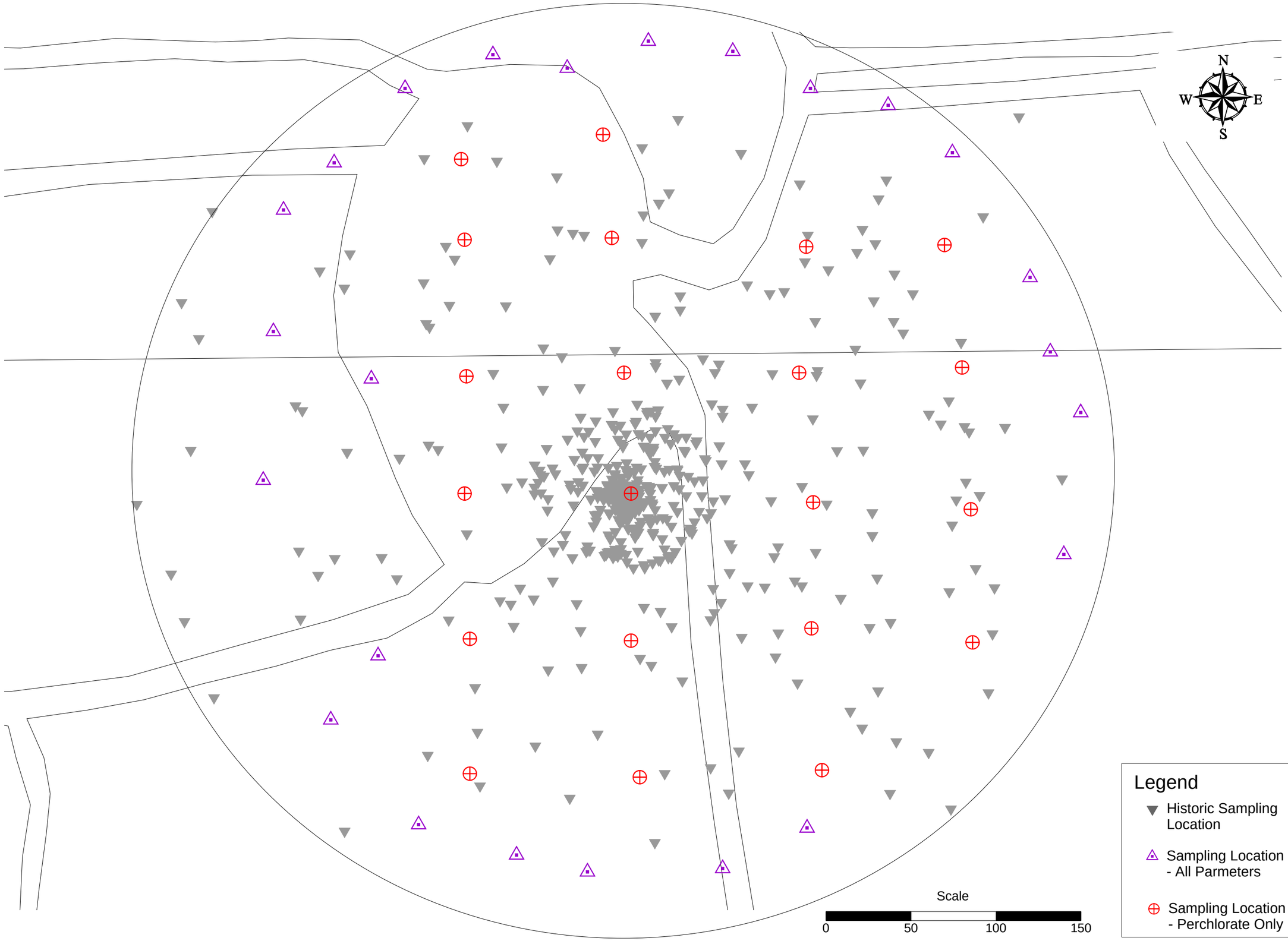
SAMPLING AND ANALYSIS PLAN
FOR THE CLOSURE OF THE 20,000-POUND
OPEN DETONATION TREATMENT UNIT
HOLLOMAN AIR FORCE BASE, NEW MEXICO

Figure 2

Historic RDX Concentrations Exceeding SSLs
at the 20K OD Treatment Site

PROJECT NO.	SCALE	DATE	DRAWN BY:	DRAWING NO:
80800013	As Shown	2/1/2012	JMS	

NATIONVIEW



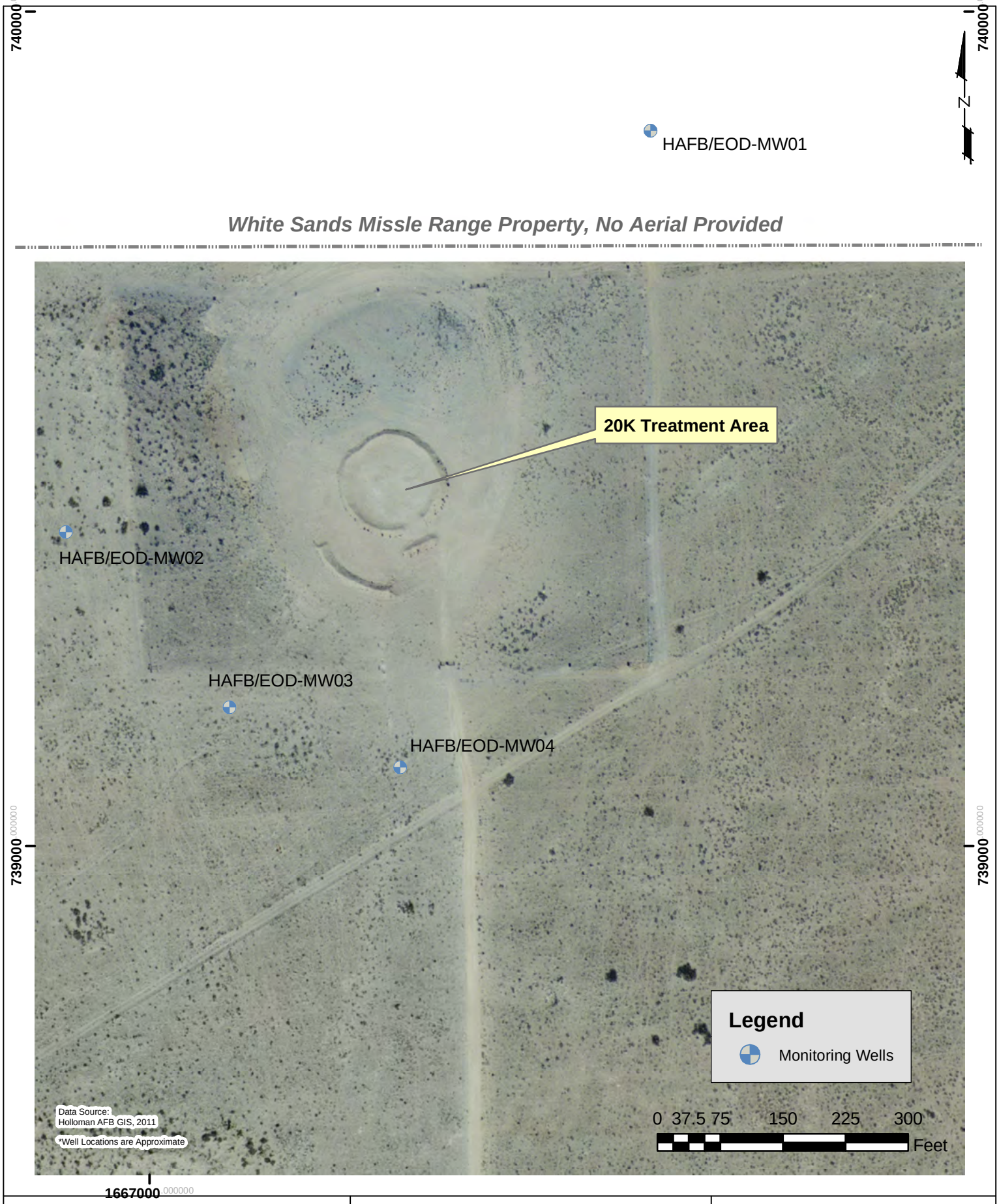
SAMPLING AND ANALYSIS PLAN
FOR THE CLOSURE OF THE 20,000-POUND
OPEN DETONATION TREATMENT UNIT
HOLLOMAN AIR FORCE BASE, NEW MEXICO

Figure 3

Proposed Soil Sample Locations
and Analytical Parameters

PROJECT NO.	SCALE	DATE	DRAWN BY:	DRAWING NO:
8080013	As Shown	2/01/2012	JMS	

NATIONVIEW



NATIONVIEW

20K Treatment Unit
Groundwater Monitoring Well Locations

PROJECT NO.	SCALE	DATE	DRAWN BY:
8080013	1"=150'	June-2011	cm

DRAWING NO: Figure 4

SAMPLING AND ANALYSIS PLAN
FOR THE CLOSURE OF THE 20,000-POUND
OPEN DETONATION TREATMENT UNIT
HOLLOMAN AIR FORCE BASE, NEW MEXICO

Figure 4

TABLES

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Table 1. Soil Standards for Closure

Parameter	Method[1]	Laboratory Reporting Limit (mg/kg)	NMED Residential SSL or *EPA RSL*[3] (mg/kg)
Soil Moisture[4]	ASTM-D-2216	NA	NA
Perchlorate	6860	0.001	54.8
Nitrate	300	5	125,000
Phosphorus	365.3	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	77.9
Chromium	6010B	1.5	NA
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	7.71
EXPLOSIVES			
HMX	8330	0.10	3,060
RDX	8330	0.20	44.2
1,3,5-Trinitrobenzene (TNB)	8330	0.10	*2,200*
1,3-Dinitrobenzene (DNB)	8330	0.10	*6.1*
Tetryl	8330	0.20	244
Nitrobenzene (NB)	8330	2.0	49.4
2,4-Dinitrotoluene (DNT)	8330	0.10	15.7
2,6-Dinitrotoluene (DNT)	8330	0.10	61.2
Trinitrotoluene (TNT)	8330	0.20	35.9
Pentaerythritol tetranitrate (PETN)	8330	3.5	*120*
2-Nitrotoluene (NT) (*o*-nitrotoluene)	8330	0.20	29.1
3-Nitrotoluene (NT) (*m*-nitrotoluene)	8330	0.20	1,560
4-Nitrotoluene (NT) (*p*-nitrotoluene)	8330	0.20	244
Nitroglycerin	8330	2.0	6.11
4-Amino-2,6-Dinitrotoluene	8330	0.1	*150*
2-Amino-4,6-Dinitrotoluene	8330	0.1	*150*
N-Nitroso-dimethylamine (NDMA)	8270C-SIM	0.018	0.0954

1. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846
2. NMED SSLs, 2009.
3. In the absence of NMED SSLs, EPA RSLs (November 2011) are used. EPA RSLs are presented *italics and underlined*.
4. Soil Moisture analysis is required for calculating other analytical concentrations in soils.
NA = Not available

Table 2. Water Standards for Closure

Parameter	Method[1]	Laboratory Reporting Limit (µg/L)	Water Quality Standard	
			NM WQCC Standard[2] (µg/L unless otherwise noted)	EPA MCL[3] (µg/L unless otherwise noted)
Perchlorate	6860	0.05	NA	NA
Nitrate	300	0.5 mg/L	10 mg/L (as nitrogen)	10 mg/L (as nitrogen)
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 (PETN)	8330	0.4	NA	NA
2-Nitrotoluene (NT) (*o*-nitrotoluene)	8330	0.4	NA	NA
3-Nitrotoluene (NT) (*m*-nitrotoluene)	8330	0.4	NA	NA
4-Nitrotoluene (NT) (*p*-nitrotoluene)	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 (NDMA)	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, May 2009.
NA = Not available

Table 3. Proposed Soil Sample Locations and Analyses for Closure Sampling

X Coord.	Y Coord.	Label	Metals	Explosives	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

(continued)

Table 3. Proposed Soil Sample Locations and Analyses for Closure Sampling (Continued)

X Coord.	Y Coord.	Label	Metals	Explosives	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

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

SW-846 Method	Analyte	Container	Preservative	Holding Time
6010B	Metals (dissolved) (except mercury)	250 mL plastic bottle	Field filtered, Ice to 4^oC pH <2 with HNO_3	6 months
7470A	Mercury	w/metals	Field filtered, Ice to 4^oC pH <2 with HNO_3	28 days
8330	Explosive Residues	1 L amber glass	None, cool, 4^oC	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^oC	48 hours
365.3	Phosphorus	250 ml glass	H_2SO_4	28 days
8270C-SIM	NDMA	Two 1 L amber	None, cool, 4^oC	7 days to extraction 40 days after extraction
2540C	TDS	1 L plastic	None, cool, 4^oC	7 days
Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846				

APPENDIX B

MEMORANDUM, JUNE 24, 2011, FROM MARK STAPLETON AND DIANE LAZARUS

AND

LIST OF MATERIALS DESTROYED AT THE 20K OD TREATMENT UNIT

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MEMORANDUM

Prepared by: Mark Stapleton, PE, PhD, Bhate Environmental Associates, Inc., and Diane Lazarus, QEP, CEA, Bhate Environmental Associates, Inc.
Prepared for: Holloman Air Force Base 20K OD Treatment Unit Closure
Date: June 24, 2011

Review of Treated Wastes

Dr. Stapleton reviewed the list of materials treated at the HAFB 20,000-Pound Open Detonation Treatment Unit in May and June 2011. This list included all materials treated at the HAFB 20K OD Treatment Unit between 1996 through March 2011. Based upon the review and research, the following compounds and elements may have been generated by the treatment of historic wastes, be persistent in the environment, and were not included in the list of required analytes in the Permit (Table J-2):

- Perchlorate
- Nitrate
- Phosphorus
- N-Nitrosdimethylamine (NDMA)

Review of Quarterly Sampling Event Data

Ms. Diane Lazarus performed a review of historic quarterly sampling data in June 2011. The following compounds and chemicals were analyzed that were not required by the Permit (Table J-2):

- 2-Amino-4,6-dinitrotoluene (2-am-DNT)
- 4-Amino-2,6-dinitrotoluene (4-am-DNT)
- Thallium
- Zinc

Zinc and thallium were analyzed once. All concentrations of thallium were below detection levels (not detected, <~0.7 mg/kg); therefore, thallium was not added to the analyte list for closure. Concentrations of zinc ranged between 3.8 and 14.8 mg/kg, which are significantly less that the NMED SSL of 23,500 mg/kg. Therefore, zinc was not added to the analyte list for closure.

Summary

Based on the review of materials treated and historic laboratory data, the following compounds and elements are suggested for addition to the analytical suite required by the Permit (Table J-2):

- Perchlorate
- Nitrate
- Phosphorus
- N-Nitrosdimethylamine (NDMA)
- 2-Amino-4,6-dinitrotoluene (2-am-DNT)
- 4-Amino-2,6-dinitrotoluene (4-am-DNT)

Holloman AFB EOD ODU

Ordnance Disposal List
1996-2005

Ordnance Disposal List
1996-2005 Holloman AFB

Nomenclature (Name)	Quantity	NEW	Country of Origin	Report #
Nike Rocket Motor M-5E1	1		USA	ACCHOLL***960531*** 0900Z
Flare IR 26mm Type 1	418		Switzerland	ACCHOLL***960725*** 0730Z
S&A Device QF-86	15		USA	
SMDC, QF-86	19		USA	
Destruct Charge QF-86	17		USA	
Nike Igniter	2		USA	
Cart Decoy Ejection	2		USA	
Dynamite	24		USA	
Electric Squibs	99		USA	
Igniter	6		USA	
Impulse Cartridge	7		USA	
Initiator	6		USA	
Stinger Rocket Flight Motor	2		USA	
Flare MJU-40/B	1		USA	
Cart. Operating A719-3	9		Germany	ACCHOLL***040506***
Cart. Pressure 6102-2	2		Germany	
Charge Set Linear, EM1-5016/17GF	4		Germany	
Squib and Battery	4		Germany	
Cart. Practice 27mm DM-38	30		Germany	
Cart. Signal Practice Bomb	2		Germany	
Fuze Signaling	4		Germany	
Propellant Rocket Motor MBEU2775RU	8		Germany	
FMU-139 A/B Fuze	1		USA	
AN-M8 HC Smoke Grenade	1		USA	
M18A1 Anti Personnel Mine	2		USA	
Cart. Cutter	5		USA	
Ejection Sequencer	2		USA	
FLSC Assembly	1		USA	
Hand Grenade Simulator	5		USA	
Impulse Cart.	2		USA	
Initiator Cart.	13		USA	
Parachute Release	35		USA	
Rocket Motor Igniter	401		USA	
Safe & Arming Device	4		USA	
Shape Charge Assembly	1		USA	
5.56mm Ammunition	6400		USA	
Mk 11 Mod 1 20mm Cart. Practice	50		USA	
Booster Initiator	33		USA	ACCHOLL***050314*** 2114Z
Cart. Recovery Sequencer	3		USA	
Charge Assembly	1		USA	
Electric Detonator	7		USA	
Drogue Servo	25		USA	
Initiator	7		USA	
Parachute Release	10		USA	
S&A Device	2		USA	

Ordnance Disposal List
1996-2005 Holloman AFB

Nomenclature (Name)	Quantity	NEW	Country of Origin	Report #
Cart.	2		USA	
Cart. ARD 446-1	55		USA	
Cart. ARD 863-1	26		USA	
Cart. BBU-35/B	10		USA	
Cart. Delay	3		USA	
Cart. Fire Extinguisher	2		USA	
Cart. Impulse	30		USA	
Cart. Initiator	42		USA	
Cart. Mk 8	6		USA	
Cart. Mortar	27		USA	
FZU-39	1		USA	
Dynamite	2		USA	
5.56mm Ammunition	20		USA	
7.62mm Ammunition	230		USA	
9mm Ammunition	39		USA	
.4 Seconds Delay Initiator	1		USA	ACCHOLL***050826*** 1552Z
Actuator, Explosive	3		USA	
Booster Initiator	8		USA	
Cart. Guillotine	14		USA	
Cart. ARD 446-1	18		USA	
Cart. Impulse	1		USA	
Cart. Impulse F/AN/ALE-29	1652		USA	
Detonating Cord	7		USA	
Cart Delay 0.2 Sec	2		USA	
Cart. ARD 863-1	1		USA	
Cart. Cutter AC	5		USA	
Electric Detonator	2		USA	
Drogue Sev, FLSC	2		USA	
Egress Items	1		USA	
Gas Pressure Generator	2		USA	
Gas Pressure Generator, Propellant	1		USA	
FLSC Assembly	4		USA	
Initiator Cart.	13		USA	
Initiator M-53	32		USA	
Locking Cord Cutter	4		USA	
Mk 200 Gas Generator	5		USA	
Parachute Release	16		USA	
Recovery Sequencer	2		USA	
Sequencer Ejection	1		USA	
M18A1 Special Purpose Model 308-9	31		USA	
105mm Projectile	1		USA	
20mm Ammunition M55	68		USA	
Igniter M69	2		USA	
Rocket Motor Igniter XM42E2	2		USA	
Rocket Motor Mk-16	2		USA	

Ordnance Disposal List
1996-2005 Holloman AFB

Nomenclature (Name)	Quantity	NEW	Country of Origin	Report #
Rocket Motor RMXM-115	502		USA	
Rocket Propellant	50		USA	
5.56mm Ammunition	4		USA	
Gas Pressure Generator	1		USA	ACCHOLL***051103*** 0046Z
Actuator, Explosive	1		USA	
Cart. Delay	27		USA	
Cart. Impulse	1911		USA	
Cart. Impulse BBU-36/B	3		USA	
Cart. Cutter	6		USA	
Inflation Device	16		USA	
Cart. Initiator	35		USA	
Propellant Initiator	27		USA	
Parachute Release	6		USA	
Warhead Adapter	10		USA	
Water Gel Explosive	1		USA	
Igniter M69	1		USA	
Flare IR MJU-7A/B	3		USA	

Ordnance Disposal List
2006

Event #	Date	Team Chief	Reason For OP	NSN	Demo Explosives Used	QTY	U/I	NEW
06-01	28-Feb-06	SrA Cooper	Test Track Disposal		BLU 128B	1	EA	975
				1375-01-389-3854AQ	Charge, Demolition, 1.25 lb, C-4, M112	120	EA	150
				1375-00-028-5168AQ	Cord Assembly, Detonating, PETN	260	FT	1.82
				1375-01-192-9174	Cap Blasting Electric M6	2	EA	0.0056
							Total	1126.8256
					Feb 06 Total: 1126.8256			
06-02	13-Mar-06	SrA Cornejo	ADR	1340-00-778-9485	Improved Honest John Rocket Motor	1	EA	1847
				1377L0000704801	Explosive Bolts	3	EA	0.15
				1305-00-892-2150	Cartridge, 7362 MILL	200	EA	1.34
				1377-00-731-9271ES	Initiator, Cart M99	3	EA	0.0198
				1377-01-168-2559ES	CTG, Delay 0.2 SEC	13	EA	0.0143
				1377L0000524801	Cartridge, Rocket	1	EA	1
				1377-01-047-7458ES	Initiator	16	EA	0.1056
				1377-01-234-0706ES	Drogue, Severence FLSC	2	EA	0.0014
				1377-01-396-2492	Cartridge, Impulse	22	EA	0.0198
				1377-01-277-2868ES	Initiator, Cart SEAWARS	16	EA	0.0032
				1377-01-166-4261ES	Initiator, Cart Actuated	1	EA	0.0069
				1377-01-047-7458ES	Initiator, Cart	20	EA	0.132
				1377-01-322-6334ES	Cartridge, Impulse	15	EA	0.21
				1377-01-052-8207ES	Cartridge, Impulse	1	EA	0.014
				1377-01-322-6334ES	Cartridge, Impulse	2	EA	0.028
				1377-01-482-1555	Cartridge, Impulse	2	EA	0.0552
				1377-01-047-7458ES	Initiator, Cart	12	EA	0.1792
				1377-01-333-9143ES	Cutter, Cart Locking Cord	3	EA	0.0072
				1377-01-047-7458ES	Initiator	16	EA	0.1056
				1377-01-332-2379ES	Cutter, Cart Actuated	4	EA	0.0096
				1377-01-360-4900ES	Cartridge, Delay	20	EA	0.026
				1377-01-386-7676ES	Inflation Device, Automatic	2	EA	0.0004
				1377-01-079-2664ES	Det Transfer Assy	3	EA	0.0033
				1377-01-076-2663ES	Cord Detonating	3	FT	0.012
				1377-01-047-7458ES	Initiator, Cart	4	EA	0.0264
				1377-01-166-4261ES	Initiator, Cart	2	EA	0.0138
				1377-01-322-6334ES	Cartridge Impulse	3	EA	0.042
				1377-01-016-3218ES	SMDC Line	1	EA	0.0008
				1377-01-333-9143ES	Locking Cord Cutter	15	EA	0.036

1377-01-394-1272ES	Parachute Release	6 EA	0.0012
1377-01-056-8643ES	Line Assy, Detonating	1 EA	0.0083
1377-01-168-2559ES	CTG, Delay 0.2 SEC	4 EA	0.0044
1377-01-360-4900ES	Cartridge, Delay	2 EA	0.0026
1377-01-240-3600ES	DTA Type ST	10 EA	0.009
1377-01-198-7485ES	DTA Type ST	8 EA	0.004
1377-01-454-9864ES	Inflation Device, Automatic	6 EA	0.0012
1377-01-332-2379ES	Cutter, Cartridge Actuated	2 EA	0.0048
1377-01-322-6334ES	Cartridge Impulse	3 EA	0.042
1377-01-198-7484EA	DTA Type ST	4 EA	0.002
1377-01-368-5411ES	Cartridge, Harness Release	6 EA	0.0024
1305-01-155-5459	CTG 5.56 MILL	42 EA	0.1596
1377-01-052-8207ES	CTG Mortar	2 EA	0.028
1377-01-386-7676ES	Inflation Device, Automatic	12 EA	0.0032
1377-01-319-3847ES	Generator, Gas Press	1 EA	0.0111
1377-01-166-4261ES	Initiator, Cart	1 EA	0.0069
1377-01-322-6334ES	Cartridge Impulse	2 EA	0.028
1377-01-322-6334ES	Cartridge Impulse	2 EA	0.028
1377-01-083-8459ES	Drogue, Severence FLSC	1 EA	0.0011
1377-01-144-8482ES	DTA Type ST	4 EA	0.0172
1377-01-200-9012ES	DTA Type ST	8 EA	0.0072
1377-01-333-9143ES	Locking Cord Cutter	2 EA	0.0048
1377-01-037-8651	CTG, Impulse, BBU-35/B	1103 EA	0.8824
1377-01-052-8207ES	CTG Mortar	4 EA	0.056
1377-01-322-6334ES	Cartridge Impulse	1 EA	0.014
1377-01-332-2379ES	Cutter, Cartridge Actuated	2 EA	0.0048
1377-01-166-4261ES	Initiator, Cartridge Actuated	1 EA	0.0069
1377-01-482-1555	Cartridge, Imp, ARD 446-1/B	26 EA	0.7176
1377-01-053-0537ES	Generator, Gas Press	1 EA	0.0111
1377-01-312-3511ES	Emergency Power Supply	3 EA	0.0006
1377-01-360-4900ES	Cartridge, Delay	1 EA	0.0013
1377-01-386-7676ES	Inflation Device, Automatic	14 EA	0.0028
1377-01-166-4261ES	Initiator, Cartridge Actuated	2 EA	0.0138
1377-01-083-8459ES	Drogue, Severence FLSC	2 EA	0.0022
1377-01-137-6039ES	Initiator	2 EA	0.0086
1375-01-389-3854AQ	Charge, Demolition, 1.25 lb, C-4, M112	360 EA	450
1375-01-192-9174	Cap Blasting Electric M6	4 EA	0.0112

			1375-00-028-5168AQ	Cord Assembly, Detonating, PETN	381	FT	2.667
						Total	2305.3398
06-03	17-Mar-06 SrA Cornejo	German ADR	1377-99-660-1127	Cartridges, Set, Seat, MBEU2775RU	13	SE	4.47
			1377-01-369-6045	Cartridge, Power D. ARD 446-1A1W	113	EA	3.39
			1370-14-043-0802	Flare, Aircraft	9	EA	15.99
			1375-99-965-0658	Detonator, Percussion	48	EA	0.096
			1377-99-657-0675	Seat Cartridges Set, MBEU 60008-4	20	SE	8.56
			1377-99-965-9115	Cartridges, Set, Jettison, MBCJ2245-1	2	SE	0.12
			1377-99-966-3031	Charge set linear, EM1-5016/17GF	3	SE	0.27
			1305-12-187-6891	Cartridge, 27mm x 145 DM 13	19	EA	4.64
			1377-00-238-0554	Cartridges, Power Device	32	EA	0.0704
			1377-12-932-5031	Cartridges, Power Device	11	EA	0.0242
			1370-12-238-1959	Signal, Emergency, DM 39, Red	10	EA	1.98
			1377-00-238-0552	Cartridges, Power Device	60	EA	0.264
			1377-01-286-3723	Cartridges, Pressure, 6102-1	17	EA	0.0374
			1377-01-299-9862	Actuator, Kit Deployment, 6014100	8	EA	0.0176
			1377-99-102-7185	Cartridge, Operating, A718-3	20	EA	0.044
			1377-99-220-3969	Cartridge, Operating, A719-3	26	EA	0.0572
			1377-12-185-2488	Initiator, Propellant Actuated	2	EA	0.022
			1305-12-199-4498	Cartridge, 27mm x 145 DM 28	10	EA	1.87
				PETN	130	EA	65
			1375-01-192-9174	Cap Blasting Electric M6	8	EA	0.0224
						Total	106.9452
06-04	23-Mar-06 SSgt Hansen	ADR Rocket Motors	1340-00-778-9486	Improved Honest John Rocket Motor	2	EA	3360
			1375-01-389-3854AQ	Charge, Demolition, 1.25 lb, C-4, M112	300	EA	375
			1375-01-192-9174	Cap Blasting Electric M6	4	EA	0.0112
			1375-00-204-0851	Cord Assembly, Detonating, PETN	201	FT	1.407
						Total	3736.4182
				Mar 06 Total: 6151.7032			
06-05	7-Jun-06 SSgt Tomten	Test Track Disposal		MK 84	1	EA	945
			1375-01-192-9174	Cap Blasting Electric M6	2	EA	0.0056
			1375-01-389-3854AQ	Charge, Demolition, 1.25 lb, C-4, M112	120	EA	150
			1375-00-204-0851	Cord Assembly, Detonating, PETN	211	FT	1.477

						Total	1096.4826
06-06	15-Jun-06	SrA Larson	ADR	1375-01-389-3854AQ	Charge, Demolition, 1.25 lb, C-4, M112	450 EA	562.5
				1375-01-192-9174	Cap Blasting Electric M6	2 EA	0.0056
				1377-01-332-2379ES	Cutter, Cartridge Actuated	2 EA	0.0048
				1377-01-333-9143ES	Locking Cord Cutter	1 EA	0.0024
				1377-01-333-9143ES	Locking Cord Cutter	2 EA	0.0048
				1377-01-403-4827ES	Initiator, JAU-8/A25	2 EA	0.008
				1377-01-425-0548ES	Initiator, Cartridge Actuated	4 EA	0.0236
				1377-01-394-5661ES	Parachute Release	1 EA	0.0004
				1377-01-384-7676ES	Inflation Device	6 EA	0.0012
				1377-01-403-4827ES	Initiator, Propellent	3 EA	0.012
				1377L00007248ES	Pressure Cartridge Assy	3 EA	0.04687
				1377-01-166-4261ES	Initiator Cartridge Actuated	1 EA	0.0069
				1377-01-166-4261ES	Initiator Cartridge Actuated	6 EA	0.0414
				1377-01-322-6334ES	Cartridge, Impulse	2 EA	0.028
				1377-01-166-4261ES	Initiator Cartridge Actuated	1 EA	0.0069
				1377-01-403-4827ES	Initiator, Propellent	1 EA	0.004
				1377-01-482-1555	Cartridge, Impulse	20 EA	0.5452
				1377-01-083-8459ES	Holder, FLSC Assembly	2 EA	0.0022
				1377-01-369-2492ES	Imp Carts	5 EA	0.045
				1370-00-490-7362ES	Sig Kit	17 EA	1.3804
				1377-01-369-6045	Imp Carts	8 EA	0.2208
				1377-01-346-2217ES	Initiator Cart	3 EA	0.0198
				1377-01-083-8459ES	Holder, FLSC Assembly	2 EA	0.002
				1377-01-322-6334ES	Imp Carts	2 EA	0.028
				1377-01-166-4261ES	Initiator Cart	3 EA	0.0207
				1377-01-454-9864ES	Inflation Device	10 EA	0.002
				1377-01-454-9864ES	Inflation Device	4 EA	0.0008
				1375-01-494-9223AQ	Dynamite	12 EA	6.6
				1325-01-214-7311	Fuze set, bomb	8 EA	0.6496
				1377-01-144-8482ES	Det Cord	1 FT	0.0043
				1377-00-403-4827ES	Initiator, Propellent	1 EA	0.004
				1377-01-369-6045	Imp Carts	2 EA	0.0552
				1377-00-987-3603ES	MK44 MOD0 Imp Cart	1 EA	0.0003
				1377-01-166-4261ES	Initiator Cart	6 EA	0.0414
				1377-01-322-6334ES	Imp Carts	2 EA	0.028

				1377-01-456-1933	Cartridge, Impulse	36 EA	0.0288
				1377-01-319-3847ES	Generator, Gas Press	1 EA	0.0111
				1377-00-731-9264	Cartridge, Impulse	30 EA	0.561
				1377-01-394-1272ES	Parachute Release	2 EA	0
				1377-01-332-2379ES	Cutter, Cartridge Actuated	6 EA	0.0144
				1377-01-414-4002	Cord Assembly, Deton	7 FT	0.0063
				1377-01-414-4001	Cord Assembly, Deton	6 FT	0.0054
				1377-01-394-1272ES	Parachute Release	7 EA	0.0014
				1377-01-056-8644ES	Cord, Detonating	12 FT	0.0996
				1390-01-415-1766	Safety and Arming Device	2 EA	0
				1377-00-918-8533ES	Squib Assembly, Elec	1 EA	0.0007
				1377-01-166-4261ES	Initiator Cartridge	2 EA	0.0138
				1377-01-332-2379ES	Cutter, Cartridge Actuated	2 EA	0.0048
				1377-01-333-9143ES	Cutter, Cartridge Actuated	2 EA	0.0048
				1325-00-941-7388	Shaft, Drive Fuze AR	1 EA	0
				1377-00-731-9271ES	Initiator Cartridge	1 EA	0.0066
				1377-01-037-8650	Cartridge, Impulse	165 EA	0.363
				1325-00-422-9022	Arming Device, Bomb	1 EA	0
				1377-01-056-8643ES	Cord, Detonating	10 FT	0.083
				1390-01-125-2127	Booster, Fuze	6 EA	0.0432
						Total	573.59447
					Jun 06 Total: 1670.07707		
06-07	12-Jul-06	SSgt Maschka	Test Track Mission		BLU-121	1 EA	980
				1375-01-389-3854AQ	Charge, Demolition, 1.25 lb, C-4, M112	90 EA	112.5
				1375-01-192-9174	Cap Blasting Electric M6	2 EA	0.0056
						Total	1092.5056
06-08	21-Jul-06	SSgt Maschka	Little John ADR	1340-00-973-3853	RKT MTR M26	1 EA	247
				1340L0000394801	IGNITER M57	1 EA	0.9
				1377L0001244801	CASSETTE C11.5	2 EA	5.6
				1375L0001054801	CASSETTE C-8	6 EA	20.1
					Loose Rocket Fuel	80 PD	80
				1375-01-389-3854AQ	Charge, Demolition, 1.25 lb, C-4, M112	180 EA	225
				1375-01-192-9174	Cap Blasting Electric M6	2 EA	0.0056
						Total	578.6056

Ordnance Disposal List
2007

Event #	Date	Team Chief	Reason For OP	NSN	Demo Explosives Used	QTY	U/I	NEW
07-001	16-Apr-07	SSgt Cloutier	Test Track Disposal	1375-01-389-3854AQ	Charge, Demolition, 1.25 lb, C-4, M112	120	EA	150
				1375-01-192-9174	Cap Blasting Electric M6	2	EA	0.0112
				N/A	Test Submunitions	15	EA	35.55
							Total:	**185.5612**
07-002	23-Apr-07	SrA Cornejo	German ADR	1305-12-199-4498	Cartridge, 27 mm x 145 DM 28	120	EA	22.44
				1370-12-159-1751	Signal, Distress	20	EA	42.401
				1370-12-159-1959	Signal, Emergency, DM 39, PT, red	68	EA	13.46
				1370-14-043-0802	Flare, Aircraft	120	EA	213.24
				1375-99-965-0658	Detonator, percussion	4	EA	0.0008
				1377-01-286-3723	Cartridge, Pressure, 6102-1	17	EA	0.037
				1377-01-299-9862	Actuator, Kit Deployment, 6014100	73	EA	0.16
				1377-01-369-6045	Cartridge, Power D. ARD 446-1A1W	63	EA	1.89
				1377-99-102-7185	Cartridge, Operating, A718-3	10	EA	0.022
				1377-99-220-3969	Cartridge, Operating, A719-3	11	EA	0.024
				1377-99-657-0675	Seat cartridges set, MBEU 60008-4	4	SE	1.712
				1377-99-965-9115	Cartridges, set jettison, MBCJ2245-1	9	SE	0.54
				1377-99-966-3031	Charge set linear, EM1-5016/17GF	4	SE	0.36
				1377-00-412-3205	Cartridges, impulse, 626AS100	9	EA	0.018
				1377-01-524-8991	Cartridge, Operating	22	EA	0.726
				1377-01-369-2492	Cartridge, Operating	24	EA	0.053
					PETN (explosive)	64	EA	64
							Total:	**361.0838**
07-003	26-Apr-07	SSgt Tomten	MUNS Quarterly ADR					
				1377013193847ES	GENERATOR, GAS PRES	1	EA	0.0111
				1377010838459ES	DROGUE SEV, FLSC	1	EA	0.0011
				1377011376040ES	INITIATOR	8	EA	0.0248
				1377013322379ES	CUTTER, CARTRIDGE ACT	1	EA	0.0024
				1377013462216ES	BOOSTER INITIATOR	8	EA	0.0352
				1377011376040ES	INITIATOR	8	EA	0.0248
				1377010838459ES	DROGUE SEV, FLSC	2	EA	0.0022
				1325013496258	FUZE, FMU-139A/B	8	EA	2.2224
				1377004034827ES	JAU-8/A25	1	EA	0.004
				1377011376040ES	INITIATOR	8	EA	0.0248
				1377013462215ES	.4 SEC DELAY	2	EA	0.0066

				1377012999862ES	KIT DEPLOYMENT ACTUATOR	45	EA	0.081
				1377014250548ES	INITIATOR	4	EA	0.0236
				1377002380552ES	INIT ALT: 01-017-0601	2	EA	0.0108
				1377012898570	CARTRIDGE, IMPULSE MK44 MOD 0	1	EA	0.0003
				1377011028963ES	INITIATOR, DELAY	5	EA	0.049
				1377002457970ES	CTG ASSEMBLY, DELAY	1	EA	0.0025
				1377002380552ES	INIT ALT: 01-017-0601	12	EA	0.0648
				1377008451059ES	INITIATOR, M27	1	EA	0.0066
				1377013462216ES	BOOSTER INITIATOR	4	EA	0.0176
				1377013193847ES	GENERATOR, GAS PRESSURE,PROPE	6	EA	0.0666
				1377004034827ES	INITIATOR, JAU-8/A25	2	EA	0.008
				1377013462216ES	BOOSTER INITIATOR	13	EA	0.0572
				1377012009009ES	DTA TYPE ST	1	EA	0.0009
				1377010568642ES	LINE ASSY, DETONATION	4	EA	0.0268
				1370012968395	FLARE, IR CM, MJU-7A/B	15	EA	9.417
				1377013462215ES	.4 SEC DELAY INITIATOR	9	EA	0.0297
				1377013339143ES	LOCKING CORD CUTTER	3	EA	0.0072
				1377010188721ES	SMDC LINE	3	EA	0.003
				1377012009009ES	DTA TYPE ST	1	EA	0.0009
				1377013941272ES	PARACHUTE RELEASE, E	2	EA	0.0004
				1377013867676ES	INFLATION DEVICE, AUTOMATIC	13	EA	0.0026
				1377012999862ES	KIT DEPLOYMENT ACTUATOR	18	EA	0.0324
				1377013604900ES	CARTRIDGE,DELAY	3	EA	0.0039
				1377013941272ES	PARACHUTE RELEASE, E	16	EA	0.0032
				1377010849358ES	CTG, BOOSTER	3	EA	0.0006
				1377008838998ES	CTG, IMPULSE (GUILLOTINE)	2	EA	0.006
				1377013339143ES	CTG LOCKING CORD CUTTER 4.0	1	EA	0.0024
				1377014940471ES	INITIATOR	2	EA	0.001
				1305007528114	CTG 20MM TP BALL BULK	868	EA	74.7348
				1305011164560	CTG, 20MM TP(BALL) M55 BULK	4967	EA	427.6587
				1377012999862ES	KIT DEPLOYMENT ACTUATOR	14	EA	0.0252
				1377013867676ES	INFLATION DEVICE, AUTOMATIC	8	EA	0.0016
				1377014549864ES	INFLATION DEVICE, AUTOMATIC	16	EA	0.0032
				1377013462216ES	BOOSTER INITIATOR	9	EA	0.0396
				1377004034827ES	INITIATOR, JAU-8/A25	6	EA	0.024
				1377014549864ES	INFLATION DEVICE, AUTOMATIC	2	EA	0.0004
				1325010339895	BOMB GP 2000LB MK84-4 TRITONAL	1	EA	940

				1377013685411ES	CARTRIDGE, HARNESS REL	1	EA	0
				1377013462216ES	BOOSTER INITIATOR	6	EA	0.0264
				1377013685411ES	CARTRIDGE, HARNESS REL	4	EA	0
				1377013462216ES	BOOSTER INITIATOR	10	EA	0.044
				1377013322379ES	CUTTER, CARTRIDGE ACT	4	EA	0.0096
				1377004034827ES	JAU-8/A25	1	EA	0.004
				1325013496258	FUZE, FMU-139A/B	1	EA	0.2778
				1377011376040ES	INITIATOR	4	EA	0.0124
				1377013462216ES	BOOSTER INITIATOR	4	EA	0.0176
				1377013462215ES	.4 SEC DELAY	1	EA	0.0033
				1377013462216ES	BOOSTER INITIATOR	3	EA	0.0132
				1377013322379ES	CUTTER, CARTRIDGE ACT	1	EA	0.0024
				1377011376040ES	INITIATOR	4	EA	0.0124
				1377008451059ES	INITIATOR, M27	1	EA	0.0066
				1377011376040ES	INITIATOR	4	EA	0.0124
				1377013462215ES	.4 SEC DELAY INITIATOR	3	EA	0.0099
				1377004034827ES	INITIATOR, JAU-8/A25	2	EA	0.008
				1377013462216ES	BOOSTER INITIATOR	6	EA	0.0264
				1377013867676ES	INFLATION DEVICE, AUT	4	EA	0.0008
				1377004034827ES	INITIATOR, JAU-8/A25	2	EA	0.008
				1377013945663ES	PARTSKIT, ESCAPESY	1	EA	0.0004
				1377013462217ES	INT, EXT, ALT INITIATOR	7	EA	0.0462
				1377013462216ES	BOOSTER INITIATOR	20	EA	0.088
				1377004034827ES	INITIATOR JAU-8/A25	2	EA	0.008
				1377013462215ES	.4 SEC DELAY INITIATOR	6	EA	0.0198
				1377004034827ES	INITIATOR, JAU-8/A25	1	EA	0.004
				1377010838459ES	DROGUE SEV, FLSC	2	EA	0.0022
				1377011376040ES	INITIATOR	19	EA	0.0589
				1377005169924	CTG IMP ARD 446-1	4	EA	0.1104
				1377013462216ES	BOOSTER INITIATOR	10	EA	0.044
				1377013322379ES	CUTTER, CARTRIDGE ACT	2	EA	0.0048
				1377004034827ES	INITIATOR, JAU-8/A25	2	EA	0.008
				1377014250548ES	INITIATOR	4	EA	0.0236
				1377011664149	WARHEAD ADAPTER	2	EA	0.0176
				1377013193847ES	GENERATOR, GAS PRES	1	EA	0.0111
				1377008451059ES	INITIATOR, M27	1	EA	0.0066
				1325013496258	FUZE SET, BOMB FMU-139A/B	1	EA	0.2778

				1325013496258	FUZE SET, BOMB FMU-139A/B	1	EA	0.2778
				1377013462216ES	BOOSTER INITIATOR	2	EA	0.0088
				1377013462215ES	.4 SEC DELAY INITIATOR	1	EA	0.0033
				1377013193847ES	CTG GYRO SPINUP GAS	1	EA	0.0111
				1305219143273	20MM TP PGU-C144	2	EA	0.1722
				1377011987481ES	DTA TYPE ST	6	EA	0.0054
				1377013692492	CTG, IMPULSE, ARD, 863-1A1W	2	EA	0.018
				1377013696045	CARTRIDGE, IMP,ARD 446-1A1W	21	EA	0.5796
				1377002938184	CTG IMP MK2 MOD 1	10	EA	0.1
				1375-01-389-3854AQ	Charge, Demolition, 1.25 lb, C-4, M112	120	EA	150
				1340-00-778-9485	Improved Honest John Rocket Motor	1	EA	1847
				1375-01-192-9174	Cap Blasting Electric M6	2	EA	0.0112
				1375-00-028-5161AQ	Det Cord	70	EA	0.7
							Total:	**3454.8869**
						April Total: 4001.8407		
07-04	5-Jun-07	TSgt Baker	Test Track Demo	1375-01-192-9174	Cap Blasting Electric M6	2	EA	0.0112
				1375-01-389-3854AQ	Charge, Demolition, 1.25 lb, C-4, M112	180	EA	225
					Loose Rocket Propellent	200	Lbs	200
					Test Submunitions	10	EA	12.5
							Total:	437.5224
07-05	8-Aug-07	TSgt Baker	Mk 82 Demo	1325-00-460-1305	Bomb, Gereral Purpose, MK 82, 500LB	1	EA	192
				1375-01-389-3854AQ	Charge, Demolition, 1.25 lb, C-4, M112	88	EA	110
				1375-01-192-9174	Cap Blasting Electric M6	2	EA	0.0112
				1375-00-028-5161AQ	Det Cord	1000	FT	10
							Total:	312.0224
07-06	15-Aug-07	SSgt Maschka	Mk 83 Demo	1325-00-460-1305	Bomb, Gereral Purpose, MK 82, 500LB	1	EA	192
				1375-01-389-3854AQ	Charge, Demolition, 1.25 lb, C-4, M112	30	EA	37.5
				1375-01-192-9174	Cap Blasting Electric M6	3	EA	0.0168
				1375-00-028-5161AQ	Det Cord	75	FT	0.75
				1375-01-057-6459	Cap Blasting Non-Electric M7	1	**EA**	0.0028
							Total:	230.2696
07-07	20-Aug-07	SSgt Cornejo	Rocket ADR	1377013692492	CTG, IMPULSE, ARD, 863-1A1W	2	EA	0.0552
				1377013696045	CARTRIDGE, IMP,ARD 446-1A1W	21	EA	0.5796

				1377014633341ES	DETONATOR, ELECTRIC	2	EA	0.0012
				1377013462215ES	.4 SEC DELAY INITIATOR	2	EA	0.0066
				1377013462216ES	BOOSTER INITIATOR	5	EA	0.022
				1377013193847ES	CTG GYRO SPINUP GAS	1	EA	0.0111
				1377013685411ES	CTG, HARNESS REL	1	EA	0.0004
				1377001033434	CTG IMP MK2 MOD 1	4	EA	0.04
				1377001033434	CTG IMP MK2 MOD 1	10	EA	0.1
				1377013462215ES	.4 SEC DELAY INITIATOR	1	EA	0.0033
				1377013193847ES	CTG GYRO SPINUP GAS	1	EA	0.0111
				1377013604900ES	CARTRIDGE,DELAY	1	EA	0.0013
				1377012999862ES	KIT DEPLOYMENT ACTUATOR	1	EA	0.0018
				1340003507804	ROCKET MOTOR, SR49TC	31	EA	9914.643
				1375-01-389-3854AQ	Charge, Demolition, 1.25 lb, C-4, M112	660	EA	825
				1375-01-192-9174	Cap Blasting Electric M6	4	EA	0.0224
							Total:	10739.656
07-08	21-Aug-07	SSgt Cornejo	Rocket ADR	1377011376040ES	INITIATOR	1	EA	0.0031
				1377001033434	CTG IMP MK2 MOD 1	1	EA	0.01
				1377013462216ES	BOOSTER INITIATOR	3	EA	0.0132
				1377013941272ES	PARACHUTE RELEASE, E	6	EA	0.0012
				1340007559861	IGNITER, ROCKET MOTOR M17A	5	EA	0.9
				1340003507804	ROCKET MOTOR, SR49TC	4	EA	1279.2
				1377008838998ES	CTG, IMPULSE (GUILLOTINE)	3	EA	0.009
				1377014821555	CARTRIDGE, IMP, ARD 446-1B	1	EA	0.0276
				1377004034827ES	INITIATOR, JAU-8/A25	3	EA	0.012
				1377011664261ES	CTG, INERTIAL REEL GAS	2	EA	0.0138
				1377013226334ES	CARTRIDGE, IMPULSE MORTAR	2	EA	0.028
				1377008838998ES	CTG, IMPULSE (GUILLOTINE)	2	EA	0.006
				1377004034827ES	INITIATOR, JAU-8/A25	2	EA	0.008
				1340003507804	ROCKET MOTOR, SR49TC	26	EA	8314.8
				1375-01-389-3854AQ	Charge, Demolition, 1.25 lb, C-4, M112	900	EA	1125
				1375-01-192-9174	Cap Blasting Electric M6	4	EA	0.0224
							Total:	10720.654
07-009	13-Sep-07	SSgt Cloutier	Leftover Item ADR	1377013193847ES	CTG GYRO SPINUP GAS	1	EA	0.0111
				1377013685411ES	CTG, HARNESS REL	1	EA	0.0004

				1377014549864ES	INFLATION DEVICE, AUTOMATIC	3	EA	0.0006
				1377012999862ES	KIT DEPLOYMENT ACTUATOR	1	EA	0.0018
				1377013692492	CTG, IMPULSE, ARD, 863-1A1W	8	EA	0.072
				1377014821555	CARTRIDGE, IMP, ARD 446-1B	7	EA	0.1932
				1377004034827ES	INITIATOR, JAU-8/A25	1	EA	0.004
				1377013685411ES	CTG, HARNESS REL	1	EA	0.0004
				1377010849358ES	CTG, BOOSTER	1	EA	0.0002
				1377013226334ES	CARTRIDGE, IMPULSE MORTAR	1	EA	0.014
				1377011664261ES	CTG, INERTIAL REEL GAS	1	EA	0.0069
				1377010528208ES	CTG, DROGUE GUN	1	EA	0.0019
				1377010528209ES	CTG CUTTER ACTUATED 1.15	2	EA	0.0048
				1325011128170	CTG, SIG, PRAC BMB CXU-3A/B	50	EA	4.15
				1375-01-389-3854AQ	Charge, Demolition, 1.25 lb, C-4, M112	90	EA	112.5
				1375-01-192-9174	Cap Blasting Electric M6	2	EA	0.0448
							Total:	117.0061
07-10	6-Dec-07	SSgt Maschka	Test Track Demo	1375-01-389-3854AQ	Charge, Demolition, 1.25 lb, C-4, M112	30	EA	37.5
				1375-01-192-9174	Cap Blasting Electric M6	4	EA	0.0896
					Nike Rocket Igniter	1	EA	2.2
					Loose Nike Propellent	40	EA	40
							Total	79.7896

Ordnance Disposal List
2008

Event #	Date	Team Chief	Reason For OP	NSN	Demo Explosives Used	QTY	U/I	NEW
08-001	4-Mar-08	SSgt Parrish	ADR	1305-12-199-4498	Cartridge, 27mm x 145 DM 28	125	ea	23.375
				1370-12-168-5524	Signal, Distress	466	ea	9.32
				1377-99-102-7185	Cartridge, Operating	9	ea	0.0198
				1370-14-043-0802	Flare, Aircraft	6	ea	10.662
				1377-01-482-1555	Cartridge, Power D. ARD 446-1B	167	ea	5.01
				1377-99-965-9115	Cartridge, set jettison, MBCJ2245-1	20	se	1.2
				1377-99-966-3031	Carge set linear, EM1-5016/17GF	4	se	0.36
				1377-00-412-3205	Cartridge, impulse, 626AS100	9	ea	0.018
				1377-99-657-2084	Cartridge, Operating	15	ea	0.033
					(PETN) Explosive	43	ea	43
							Total:	92.9978
08-002	6-Mar-08	SSgt Parrish	ADR	1325010121990	FUZE PROX BOMB NOSE FMU-113/B	2	ea	0.004
				1337000322446	INGNITERS M24	4	ea	8.8
				1337001799203	ROCKET MOTOR	5	ea	450
				1337007370462	IGNITOR, ROCKET MOTOR, XM42E2	1	ea	2.2
				1340000931075	IGN RKT MTR MK165-0 F/MK6-0,1	3	ea	0.30411
				1340003507804	ROCKET MOTOR, SR49TC	15	ea	4796.9998
				1370010308330	SIG SMK/ILL MK124	1	ea	0.2
				1377001033434	CTG IMP MK2 MOD 1	1	ea	0.01
				1377010378650	CTG,IMPULSE,BBU-36/B	306	ea	0.6732
				1377013692492	CTG, IMPULSE, ARD, 863-1A1W	8	ea	0.072
				1377013692492	CTG, IMPULSE, ARD, 863-1A1W	7	ea	0.063
				1377013696045	CARTRIDGE, IMP,ARD 446-1A1W	5	ea	0.138
				1377013696045	CARTRIDGE, IMP,ARD 446-1A1W	11	ea	0.3036
				1377013696045	CARTRIDGE, IMP,ARD 446-1A1W	3	ea	0.0828
				1377014561933	CTG, IMPULSE BBU-35/B	40	ea	0.032
				1377014821555	CARTRIDGE, IMP, ARD 446-1B	1	ea	0.0276
				1377014821555	CARTRIDGE, IMP, ARD 446-1B	10	ea	0.276
				1337009943084	IGNITER, RKT MTR XM69	1	ea	0.133
				1325L0000184801	PBXN-5 BOOSTER	2	ea	1.058
				1377002380552ES	INIT ALT: 01-017-0601	9	ea	0.0486
				1377002380552ES	INIT ALT: 01-017-0601	2	ea	0.0108
				1377002380553ES	CTG ASSEMBLY, DELAY	1	ea	0.0025
				1377004034827ES	INITIATOR, JAU-8/A25	2	ea	0.008
				1377004034827ES	INITIATOR, JAU-8/A25	1	ea	0.004
				1377004034827ES	INITIATOR, JAU-8/A25	2	ea	0.008
				1377004034827ES	INITIATOR, JAU-8/A25	2	ea	0.008
				1377004034827ES	INITIATOR, JAU-8/A25	2	ea	0.008
				1377008451059ES	INITIATOR, M27	5	ea	0.033
				1377008451059ES	INITIATOR, M27	2	ea	0.0132
				1377008451059ES	INITIATOR, M27	8	ea	0.0528
				1377008451059ES	INITIATOR, M27	4	ea	0.0264
				1377008451059ES	INITIATOR, M27	1	ea	0.0066
				1377008455242ES	CTG SET, (REDUCED CHARGE)	4	ea	1.024

				1377008455242ES	CTG SET, (REDUCED CHARGE)	1	ea	0.256
				1377008455242ES	CTG SET, (REDUCED CHARGE)	2	ea	0.512
				1377008455242ES	CTG SET, (REDUCED CHARGE)	8	ea	2.048
				1377008838998ES	CTG, IMPULSE (GUILLOTINE)	3	ea	0.024
				1377008838998ES	CTG, IMPULSE (GUILLOTINE)	5	ea	0.04
				1377008838998ES	CTG, IMPULSE (GUILLOTINE)	8	ea	0.064
				1375002040851	CORD ASSEMBLY, DETONATING	111	ea	0.777
				1375007247040AQ	CHG DEMO M112 COMP 4 1.25 LBS	60	ea	75
				1375013893854AQ	CHG DEMO M112 COMP 4 1.25 LBS	425	ea	531.25
				1375011929174	Cap, Blasting, Electric, Special, M6	2	ea	0.0056
							Total:	5872.60761
08-003	3-Apr-08	SSgt Parrish	ADR	1377010378650	CTG,IMPULSE,BBU-36/B	129	ea	0.2838
				1377014561933	CTG, IMPULSE BBU-35/B	174	ea	0.1392
				1377008838998ES	CTG, IMPULSE (GUILLOTINE)	8	ea	0.064
				1377008838998ES	CTG, IMPULSE (GUILLOTINE)	7	ea	0.056
				1377008838998ES	CTG, IMPULSE (GUILLOTINE)	5	ea	0.04
				1377010528206ES	CTG, HARNESS REL	1	ea	0.0004
				1377010528206ES	CTG, HARNESS REL	1	ea	0.0004
				1377010528206ES	CTG, HARNESS REL	1	ea	0.0004
				1377010528207ES	CTG, MORTAR	1	ea	0.014
				1377010528207ES	CTG, MORTAR	1	ea	0.014
				1377010528209ES	CTG CUTTER ACTUATED 1.15	6	ea	0.0144
				1377010530537ES	CTG GAS GEN GYRO SPINUP	1	ea	0.0111
				1377010568642ES	EMERGENCY CANOPY RELEASE LINE	2	ea	0.0134
				1377010639732ES	DTA TYPE C	1	ea	0.0031
				1377010849358ES	CTG, BOOSTER	3	ea	0.0006
				1377011606506ES	DTA TYPE ST	2	ea	0.0012
				1377011606506ES	DTA TYPE ST	2	ea	0.0012
				1377011664261ES	CTG, INERTIAL REEL GAS	3	ea	0.0207
				1377011664261ES	CTG, INERTIAL REEL GAS	2	ea	0.138
				1377012009009ES	DTA TYPE ST	1	ea	0.0009
				1377012009009ES	DTA TYPE ST	1	ea	0.0009
				1377012009015ES	DTA TYPE ST	1	ea	0.0009
				1377012340706ES	DROGUE SEVERENCE FLSC	2	ea	0.0014
				1377013193847ES	CTG GYRO SPINUP GAS	1	ea	0.0111
				1377013193847ES	CTG GYRO SPINUP GAS	2	ea	0.0222
				1377013193847ES	CTG GYRO SPINUP GAS	3	ea	0.0333
				1377013193847ES	CTG GYRO SPINUP GAS	1	ea	0.0111
				1377013193847ES	CTG GYRO SPINUP GAS	1	ea	0.0111
				1377013193847ES	CTG GYRO SPINUP GAS	1	ea	0.0111
				1377013226334ES	CARTRIDGE, IMPULSE MORTAR	1	ea	0.014
				1377013322379ES	CTG CUTTER ACTUATED 1.15	8	ea	0.0192
				1377013322379ES	CTG CUTTER ACTUATED 1.15	1	ea	0.0024
				1377013462215ES	.4 SEC DELAY INITIATOR	1	ea	0.0033
				1377013685411ES	CTG, HARNESS REL	1	ea	0.0004

				1377013941272ES	PARACHUTE RELEASE, E	1	ea	0.0002
				1377014632595ES	CHARGE ASSEMBLY, SHA	1	ea	0.0287
				1377014632595ES	CHARGE ASSEMBLY, SHA	6	ea	0.1722
				1377014632595ES	CHARGE ASSEMBLY, SHA	6	ea	0.1722
				1377014633341ES	DETONATOR, ELECTRIC	1	ea	0.0005
				1377014633341ES	DETONATOR, ELECTRIC	3	ea	0.0015
				1377014633341ES	DETONATOR, ELECTRIC	2	ea	0.001
				1377014633341ES	DETONATOR, ELECTRIC	1	ea	0.0005
				1377014633341ES	DETONATOR, ELECTRIC	2	ea	0.001
				1377014940471ES	INITIATOR	6	ea	0.066
				1377014940471ES	INITIATOR	4	ea	0.044
				1377L0000464801	CATAPULT, CKU-5/A, MODIFIED	8	ea	1.04
				1340003507804	ROCKET MOTOR, SR49TC	16	ea	5116.7998
				1375007247040AQ	Charge, Demolition, 1.25 lb, C-4, M112	360	ea	450
				1375013893854AQ	Charge, Demolition, 1.25 lb, C-4, M112	14	ea	17.5
				1375013893854AQ	Charge, Demolition, 1.25 lb, C-4, M112	300	ea	375
				1375011929174	Cap, Blasting, Electric, Special, M6	1	ea	0.0028
				1375007561865	Cap, Blasting, Electric, Special, M6	3	ea	0.0084
				1375000285168AQ	Cord Assembly, Detonating, PETN	40	ea	0.28
							Total:	5962.078
08-004	20-Jun-08	SSgt Parrish	Test Track Emer. Destruct	N/A	Test Penetrator Bomb	1	ea	535
				1375013893854AQ	Charge, Demolition, 1.25 lb, C-4, M112	30	ea	37.5
				1375007561865	Cap, Blasting, Electric, Special, M6	2	ea	0.0056
							Total:	572.5056
08-005	14-Aug-08	SSgt Parrish	ADR	1340003095092	RKT MTR MK6-1 LONGITUDNAL SLOT	100	ea	7200
				1337007370462	IGNITOR, ROCKET MOTOR, XM42E2	4	ea	8.8
				1337009943084	IGNITER, RKT MTR XM69	1	ea	0.133
				1375013893854AQ	Charge, Demolition, 1.25 lb, C-4, M112	600	ea	750
				1375011929174	Cap, Blasting, Electric, Special, M6	2	ea	0.0056
							Total:	7958.9386
08-006	20-Aug-08	SSgt Rupp	Test Track Emer. Destruct	N/A	Test Penetrator Bomb	1	ea	535
				1375013893854AQ	Charge, Demolition, 1.25 lb, C-4, M112	60	ea	75
				1375011929174	Cap, Blasting, Electric, Special, M6	6	ea	0.0168
				1375010576439	Cap, Blasting, Non-electric, Special, M7	20	ea	0.54
				1375000285168AQ	Cord Assembly, Detonating, PETN	100	ea	0.7
							Total:	779.24
08-007	9-Oct-08	SSgt Rupp	Test Track Emer. Destruct	N/A	Test Penetrator Bomb	1	ea	150
				1375013893854AQ	Charge, Demolition, 1.25 lb, C-4, M112	10	ea	12.5
				1375011929174	Cap, Blasting, Electric, Special, M6	2	ea	0.0056
							Total:	162.5056
08-008	15-Oct-08	TSgt Tomten	Test Track Emer. Destruct	N/A	Test Penetrator Bomb	1	ea	200

				1375013893854AQ	Charge, Demolition, 1.25 lb, C-4, M112	15	ea	18.75
				1375011929174	Cap, Blasting, Electric, Special, M6	4	ea	0.0112
							Total:	218.7612
08-009	18-Nov-08	SSgt Rupp	Munitions Residue Destruc	N/A	Misc. Explosives	1	ea	350
				N/A	Test Sbmunitions	26	ea	97.5
				1375013893854AQ	Charge, Demolition, 1.25 lb, C-4, M112	60	ea	75
				1375011929174	Cap, Blasting, Electric, Special, M6	2	ea	0.0056
							Total:	522.5056
08-010	19-Dec-08	SSgt Rupp	Munitions Residue Destruc	1370012968395	MJU-7A/B	9	ea	5.6502
				1377010378650	BBU-36/B	9	ea	0.0198
				1337005462231	Rocket Motor MSE1 (NIKE), w/ ign	1	ea	752.2
				1375013893854AQ	M112	90	ea	112.5
				1375011929174	M6	4	ea	0.0112
							Total:	870.3812
							Grand Total:	**23012.52121**

Ordnance Disposal List
2009

Event #	Date	Team Chief	Reason For OP	NSN	Noun	QTY	U/I	NEW	Total NEW
09-001	9-Jan-09	SSgt Rupp	Disposal	1370012968395	MJU-7A/B	1	ea	0.628	0.6278
				1375013893854AQ	M112	1	ea	1.250	1.2500
				1375011929174	M6	2	ea	0.003	0.0056
				1377010378650	BBU-36/B	1	ea	0.002	0.0022
								Total	**1.8856**
09-002	13-Mar-09	SrA Gamboni	German ADR	1305121994498	Patrone 27mm DM28 / Cartridge, Gun	144	ea	0.187	26.9755
				1370014664951	Scheinziel KC004 / Flare, IR	45	ea	1.997	89.8570
				1370121591751	Rauch DM42 / Flare Kit, Pilot	159	ea	0.108	17.1710
				1370121591959	Fackel DM39 / Flare Kit, Pilot	2	ea	0.198	0.3960
				1370121685524	Licht DM13 / Flare Kit, Pilot	481	ea	0.018	8.4800
				1370140430802	Scheinzeil Type 1010 / Flare, IR	40	ea	1.776	71.0560
				1375999650658	Sprengkapselzunder / Saftey Fuze Canopy	10	ea	0.002	0.0220
				1377012863723	Kartuschensatz / Power Device Cartridge	29	ea	0.002	0.0639
				1377012999862	Betantigerausstattung / Power Device Cartridge	43	ea	0.002	0.0947
				1377013692492	ARD863-1 / Power Device Cartridge	1443	ea	0.009	12.7199
				1377014821555	ARD 446-1 / Power Device Cartridge	149	ea	0.029	4.2690
				1377013696045	ARD 446-1 / Power Device Cartridge	32	ea	0.029	0.9160
				1377015248991	Saftey Buckle Opener Cartridge	56	ea	0.033	1.8500
				1377991027185	A 718-3 / Fire Extingusher Cartridge	21	ea	0.002	0.0462
				1377992203969	A 719-3 / Fire Extingusher Cartridge	28	ea	0.002	0.0617
				1377996570675	Emergency Seat Cartridge	41	ea	0.428	17.5300
				1377999659115	Canopy Cartridge	17	ea	0.059	1.0110
				1377996572084	Anzundkapsel Eli / Electrical Cartridge	19	ea	0.002	0.0418
				1377999663031	Canopy Detonation Cord Set	9	ea	0.090	0.8130
					PETN	1	ea	134.000	134.0000
					DM43 / Blasting Cap	16	ea	0.002	0.0351
					Detonation Cord	230	ft	0.007	1.5212
								Total	**388.9309775**
09-003	14-May-09	SSgt Rupp	Bulk HE Disposal	N/A	AFX-757	1	ea	500.000	500.0000
				1375013893854AQ	M112	90	ea	1.25	112.5000
				1375011929174	M6	4	ea	0.003	0.0112
								Total	**612.5112**
09-004	20090618	SSgt Rupp	Flare Disposal	1370014982045	MJU 39	9	ea	0.707	6.3630
				1370014982050	MJU 40	9	ea	1.028	9.2520
				1377014982054	BBU 59	9	ea	0.005	0.0450
				1377010378650	BBU 36	9	ea	0.0022	0.0198
				1375013893854AQ	M112	15	ea	1.25	18.7500
				1375011929174	M6	2	ea	0.003	0.0060
								Total	**34.4358**
						Grand Total:			**1037.763578**

Event#	Date	Team Chief	Reason for OP	NSN	Noun	QTY	U/I	NEW	Total NEW	
09-005	14-Aug-09	SSgt Aldridge	Disposal	1337-01-145-9360	Rocket Motor Mk 36 Mod 1 EUR	19	EA	60.000	1140.0000	
								Total	**1140.0000**	

Ordnance Disposal List
2010

Ordnance Disposal List
2010 Holloman AFB

Nomenclature (Name)	Quantity	NEW	Country of Origin	Report #
Rocket Motor Propellant	10		USA	ACCHOLL***100115*** 1716Z
Reefing Line Cutter	5		USA	
Rocket Motor Igniter	8		USA	
Water Gel	1		USA	
Little John Rocket Motor	1		USA	
Rocket Motor Igniter	21		USA	Event#2
Ejection Seat Kit	1		USA	
Nike Rocket Motor Propellant	41		USA	

Ordnance Disposal List
2011

Ordnance Disposal List
2011 Holloman AFB

Nomenclature (Name)	Quantity	NEW	Country of Origin	Report #
Rocket Motor Propellant	500		USA	ACCHOLL***110303*** 2037Z
Mk-65 Igniter	4		USA	
9mm Ammunition	34		USA	

ATTACHMENTS

- NMED Notice of Deficiency to Holloman AFB, 29 August 2011
- Holloman AFB Correspondence to NMED, 22 September 2011

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NEW MEXICO ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

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Lieutenant Governor

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Secretary

BUTCH TONGATE
Acting Deputy Secretary

CD AB 1 Sep
CCS SB 1 Sep
CEA

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

August 29, 2011

A. David Budak
Deputy Base Civil Engineer
550 Tabosa Avenue
Holloman AFB, NM 88330-5840

David Scruggs
Chief, Asset Management Flight
49 CES/CEVR
550 Tabosa Avenue
Holloman AFB, NM 88330-8458

RE: NOTICE OF DEFICIENCY
EXPANDED CLOSURE AND POST-CLOSURE CARE PLANS
20,000 POUND OPEN DETONATION UNIT
HOLLOMAN AIR FORCE BASE, EPA ID # NM6572124422
HWB-HAFB-10-005-OD

Dear Messrs. Budak and Scruggs:

The New Mexico Environment Department (NMED, the Department) has received the Holloman Air Force Base's (HAFB's, the Permittee's) *Expanded Closure and Post-Closure Care Plans for the 20,000 Pound Open Detonation (OD) Unit* (Expanded Plan) dated July 20, 2011. NMED has reviewed the Expanded Plan and hereby issues this Notice of Deficiency (NOD) with the following comments:

Comment 1

The Closure Plan does not address the nitroglycerin and RDX contaminated soils other than providing figures showing the location of associated sample locations (see Appendix A, Figures 1 and 2). Please provide more detailed information on the RDX contaminated soils at the OD Unit. Incorporate the additional information into the revised version of the Expanded Closure Plan that shall be submitted to the NMED.

Comment 2

The Permittee proposes to submit to NMED a Corrective Action Work Plan at Section 2.8 (page 2-8) should any soil samples be found to exceed SSLs and apparently HAFB is planning on submitting one.

NMED recommends that the Revised Expanded Closure Plan be augmented to address the two locations of known nitroglycerine and the single RDX contaminations now (see Figures 1 and 2). A Corrective Action Work Plan may be submitted only if additional contamination above action levels is identified at the OD Unit at locations other than those three shown on Figures 1 and 2.

Comment 3

The Expanded Closure Plan does not address performing an ecological risk assessment unless residential screening levels are exceeded (see Closure Plan page 2-7). Further, Permit Module III, Section 3 describes generating ecological screening action levels and an ecological risk assessment but this was never done.

The Permittee must provide an ecological risk assessment and incorporate it into the revised Expanded Closure Plan. Include also a Human Health Risk assessment in the revised Expanded Closure Plan.

Comment 4

In Appendix A, Section 2.2.3.2 HAFB states that groundwater samples will be collected at the four existing monitoring wells for the appropriate set of analytes listed in Table 3 of Appendix A, but the Permittee does not specify when the groundwater sampling will commence.

Provide information about when HAFB plans to begin groundwater sampling at the four existing wells at the OD Unit, and for how long the Permittee plans to conduct the groundwater sampling.

Further, the Permittee shall augment the Closure Plan so that if clean closure of the OD Unit is achieved the monitoring wells shall be appropriately plugged and abandoned. Describe how the Permittee will conduct plugging and abandonment of the groundwater sampling wells following clean closure activities at the OD Unit.

Comment 5

Please remove all "Permit Text" excerpts from the revised Closure Plan, except in cases like Section 2.1 (Closure Performance Standard), where it may be retained, but no longer titled "Permit Text" in any section of the Closure Plan.

If the Permittee determines that clean closure of the OD Unit cannot be achieved then that information must be included in the Closure Report that will be submitted to NMED at the conclusion of all closure activities.

The Permittee must address all comments contained in this NOD and submit a revised Amended Plan no later than October 31, 2011. The revised Amended Plan must include a response letter that details where all revisions have been made, cross-referencing NMED's numbered comments. In addition, an electronic version of the revised Amended Plan must be submitted that identifies where all changes have been made in red-line strikeout format.

If you have any questions regarding this NOD please contact Cornelius Amindyas of my staff at (505) 222-9543 or at the above letterhead address.

Sincerely,

John E. Kieling
Acting Chief
Hazardous Waste Bureau

cc: W. Moats, NMED HWB
C. Amindyas, NMED HWB
D. Strasser, NMED HWB
S. Pullen, NMED HWB
L. King, EPA-Region 6 (6PD-N)
File: HAFB 2011 and Reading

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

SEP 2 2 2011

A. David Budak
Deputy Base Civil Engineer
550 Tabosa Avenue
Holloman AFB NM 88330-5840

New Mexico Environment Department
Attn: Mr. John Kieling
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe NM 87105-6303

Dear New Mexico Environment Department

Holloman AFB is pleased to submit the following responses to comment associated with the 29 August 2011 Notice of Deficiency on Expanded Closure and Post-Closure Care Plans, 20,000 Pound Open Detonation Unit (Holloman Air Force Base, EPA ID # NM6572124422; HWB-HAFB-10-005-OD) for your review:

Comment 1

The Closure Plan does not address the nitroglycerin and RDX contaminated soils other than providing figures showing the location of associated sample locations (see Appendix A. Figures 1 and 2). Please provide more detailed information on the RDX contaminated soils at the OD Unit. Incorporate the additional information into the revised version of the Expanded Closure Plan that shall be submitted to the NMED.

Comment 1 Response

The document submitted is an *Expanded Closure Plan and Post-Closure Plan*, intended to supplement the Permit, Attachment F, Closure and Post-Closure Care Plans. It is not a report used to describe site conditions. Site conditions will be described in the Closure Report.
The Permittee will add available information to Section 1.4 of Appendix A (*Sampling and Analysis Plan*, Historical Sampling). Additional information available includes only the sampling date and the concentration.

Comment 2

The Permittee proposes to submit to NMED a Corrective Action Work Plan at Section 2.8 (page 2-8) should any soil samples be found to exceed SSLs and apparently HAFB is planning on submitting one.

Comment 2 Response

It is not known at this time whether any of the sampling results will exceed an RSL or an SSL.

The Permittee notes that the Permit is not clear on the actions to be taken in response to an exceedance of an SSL or RSL. Permit Attachment F "Background Comparison and Risk-Based Screening" and "Corrective Action" state actions to be taken in response to exceedances.

- Permit Attachment F, "Background Comparison and Risk-Based Screening" (page 4 of 10) states that *if* results exceed *background* or *risk-based standards* (interpreted as SSLs or RSLs), NMED will be contacted to discuss further action prior to completing closure, such as risk assessment, confirmation sampling, delineation of the extent of exceedance, analysis of corrective measures, and corrective measures implementation.
- Permit Attachment F, "Corrective Action" (page 4 of 10) states that if any sample exceeds a *risk-based* or *cleanup level* (also interpreted as SSL or RSL), the Permittee will submit a Corrective Action Work Plan.

Since NMED has expressed an interest in ecological and human health risk assessments as part of the Treatment Unit closure, the Permittee proposes that an ecological risk assessment and a human health risk assessment be performed *if* an exceedance of an SSL or RSL is identified through the evaluation of existing conditions. If either risk assessment identifies an unacceptable risk, then the Permittee will prepare a Corrective Action Work Plan, which may include confirmation sampling, delineation of the extent of exceedance, analysis of corrective measures, and corrective measures implementation. The *Expanded Closure and Post-Closure Plan* will be appropriately modified.

NMED recommends that the Revised Expanded Closure Plan be augmented to address the two locations of known nitroglycerine and the single RDX contaminations now (see Figures 1 and 2). A Corrective Action Work Plan may be submitted only if additional contamination above action levels is identified at the OD Unit at locations other than those three shown on Figures 1 and 2.

The RDX exceeded the SSL of 44.2 mg/kg in 1st Quarter of 2006 with a concentration of 57 mg/kg. 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 was below the SSL with a concentration of 4.1 mg/kg.

Two nitroglycerin concentrations were identified that exceed the current SSL of 6.1 mg/kg:

- One nitroglycerin concentrations (16 mg/kg in 2nd Quarter of 2009) exceeded the current SSL of 6.1, 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.
- The second exceedance (8 mg/kg nitroglycerin) was identified in 1st Quarter of 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 as an exceedance. The Permittee notified the NMED in writing (letter dated 15 Apr 11 from Lieutenant Colonel Christian J. Knutson, P.E.) of the exceedance. The Permittee elected to perform additional sampling, as stated in the 15 Apr 11 letter. However, by 30 March, 2011, before the additional sampling was performed, the Permittee notified NMED that HAFB would initiate closure activities.

- The Permittee has re-gra*ded the OD unit to backfill the depress*ion in accordance with Permit Attachment I, Post Operation Procedures, No. 3. Therefo*re,* the soil exceeding the SSL is not likely to remain in the same state or location when sampled in March 2011. A geostatistical sampling approach has been proposed for sampling the treatment unit because soils have been disturbed, re-graded, and backfilled over the life of the unit. The geostatistical approach will evaluate existing conditions. Based on the existing conditions, the next steps toward closure will

be determined. These may include an ecological and/or human health risk assessment based on current conditions, corrective actions, or no action.

Comment 3

The Expanded Closure Plan does not address performing an ecological risk assessment unless residential screening levels are exceeded (see Closure Plan page 2-7). Further, Permit Module III, Section 3 describes generating ecological screening action levels and an ecological risk assessment but this was never done.

The Permittee must provide an ecological risk assessment and incorporate it into the revised Expanded Closure Plan. Include also a Human Health Risk assessment in the revised Expanded Closure Plan.

Comment 3 Response

The NOD Comment 3 references Permit Module III, Section 3, for requiring an ecological risk assessment. The Permittee respectfully disagrees with the need to perform an ecological risk assessment as part of the *Expanded Closure and Post-Closure Plan*. The Permittee will perform an ecological risk assessment and/or human health risk assessment if any sample collected for closure sampling exceeds a RSL or SSL. The Permittee respectfully declines to perform an ecological risk assessment as part of the *Expanded Closure and Post-Closure Plan* for the reasons detailed below:

1. Permit Module III is titled "Treatment of Energetic Wastes" and does not include any text referring to Treatment Unit closure. Therefore, the requirement to perform the ERA as part of the *closure* based on this citation is not appropriate.
2. The text of Permit Module III, Section *E*, states: "The Permittee shall generate Screening Action Levels for current Reference Dose (non-carcinogenic) and/or Slope Factor (carcinogen) data listed (in order of preference) in IRIS, HEAST, or other acceptable EPA sources. This risk assessment shall be done whenever contamination is determined below the soil surface, in excess of 0.01 confidence level. The Permittee must submit an ecological risk assessment to the HRMB for approval prior to conducting its ecological risk assessment. NMED will decide on the cleanup level after reviewing the ecological risk assessment. Final Risk Assessment will be expressed as an aggregate Risk Assessment using EPA's Ecological Assessment of Hazardous Waste Sites (1989)."

   In the context of the 1990s when the Permit was prepared, it was appropriate to compare values to EPA sources, such as IRIS, if contamination was identified. However, the development of SSLs by NMED served as risk-based screening level data to which the Permittee was allowed by NMED to compare soil data.

   Up until the March 2011 exceedance, the Permittee has addressed all exceedances according to Permit requirements. All exceedance resample results were below applicable screening levels in effect at the time. Thus, development of a risk assessment in response to an exceedance was not applicable, and it was not necessary for NMED to decide on cleanup levels based on a risk assessment.

3. Permit Attachment F is titled "Closure and Post-Closure Care Plans". This is the majority of closure requirements for closing the treatment unit. (Additional closure requirements are detailed in Permit Module II, Section K, General Closure Requirements.)

Under the section titled "Summary of Closure Activities" in Permit Attachment H (page 2 of 10), the text reads:

> "Following these activities, representative samples from across the entire 20,000 pound OD unit will be collected and analyzed to determine the residual concentrations of any toxic metals and explosive compounds, if any. These analytical results will be compared to background levels or risk-based criteria deemed to be protective of human health. If all levels are determined to be below background (for metals) or the analytical detection limits (for organics), the closure will be considered clean closure. If levels are detected in excess of background or detection limits, but are below risk-based criteria, the closure will be considered a risk-based closure."
>
> "In the event that an area of the unit is determined to contain levels in excess of risk-based criteria, further action will be taken as necessary in coordination with NMED prior to completing the closure, such as risk assessment, delineation of the extent of the exceedance, analysis of corrective measures, and corrective measures implementation."

Under the Section titled "Background and Risk-Based Screening" (Permit Attachment F, Page 4 of 10), the Permit states:

> "Following sampling and analysis, the analytical results will be compared to background results and with appropriate risk-based standards deemed to be protective of human health. In the event that a sample or area of the OD unit is determined to contain hazardous constituent levels in excess of these standards, NMED will be contacted to discuss further action prior to completing closure, such as risk assessment, confirmation sampling, delineation of the extent of the exceedance, analysis of corrective measures, and corrective measures implementation. When all such activities have been completed and all sample results show that the residual levels of contamination are below the risk-based criteria or are protective of human health and the environment, all remaining closure activities will be completed."

Based on the permit text regarding closure of the treatment unit, the *Expanded Closure and Post-Closure Plan* is consistent with the Permit text regarding closure. The Permittee proposes to collect samples using a geostatistical approach across the entire treatment unit. Since NMED has expressed an interest in ecological and human health risk assessments for the treatment unit, the Permittee has proposed that an ecological risk assessment and a human health risk assessment be performed *if* an exceedance of an SSL or RSL is identified through the closure sampling event.

<u>Comment 4, Part 1</u>

> In Appendix A, Section 2.2.3.2 HAFB states that groundwater samples will be collected at the four existing monitoring wells for the appropriate set of analytes listed in Table 3 of Appendix A, but the Permittee does not specify when the groundwater sampling will commence.

<u>Comment 4, Part 1 Response</u>

Table 2-1, Proposed Closure Schedule, proposed a date for "sampling and analysis". This includes soil and groundwater sampling efforts. The Permittee will amend the Table to state "soil and groundwater sampling and analysis".

<u>Comment 4, Part 2</u>

> Provide information about when HAFB plans to begin groundwater sampling at the four existing wells at the OD Unit, and for how long the Permittee plans to conduct the groundwater sampling.

<u>Comment 4, Part 2 Response</u>

Only one groundwater sampling event is scheduled at this time. As stated in Section 4 of the *Expanded Closure Plan and Post-Closure Plan*, in the event that the site is able to be closed, even though the residential SSLs are exceeded, monitoring of the four wells will be performed periodically, as follows:

- Quarterly for the first 5 years
- Semi-annually for the second 10 years

- Annually for the remaining 15 years

Comment 4, Part 3

Further, the Permittee shall augment the Closure Plan so that if clean closure of the OD Unit is achieved the monitoring wells shall be appropriately plugged and abandoned. Describe how the Permittee will conduct plugging and abandonment of the groundwater sampling wells following clean closure activities at the OD Unit.

Comment 4, Part 3 Response

The Permitted will amend the *Expanded Closure and Post-Closure Plan* to address well abandonment following clean closure of the Treatment Unit. Well abandonment will be performed in accordance with NMED Ground Water Quality Bureau Monitoring Well Construction and Abandonment Guidelines and applicable New Mexico Administrative Code requirements in effect at the time of abandonment.

Comment 5

Please remove all "Permit Text" excerpts from the revised Closure Plan, except in cases like Section 2.1 (Closure Performance Standard), where it may be retained, but no longer titled "Permit Text" in any section of the Closure Plan.

Comment 5 Response

The "Permit Text" excerpts will be removed and modified as suggested.

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 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.

If you have any questions, please contact Mr. David Scruggs of our Asset Management Flight at (575) 572-5395.

Sincerely

22 Sep 2011

A. DAVID BUDAK, GS-14, DAFC

cc:

Mr. Cornelius Amindyas
Hazardous Waste Bureau
5500 San Antonio Dr. NE
Albuquerque, NM 87109

Mr. Steve Jetter
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Bldg 1
Santa Fe NM 87105-6303

Ms. Laurie King
USEPA, Region 6 (6PD-F)
1445 Ross Ave., Ste 1200
Dallas, TX 75202-2733

EXPANDED CLOSURE AND POST-CLOSURE PLAN FOR THE 20,000-POUND OPEN DETONATION TREATMENT UNIT

HOLLOMAN AIR FORCE BASE, NEW MEXICO

NMED Permit No. NM6572124422

Prepared for:

49 CES/CEAN
Holloman Air Force Base
New Mexico

Under Contract To:

U.S. Army Corps of Engineers-
Albuquerque District
HTRW Branch
4101 Jefferson Plaza NE
Albuquerque, New Mexico 87109-3435

Prepared By:

NationView, LLC
1608 13th Avenue South, Suite 160
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NationView Project No. 8100013.01.010

Contract No. W912PP-09-D-0003
Delivery Order No. 0010

February 2012

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EXPANDED CLOSURE AND POST-CLOSURE PLAN FOR THE 20,000-POUND OPEN DETONATION TREATMENT UNIT

HOLLOMAN AFB, NEW MEXICO

DISTRIBUTION LIST

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David Scruggs 49 CES/CEAN 550 Tabosa Avenue Holloman AFB, NM 88330-8458	4 with CDs	4 with CDs

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EXPANDED CLOSURE AND POST-CLOSURE PLAN FOR THE 20,000-POUND OPEN DETONATION TREATMENT UNIT

HOLLOMAN AFB, NEW MEXICO

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Appendices

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B *Memorandum*, June 24, 2011, from Mark Stapleton and Diane Lazarus and List of Materials Destroyed at the 20K OD Treatment Unit

Attachments

NMED Notice of Deficiency to Holloman AFB, 29 August 2011

Holloman AFB Correspondence to NMED, 22 September 2011

Acronyms

20K OD	20,000-Pound Open Detonation
ANSI	American National Standards Institute
CFR	Code of Federal Regulations
DLA	Defense Logistics Agency
DRMO	Defense Reutilization and Marketing Office
EOD	Explosive Ordnance Demolition
EPA	Environmental Protection Agency
HAFB	Holloman Air Force Base
HASP	Health and Safety Plan
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NOD	Notice of Deficiency
OD	Open detonation
OSHA	Occupational Safety and Health Administration
PE	Professional Engineer
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
SSL	Soil Screening Level
UXO	Unexploded ordnance

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1 INTRODUCTION AND BACKGROUND

Holloman Air Force Base (HAFB) operated an open detonation (OD) unit for the destruction of ordnance, munitions, incendiaries, and propellants from 1996 through March 2011. The 20K OD Treatment Unit was operated under New Mexico Environment Department (NMED) Permit No. NM6572124422, issued in 1997, and updated in 1998. Permit Attachment F, Closure and Post-Closure Care Plans, prescribes the general requirements for OD unit closure. This *Expanded Closure and Post-Closure Plan for the 20,000-Pound Open Detonation Treatment Unit* (Expanded Closure and Post-Closure Plan) expands upon the permit requirements and standards and provides a specific plan of action for the OD unit closure.

This Expanded Closure and Post-Closure Plan is designed to parallel the specific Sections of Attachment F of the Permit, augmenting the general text as appropriate with specific processes, standards, and requirements. In the sections that follow, 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, describes how HAFB will meet the requirement, or provides additional detail for the requirement.

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This Expanded Closure and Post-Closure Plan includes changes that were warranted based on the NMED Notice of Deficiency (NOD) dated 29 August 2011 and Holloman AFB's response to the NOD dated 22 September 2011. The 29 August 2011 NOD and 22 September 2011 Response to Comments are included as an Attachment to this Expanded Closure and Post-Closure Plan.

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2 CLOSURE PLANS

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."

No further clarification is required.

2.2 Summary of Activities Conducted During Active Life

This section clarifies the permit text in Section 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 Section F, "Summary of Closure Activities", summarizes the closure process. Each of the specific tasks and requirements are discussed and detailed in this Expanded Closure and Post-Closure Plan.

2.4 Partial and Final Closure Activities

Text under Section F, "Partial and Final Closure Activities" states: "There will be no partial closure of the OD treatment unit." No clarification of the permit text is needed. The OD Treatment unit will be permanently closed.

2.5 Maximum Waste Inventory

Section 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 OD treatment unit occurred on March 4, 2011. Wastes munitions are not stored at the site.

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This closure plan i
Unit will not requi
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2.6 Inventory, Removal, Disposal, and Decontamination of Equipment

Text in Section F, under heading "Inventory, Removal, Disposal, and Decontamination of Equipment", presents general steps to achieve the closure standard and requires that appropriate personal protective equipment (PPE) 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 Section F.

Decontamination of sampling equipment is addressed in the *Sampling and Analysis Plan for the Closure of the 20,000-Pound Open Detonation Treatment Unit* (included as Appendix A to this Expanded Closure and Post-Closure Plan).

Project Health and Safety practices will adhere to the *Basewide Health and Safety Plan* (Bhate, 2003a) (Basewide HASP) for closure inspection and sampling activities. All work must be conducted in accordance with the U.S. Army Corps of Engineers (USACE) *Safety and Health Requirements Manual, EM 385-1-1.* It is anticipated that no greater than level D PPE will be required to complete the site inspection and 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.

2.6.1 Site Reconnaissance

This section clarifies the permit text in Section F under the heading "Site Reconnaissance."

A pre-final visual site inspection (as required by Appendix F of the Permit) will be performed to determine whether any surficial debris, scrap, or other substances remain in the 20K OD Treatment Unit that requires removal in order for the closure to proceed. Debris to be identified will include metal fragments and remnants. The volume of materials to be removed may need to be estimated if a significant volume of debris is present.

The pre-final inspection will be documented using photographs and notes in a bound, water-resistant field logbook. If no debris or fragments are observed during the pre-final inspection, this will be noted in the logbook, and the final Inspection may be immediately completed.

2.6.2 Removal of Scrap Materials and Debris

This section clarifies the permit text in Section F under the heading "Removal of Scrap Materials and Debris."

The pre-final inspection will be followed by the debris removal task. Depending on the volume of debris identified, this may occur immediately following the pre-final inspection.

Permit requirements for debris removal for site closure are as follows:

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- 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.

In accordance with past practice, the debris and metal fragments will be collected by HAFB 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.

2.6.3 Closure Sampling and Analysis

This section clarifies the permit text in Section F under the heading "Closure Sampling and Analysis."

Soil sampling will be conducted to compare soil concentrations of identified analytes against the NMED Soil Screening Levels (SSLs) and EPA Regional Screening Levels (RSLs) (as appropriate) for residential soil. The *Sampling and Analysis Plan for the Closure of the 20,000-Pound Open Detonation Treatment Unit* (included as Appendix A of this Expanded Closure and Post-Closure Plan) details the methodology for collecting and analyzing soil and ground water samples, and the standards to which they will be compared.

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 managed from 1996 through 2011 was reviewed by a New Mexico Registered Professional Engineer (PE). Appendix B provides the lists of materials destroyed at the 20K OD Treatment Unit. The PE findings are also included as Appendix B. As a result of the records review, the list of chemical constituents of concern in the *Sampling and Analysis Plan for the Closure of the 20,000-Pound Open Detonation Treatment Unit* (included as

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Appendix A to this Expanded Closure and Post-Closure Plan) was augmented to accurately reflect the review findings.

Soil and ground water will be analyzed for the following parameters (see the *Sampling and Analysis Plan for the Closure of the 20,000-Pound Open Detonation Treatment Unit*, included as Appendix A of this Expanded Closure and Post-Closure Plan for details):

- Metals (see full list in SAP (Appendix A to this Plan))
- Explosives (see full list in SAP (Appendix A to this Plan))
- Perchlorate
- Nitrate
- Phosphorus

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.

2.7 Background Comparison and Risk-Based Screening

This section clarifies the permit text in Section F under the heading "Risk-Based Screening."

Residential SSLs established in NMED's *Technical Background Document for Development of Soil Screening Levels* (NMED, August 2009) will be used as the action levels for detections in soil. If NMED does not have an SSL for a particular parameter in soil, it will be compared to its respective EPA RSL (June 2011).

In the event an SSL or RSL is exceeded, HAFB will notify NMED via certified letter. The letter will detail the exceedances, including the concentrations, parameters, and locations. The letter will also summarize HAFB's proposed course of action (e.g., risk-based closure, further remediation, etc.). A Human Health and Ecological Risk Assessment will be performed if an exceedance of a standard for closure (see the *Sampling and Analysis Plan* in Appendix A of this Expanded Closure and Post-Closure Plan) is identified through the evaluation of existing conditions. The risk assessments will be performed only on the parameter(s) that exceed a standard for closure.

2.8 Corrective Action

This section clarifies the permit text in Section F under the heading "Corrective Action."

An ecological risk assessment and a human health risk assessment will be performed *if* an exceedance of a standard for closure (see the *Sampling and Analysis Plan* in Appendix A of this Expanded Closure and Post-Closure Plan) 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 identifies an unacceptable risk, then the Permittee will prepare a Corrective Action Work Plan, which may include confirmation sampling, delineation of the extent of exceedance, analysis of corrective measures, and/or corrective measures implementation.

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2.9 Surface Grading

This section clarifies the permit text in Section F under the heading "Surface Grading."

The OD Unit will be graded as required in the permit and follow natural contours. The area will be allowed to revegetate naturally.

2.10 Decontamination

This section clarifies the permit text in Section F under the heading "Decontamination."

All field equipment (large and small field instruments and tools) will be properly decontaminated in accordance with HAFB Standard Operating Procedure (SOP) No. 2, *Sampling Equipment Decontamination* (included in the *Basewide Quality Assurance Project Plan (QAPP)* (Bhate, 2003b)), prior to use and in between sampling to eliminate cross contamination of soil samples and minimize contamination leaving the site.

Small equipment such as sampling tools will be decontaminated using laboratory-grade detergent and water using a brush, followed by tap water rinse and two distilled water rinses. If necessary, 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.

2.11 Schedule for Closure

This section clarifies the permit text in Section F under the heading "Schedule for Closure."

The schedule for closure was modified to include this Expanded Closure and Post-Closure Plan and its subsequent review and probable approval by NMED. It is also modified to reflect that HAFB notified NMED on March 30, 2011, that the OD Treatment Unit would be closed. We note that the last waste was treated on March 3, 2011.

The schedule for closure is anticipated to be as follows:

Table 2-1. Proposed Closure Schedule

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

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Closure Activity	Closure Period
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
Remove debris	April 2012
Soil and groundwater sampling and analysis and sampling equipment decontamination	May 2012
Analytical quality control (QC) (to ensure sampling and analysis is sufficient to demonstrate clean closure)	June 2012
Site grading and equipment decontamination	July 2012
Prepare closure certification/post-closure documentation (includes HAFB review period)	July 2012 – October 2012
Submit closure certification to NMED	October 2012
NMED review of closure certification	November 2012 – January 2013
NMED issues post-closure permit	February 2013
Periodic post-closure visual checks	30 years after issuance of post-closure permit
Conduct other post-closure care activities	To be determined

Note that this schedule does not include any notification to NMED of any closure standard exceedances. If concentrations are found to exceed the standards for closure listed in the *Sampling and Analysis Plan*, included in Appendix A of this Expanded Closure and Post-Closure Plan), the schedule will be modified to include the notification and the development and implementation of a Corrective Action Work Plan.

The schedule assumes that only one revision was required after the initial NMED review of the Expanded Closure and Post-Closure Plan and that only one revision will be required for the closure certification and post-closure documentation.

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Clarification of Permit Text¶

2.12 Certification of Closure

This section clarifies the permit text in Section F under the heading "Certification of Closure."

Within 240 days after initiating closure of the treatment unit, HAFB will submit by registered mail a closure report (Report) for the treatment unit to the NMED for review and approval. The Report will document that the treatment unit has been closed in compliance with the Permit and the approved Expanded Closure and Post-Closure Plan. A certification will be included with the Report that is signed by HAFB 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. The 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 Expanded Closure and Post-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 (QA)/QC 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 Assessment, 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 Section F under the heading "Other Activities."

Following site closure, HAFB will perform visual checks of the site to ensure naturalization, the need for regarding, and to verify posting and security measures. Checks will be performed as follows:

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- Quarterly for the first 5 years
- Semi-annually for the remaining 25 years

The checks will be documented in a logbook specific to the 20K OD Treatment Unit.

3 CONTINGENT POST-CLOSURE PLAN

Attachment F of the Permit includes a Contingent Post-Closure Plan in the event residues remain in place, to describe activities that may be conducted to ensure long-term reliability and effectiveness of the closure.

In the following subsections, the Permit text is followed by details and clarifications that may be necessary.

3.1 Post-Closure Care and Use of Property

Text in Section F, under the heading "Post-Closure Care and Use of Property" is introductory information. No supplemental text or clarification is necessary.

3.2 Post-Closure Care Period

The text in Section F under the heading "Post Closure Care Period" requires long-term actions to be taken in the event waste residues are left in place.

At this time, the only activities anticipated after closure are the periodic inspections. Periodic inspections will begin after the issuance of the Closure Certification.

3.3 Post-Closure Security

The text in Section F under the heading "Security" prescribes measures to take to maintain long-term security during the post-closure period. No clarification is required. The periodic visual checks of the site during the post-closure period will check for the continued adequacy of signage and the condition of the fencing.

3.4 Post-Closure Use of Property

The text in Section F under the heading "Post-Closure Use of Property" limits the use of the closed treatment unit. No clarification is required. The periodic visual checks of the site during the post-closure period will check for potential site disturbance.

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4 POST-CLOSURE CARE PLAN AND GROUND WATER MONITORING

In the event that the site is able to be closed without meeting closure standards (see the *Sampling and Analysis Plan* in Appendix A of this Expanded Closure and Post-Closure Plan), as appropriate, HAFB will propose a course of action (e.g., risk-based closure, further remediation, etc.) and the site will be will be managed according to this Section. Based on the results of the additional courses of action, modifications to the ground water monitoring requirement may be requested.

Deleted: residential SSLs or RSLs

The introductory text in Section F under heading "Post Closure Care Plan and Ground Water Monitoring" states that "post-closure care of the OD Treatment Unit will be conducted when it has been established that clean closure cannot be achieved," and requires the installation and monitoring of groundwater monitoring wells.

In the event that the site is able to be closed even though the closure standards are exceeded, monitoring of the existing four wells, as detailed on Figure G-5 of the Permit, will be performed periodically, as follows:

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- Quarterly for the first 5 years
- Semi-annually for the second 10 years
- Annually for the remaining 15 years

Ground water samples will be collected and analyzed for the following parameters:

Deleted: residential SSLs

- Metals (full list of analytes is shown in the SAP, included as Appendix A to this Plan)
- Explosives (full list of analytes is shown in the SAP, included as Appendix A to this Plan)
- Perchlorate
- Nitrate
- Phosphorus

Ground water monitoring will begin after the issuance Closure Certification. Ground water will be sampled and analyzed using the methodology provided in the *Sampling and Analysis Plan for the Closure of the 20,000-Pound Open Detonation Treatment Unit* (included as Appendix A to this Expanded Closure and Post-Closure Plan).

At any time, HAFB may request a reduction in the ground water sampling effort if sufficient quarterly data show concentrations of parameters below risk-based levels. This may include a change in analyses, analysis method, and/or sampling frequency.

When groundwater monitoring is no longer required, the wells will be abandoned in accordance with NMED Ground Water Quality Bureau Monitoring Well Construction and Abandonment Guidelines and applicable New Mexico Administrative Code requirements in effect at the time of abandonment.

4.1 Post-Closure Maintenance Requirements

The text in Section F under the heading "Post-Closure Maintenance Requirements" lists post-closure maintenance requirements and a schedule. Maintenance activities as described in the Permit will begin after the issuance of the Closure Certification.

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4.2 Certification of Post-Closure Care

The text in Section F under the heading "Certification of Post-Closure Care" requires certification by HAFB that all post-closure activities were performed in accordance with the approved Post-Closure Care Plan. HAFB assumes that the Post-Closure Care Plan will be implemented for 30 years after issuance of the Closure Certification. Based on the results of the additional courses of action, modifications to Post-Closure Care Plan may be requested.

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5 SURVEY PLAT AND POST-CLOSURE NOTICES

This section clarifies the text in Section F under the heading "Survey and Post-Closure Notices."

NMED issued the Permit in 1997. The referenced regulations were repealed on June 14, 2000, and replaced with 20 NMAC 4.1, Hazardous Waste Management, effective June 14, 2000. Included in this revised regulation is the incorporation of 40 CFR Part 264 by reference. The regulatory text presented in 40 CFR §264.116 and 40 CFR §265.119 as of the date of this Expanded Closure and Post-Closure Plan (February 2012) shall apply at the time of all closure activities (at the end of the post-closure period).

As of January 25, 2012, 40 CFR §264.116 reads as follows:

"§ 264.116 Survey plat.

No later than the submission of the certification of closure of each hazardous waste disposal unit, the owner or operator must submit to the local zoning authority, or the authority with jurisdiction over local land use, and to the Regional Administrator, a survey plat indicating the location and dimensions of landfill cells or other hazardous waste disposal units with respect to permanently surveyed benchmarks. This plat must be prepared and certified by a professional land surveyor. The plat filed with the local zoning authority, or the authority with jurisdiction over local land use, must contain a note, prominently displayed, which states the owner's or operator's obligation to restrict disturbance of the hazardous waste disposal unit in accordance with the applicable subpart G regulations.

[51 FR 16444, May 2, 1986, as amended at 71 FR 40272, July 14, 2006]"

As of January 25, 2012, 40 CFR §264.119 reads as follows:

"§ 264.119 Post-closure notices.

(a) No later than 60 days after certification of closure of each hazardous waste disposal unit, the owner or operator must submit to the local zoning authority, or the authority with jurisdiction over local land use, and to the Regional Administrator a record of the type, location, and quantity of hazardous wastes disposed of within each cell or other disposal unit of the facility. For hazardous wastes disposed of before January 12, 1981, the owner or operator must identify the type, location, and quantity of the hazardous wastes to the best of his knowledge and in accordance with any records he has kept.

(b) Within 60 days of certification of closure of the first hazardous waste disposal unit and within 60 days of certification of closure of the last hazardous waste disposal unit, the owner or operator must:

(1) Record, in accordance with State law, a notation on the deed to the facility property—or on some other instrument which is normally examined during title search—that will in perpetuity notify any potential purchaser of the property that:

(i) The land has been used to manage hazardous wastes; and

(ii) Its use is restricted under 40 CFR part 264, subpart G regulations; and

(iii) The survey plat and record of the type, location, and quantity of hazardous wastes disposed of within each cell or other hazardous waste disposal unit of the facility required by §§264.116 and 264.119(a) have been filed with the local zoning authority or the authority with jurisdiction over local land use and with the Regional Administrator; and

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(2) Submit a certification, signed by the owner or operator, that he has recorded the notation specified in paragraph (b)(1) of this section, including a copy of the document in which the notation has been placed, to the Regional Administrator.

(c) If the owner or operator or any subsequent owner or operator of the land upon which a hazardous waste disposal unit is located wishes to remove hazardous wastes and hazardous waste residues, the liner, if any, or contaminated soils, he must request a modification to the post-closure permit in accordance with the applicable requirements in parts 124 and 270. The owner or operator must demonstrate that the removal of hazardous wastes will satisfy the criteria of §264.117(c). By removing hazardous waste, the owner or operator may become a generator of hazardous waste and must manage it in accordance with all applicable requirements of this chapter. If he is granted a permit modification or otherwise granted approval to conduct such removal activities, the owner or operator may request that the Regional Administrator approve either:

(1) The removal of the notation on the deed to the facility property or other instrument normally examined during title search; or

(2) The addition of a notation to the deed or instrument indicating the removal of the hazardous waste.

[51 FR 16444, May 2, 1986, as amended at 71 FR 40272, July 14, 2006]"

6 REFERENCES

Bhate, December 2003a. *Final Basewide Health and Safety Plan, Holloman Air Force Base, Alamogordo, New Mexico*.

Bhate, November 2003b. *Final Basewide Quality Assurance Project Plan, Holloman Air Force Base, New Mexico*.

New Mexico Environment Department (NMED), February 3, 1997. Hazardous Waste Facility Permit No. NM6572124422. Amended 1998.

NMED, August 2009. *New Mexico Environment Department Technical Background Document for Development of Soil Screening Levels*, Revision 5.0.

U.S. Army Corps of Engineers, 2008. *Safety and Health Requirements Manual, EM 385-1-1*.

USEPA, November 2011. Regional Screening Level (RSL) Summary Table.

USEPA, May 2009. List of Contaminants and their Maximum Contaminant Levels.

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APPENDIX A

SAMPLING AND ANALYSIS PLAN FOR THE CLOSURE OF THE 20,000-POUND OPEN DETONATION TREATMENT UNIT

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APPENDIX B

MEMORANDUM, JUNE 24, 2011, FROM MARK STAPLETON AND DIANE LAZARUS

AND

LIST OF MATERIALS DESTROYED AT THE 20K OD TREATMENT UNIT

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ATTACHMENTS

- NMED Notice of Deficiency to Holloman AFB, 29 August 2011
- Holloman AFB Correspondence to NMED, 22 September 2011

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Permit Text

The majority of maintenance activities will be contingent upon the results of routine (quarterly) inspections. Maintenance activities include maintaining all site markings and other benchmarks, access control devices, and postings. Table F-2 outlines these activities and frequency of occurrence.

Table F-2

Required Maintenance Activities and Schedule

Area/ Equipment	Specific Items	Types of Problems	Corrective Action	Frequency of Inspection
Security Devices	Fence	Broken/ Damaged	Repair immediately if damaged	Quarterly
	Access Gate	Locking mechanism jammed	Repair/replace	Quarterly
	Signs	Illegible	Replace	Quarterly
Final Cover/ Grading	Cover/ Grading Integrity	Subsidence, excessive bare soil, rodent burrows	Restore site to grade	Quarterly (immediately following any 10 year, 24-hour intensity rainfall event)
Run-on/Runoff Drainage Control	Drainage sloping and channels	Settlement, ponded water, blockage, erosion	Repair settlement and erosion, remove blockages	Quarterly
Benchmarks	Not Applicable	Damaged	Replace if Damaged	Quarterly

Clarification of Permit Text

Page 3-1: [2] Deleted	Diane Lazarus	1/20/2012 11:51:00 AM

Permit Text

If any waste residues are left in place, contingent post-closure care activities will be required to ensure the long-term integrity of the closure and continued protection of human health and the environment. However, several factors suggest that the duration of any post-closure activities might be limited, including:

- The treatment activities render the waste munitions non-hazardous;
- The risk-based closure activities will ensure that no residues remain in concentrations exceeding established health-based criteria;
- The nature of the treatment, the waste residues, and the closure approach substantially minimize the likelihood of any contaminant migration; and
- Groundwater beneath Holloman AFB has been designated by NMED as unfit for human consumption due to levels of total dissolved solids that exceed human health standards.

Therefore post-closure care of the subject OD unit, and ground water monitoring at the site may continue for a period of at least 30 years after closure certification verification and issuance of a Post-Closure Care Permit under the provisions of 20 NMAC 4.1, Subpart V, 40 CFR §264.117.

Clarification of Permit Text

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Permit Text

Although the closure plan will ensure that all contaminants are reduced to levels protective of human health and the environment and will minimize the potential for contaminant migration, because some residual contamination may remain in place, security that was used for the management of hazardous wastes will be provided during the contingent post-closure period to prevent access to the OD treatment unit.

The security mechanisms that will be in-place during the contingent post-closure period will include the following:

- Utilization of the Base's existing 24-hr security system (i.e., guards making routine rounds) to provide continuous monitoring of the unit; and

- Access control to the Base via fence, gate and other entry control devices.

In addition to these measures, the 20,000-Pound OD Unit will be clearly posted with signs that state, "DANGER—UNAUTHORIZED PERSONNEL KEEP OUT." These signs will be posted at all entrances and at other locations so as to be seen from any approach to the unit. The legend will be written in both English and Spanish and will be legible from a distance of 25 feet.

Clarification of Permit Text

Page 2-5: [4] Deleted	Diane Lazarus	1/20/2012 11:45:00 AM

Permit Text

As specified in 40 CFR 261.113(b), closure activities at the 20,000-Pound OD Unit will be completed within 180 days of treating the final volume of hazardous waste. No extension beyond the 180 days provided is being requested at this time; however, if it is determined that an extension is needed, this plan will be modified. Notification of intent to close will be submitted to the NMED, Hazardous and Radioactive Materials Bureau. The anticipated date for the initiation of closure activities is January 2006. Table F-1 presents an estimated closure schedule.

Table F-1
Estimated Closure Schedule for the 20,000-Pound OD Unit

Closure Activity	Closure Period (Days)
Receive and treat final volume of waste	-10 to 0
Closure begins	0
Perform site reconnaissance	0 to 5
Remove scrap	5-15
Soil Sampling and Analysis	15-50
Address any exceedences of standard (if any)	50-130
Grade	130-140
Decontaminate equipment	140-150
Prepare closure certification/post-closure documentation	150-180
Submit closure certification/post-closure documentation	180
NMED issues post-closure permit	180-235
Conduct post-closure care activities	To Be Determined

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Permit
Text

At the conclusion of the final OD treatment event, the site will be inspected and all debris will be removed. Following these activities, representative samples from across the entire 20,000 Pound OD Unit will be collected and analyzed to determine the residual concentrations of any toxic metals and explosive compounds, if any. These analytical results will be compared to background levels or risk-based criteria deemed to be protective of human health. If all levels are determined to be below background (for metals) or the analytical detection limits (for organics), the closure will be considered clean closure. If levels are detected in excess of background or detection limits but are below risk-based criteria, the closure will be considered a risk-based closure.

In the event that an area of the unit is determined to contain levels in excess of risk-based criteria, further action will be taken as necessary in coordination with NMED prior to completing closure, such as risk assessment, delineation of the extent of the exceedence, analysis of corrective measures, and corrective measures implementation. When all such activities have been completed as required, and all samples show that the residual levels of contamination are below the risk-based criteria, all remaining closure and post-closure activities will be completed, including grading, decontamination, and closure certification. More detailed descriptions of the specific activities that will be conducted to ensure that the closure performance standard is met are presented in the following sections.

Clarification of Permit Text

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Permit Text

Operating practice precludes the storage of hazardous wastes at the 20,000-pound OD Unit. For safety reasons, waste munitions will be treated as received or as generated and no other wastes are stored at the site. During operation, the maximum amount of hazardous wastes treated during a single OD event at any time during the life of the facility is 20,000 pounds NEW of waste munitions. No waste munitions will be present at the site upon initiation of closure activities.

Clarification of Permit Text

T

SAMPLING AND ANALYSIS PLAN FOR THE CLOSURE OF THE 20,000-POUND OPEN DETONATION TREATMENT UNIT

HOLLOMAN AIR FORCE BASE, NEW MEXICO

NMED Permit No. NM6572124422

Prepared for:

49 CES/CEAN
Holloman Air Force Base
New Mexico

Under Contract To:

U.S. Army Corps of Engineers-
Albuquerque District
HTRW Branch
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Delivery Order No. 0010

February 2012

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SAMPLING AND ANALYSIS PLAN FOR THE CLOSURE OF THE 20,000-POUND OPEN DETONATION TREATMENT UNIT

HOLLOMAN AIR FORCE BASE, NEW MEXICO

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SAMPLING AND ANALYSIS PLAN FOR THE CLOSURE OF THE 20,000-POUND OPEN DETONATION TREATMENT UNIT

HOLLOMAN AFB, NEW MEXICO

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ACRONYMS AND ABBREVIATIONS

ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
Bhate	Bhate Environmental Associates, Inc.
CES/CEAN	Civil Engineering Squadron/Environmental Flight
CFR	Code of Federal Regulations
DLA	Defense Logistics Agency
DRMO	Defense Reutilization and Marketing Office
EDD	Electronic Data Deliverable
EOD	Explosive Ordnance Demolition
ERPIMS	Environmental Restoration Program Information Management System
ESRI	Environmental Systems Research Institute
GIS	Geographical Information System
GPS	Global Positioning System
HAFB	Holloman Air Force Base
HASP	Health and Safety Plan
HMX	Cyclotetramethylenetetranitramine
IDW	Investigation-Derived Waste
LIMS	Laboratory Information Management System
MCL	Maximum Contaminant Level
mg/kg	Milligrams per kilogram
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NEW	Net explosive weight
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Criteria
OD	Open detonation
OSHA	Occupational Safety and Health Administration
PETN	Pentaerythritol tetranitrate
PPE	Personal protective equipment
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RDX	Cyclotrimethylenenitramine
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
SSLs	Soil Screening Levels
TNT	2,4,6-Trinitrotoluene
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
UXO	Unexploded ordnance

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1 INTRODUCTION

NationView, LLC (NationView), has been retained by the U.S. Army Corps of Engineers (USACE), Albuquerque District under contract W912PP-09-D-0003, Delivery Order No. 0010, to conduct closure sampling, as required by New Mexico Environment Department (NMED) Permit No. NM6572124422, at the 20,000-Pound Open Detonation Treatment Unit (20K OD Treatment Unit) at Holloman Air Force Base (HAFB), New Mexico.

HAFB operated an open detonation (OD) unit for the destruction of explosive ordnance from February 1997 through March 2011. The OD unit was operated under NMED Hazardous Waste Facility Permit No. NM6572124422, issued February 3, 1997. Permit Attachment F, Closure and Post-Closure Care Plans, prescribes the general requirements for the 20K OD Treatment Unit closure. As part of the closure process, sampling and analysis are required. This Sampling and Analysis Plan (SAP) provides the detailed sampling and analysis requirements for the 20K OD Treatment Unit closure.

As part of the Permit, Attachment J, Sampling and Analysis Plan, quarterly sampling throughout the operating life of the unit was required. Results of quarterly sampling were available from the first quarter of 2003 through the first quarter of 2011 for the preparation of this SAP. These results were reviewed and evaluated, and the permit conditions were reviewed to develop an appropriate sampling and an analysis approach.

1.1 SAP Organization

This SAP will serve as the primary working document for the closure sampling for the 20K OD Treatment Unit. The SAP is organized as follows:

- Section 1 presents a summary of the closure approach and project objectives.
- Section 2 presents the detailed Sampling and Analysis Plan for the characterization of soil for the closure, as well as the specific data quality objectives, sampling procedures, sample analysis, and related sample quality assurance/quality control (QA/QC) measures to be employed during the conduct of the investigation.
- Section 3 describes the data management plan that will be used to support this SAP.
- Section 4 describes the Health and Safety requirements to be followed during the sampling effort.
- Section 5 identifies the full reference information for the documents cited throughout this SAP.
- The figures and tables referenced throughout this SAP are included under separate tabs following the text.

1.2 Project Objectives

The primary project objectives of this SAP are to:

- Collect data to demonstrate site conditions at the time of closure.

- Collect data to compare results to NMED residential Soil Screening Levels (SSLs) and/or EPA Regional Screening Levels (RSLs) to demonstrate clean closure.
- Collect the proper data to support closure of the 20K OD Treatment Unit.

1.3 Facility Description and Operational History

1.3.1 Holloman Air Force Base

HAFB is located on approximately 50,700 acres of land in Otero County, south-central New Mexico. HAFB 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. HAFB 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 HAFB 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 20,000-Pound OD Unit is located adjacent to the northern boundary of HAFB. The area to the north is part of the White Sands Missile Range.

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 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 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.

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 20K OD Treatment 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 20K OD Treatment Unit, and operating procedures is provided in other attachments to the Permit.

The 20K OD Treatment 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 20K OD Treatment Unit to prevent carryover of fragments towards the test track area.

All waste that was treated at the 20K OD Treatment 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, ensured that incompatible wastes were not mixed. The reactive wastes treated at the 20K OD Treatment Unit were solid in nature and contained no free liquid.

HAFB has never been used for the research and development of nuclear, chemical warfare, or other exotic warfare types of weapons. The 20K OD Treatment 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 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.

1.4 Historical Sampling

Samples were collected from the 20K OD Treatment Unit quarterly throughout the life of the unit. Quarterly sampling data from the first quarter of 2003 through the first quarter of 2011 was available and reviewed for the preparation of this SAP. Samples were collected and analyzed for the following parameters:

1. Explosive compounds (by U.S. Environmental Protection Agency [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
- 2,4,6-Trinitrotoluene (TNT)
- Pentaerythritol tetranitrate (PETN)
- 2-Amino-4,6-dinitrotoluene
- 4-Amino-2,6-dinitrotoluene
- 2-Nitrotoluene
- 3-Nitrotoluene
- 4-Nitrotoluene
- Nitroglycerin

2. Toxic metals (by USEPA Method 6010, unless otherwise noted)
   - Antimony
   - Arsenic
   - Barium
   - Beryllium
   - Cadmium
   - Chromium
   - Copper
   - Lead
   - Mercury (Method 7471)
   - Nickel
   - Selenium
   - 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):

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- 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 regraded and 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 compound.

1.5 Sample Analysis Rationale

This section addresses the parameters of concern for wastes that were treated at the 20K OD Treatment Unit. The rationale for the selection of these parameters, sampling methods, analytical protocols, and frequency of analysis are described.

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 20K OD Treatment 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 CO_2, CO, H_2O, N_2, and, to some degree, NO_x. 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 ($NaNO_2$, KNO_2). 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 SAMPLING AND ANALYSIS PLAN

This section presents the SAP for the closure of the 20K OD Treatment Unit, including:

- Pre-Sampling Events
- Closure Sampling Strategy
- Sample Analysis

The SAP for this closure has three primary objectives. The first goal is to characterize the site at the time of closure. The second objective is to demonstrate that the concentrations of residual materials remaining at the site do not exceed NMED residential SSLs. The third goal of this SAP is to evaluate the groundwater condition in the immediate area surrounding the treatment unit.

Soil and groundwater sampling procedures will utilize industry standard methods to ensure sample quality and provide a platform for efficient collection. Sample analysis includes field screening methods and offsite analysis to provide an efficient means of identifying subsurface conditions.

2.1 Pre-Sampling Events

Before sampling can begin, there are several activities that must occur, including a pre-final inspection, debris removal (if necessary), site security measures, and facility manager notification of the intended operations. The Project Manager will coordinate project requests for Base installation support services through the 49th Civil Engineering Squadron/Environmental Flight (CES/CEAN).

2.1.1 Preparation Meeting

Prior to the start of activities, a preparation meeting and site walk-through of the 20K OD Treatment Unit will be conducted with the Contract Officer Representative, HAFB 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 reviewed at this time will be project procedures in accordance with the schedule and planned activities.

Site security is concerned with safety at the 20K OD Treatment Unit during all sampling activities, and areas surrounding the sampling activity, and will be addressed as outlined in the *Basewide Health and Safety Plan* (HASP) (Bhate Environmental Associates, Inc. [Bhate], 2003b).

2.1.2 Pre-Final Inspection

A pre-final visual site inspection (as required by the Permit, Appendix F) will be performed to determine whether any surficial debris, scrap, or other substances remain in the 20K OD Treatment Unit that requires removal in order for the closure to proceed. Debris to be identified

will include metal fragments and remnants. The volume of materials to be removed may need to be estimated if a significant volume of debris is present.

The pre-final inspection will be documented using photographs and notes in a bound, water-resistant field logbook. If no debris or fragments are observed during the pre-final inspection, this will be noted in the logbook, and the final Inspection may be immediately completed.

The pre-final inspection may occur immediately following, or simultaneously with, the preparation meeting.

2.1.3 Removal of Scrap Materials and Debris

The pre-final inspection will be followed by the debris removal task. Depending on the volume of debris identified, this may occur immediately following the pre-final inspection.

According 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."

According to the 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 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 [New Mexico Administrative Code] NMAC 4.1, Subpart V, 40 [Code of Federal Regulations] CFR SS 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." It should be noted that Permit Attachment J, Sampling and Analysis Plan, does not identify specific tests or analytes for debris and metal fragments.

In accordance with past practice, the debris and metal fragments are collected by HAFB 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 will be performed to confirm that all surficial fragments debris have been removed. The final inspection will be documented using photographs and notes in the field logbook.

2.2 Closure Sampling Strategy

2.2.1 Applicable or Relevant and Appropriate Requirements

2.2.1.1 Soil

The residential SSLs established in NMED's *Technical Background Document for Development of Soil Screening Levels* (NMED, August 2009) will be used as the action levels for detections in soil. If NMED does not have an SSL for a particular parameter in soil, it will be compared to its respective USEPA Regional Screening Level (RSL) (November 2011). Table 1 shows the soil parameters and their appropriate standard (SSL or RSL).

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2.2.1.2 Groundwater

Groundwater results will be compared to USEPA Maximum Contaminant Levels MCLs (for drinking water) and New Mexico Water Quality Control Commission (NMWQCC) groundwater protection standards. The lower of the available standards will be used. Table 2 shows the available standards.

2.2.2 Sampling Location Design and Rationale

2.2.2.1 Soil

Representative soil samples will be collected from the 20K OD Treatment 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 is important to verify that the entire area of the OD Unit has been 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 have been selected for analysis of explosives, metals, nitrate, perchlorate, and phosphorus. Because no samples were previously analyzed for perchlorate, additional soil sample locations have been selected for analysis of perchlorate only.

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Table 3 provides the coordinates, sample identification, and analyses for all the proposed sample locations.

2.2.2.2 Groundwater

Representative water samples will be collected from the four groundwater monitoring wells around the 20K OD Treatment Unit and analyzed to determine the concentrations of toxic metals, explosive compounds, perchlorate, nitrate, and phosphorus. See Table 3 for a full list of analytes.

Figure 4 shows the groundwater monitoring well locations around the 20K OD Treatment Unit as surveyed in 1993 at the time of installation (Labat-Anderson, 1993).

2.2.3 Sampling Procedures

2.2.3.1 Soil

A hand auger will be used to collect soil from the surface interval (0-1 foot) at each of the selected locations. Specific sampling procedures and technologies to be used during the project are described in the following references:

- *Final Basewide Quality Assurance Project Plan* (Bhate, 2003a)
- HAFB Standard Operating Procedures (SOPs) from Appendix A of the *HAFB Basewide QAPP*

The specific HAFB SOPs for this sampling event are listed below:

- HAFB SOP-1: Documentation, Sample Handling, Chain-of Custody, and Shipping
- HAFB SOP-2: Sampling Equipment Documentation
- HAFB SOP-5: Soil Sampling for Chemical Analysis
- HAFB SOP-9: Field Management of Investigation-Derived Waste (IDW)

A Global Positioning System (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.

2.2.3.2 Groundwater

The groundwater monitoring wells were installed in 1993 and were developed at the time of installation (Labat-Anderson, October 2003). Therefore, the wells will need to be developed and the integrity of the wells will need to be determined prior to sampling.

Groundwater monitoring wells will be developed, and the process documented, in accordance with the HAFB Basewide Quality Assurance Project Plan (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 may be required due to the age and inactivity of the wells). Monitoring well development will take place by over-pumping each well until at least five well volumes have been removed, and the turbidity, pH, specific conductivity, and temperature have stabilized by +/- 10 percent for at least 3 consecutive readings.

One set of groundwater samples will be collected from the four monitoring wells for the parameters shown in Table 3. Groundwater samples will be 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 will be placed at mid-screen and purged until field parameters are stabilized. The groundwater samples will be collected from mid-screen interval.

The samples will be labeled, handled, and prepared for shipment in accordance with HAFB SOP-1 of the HAFB Basewide QAPP (Bhate, 2003a). The samples will be 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 will be managed in accordance with HAFB SOP-1 of the HAFB Basewide QAPP (Bhate, 2003a).

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 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 will be entered in the log book on dated, initialed, and serially-numbered pages. Corrections will be made to entries by initialed and dated line-out deletions. A diagonal line will be drawn across the remaining blank space of the last page of each day's entry. Each day's entry will be signed and dated by the author.

The date and time of sample preparation, collection, and personnel who conducted sampling will be 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 will also be recorded in the field log book. Sampling personnel will record 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 3.2.1 of this SAP.

2.2.5 Decontamination

Sampling equipment will be decontaminated as described in HAFB SOP-2 of the HAFB Basewide QAPP (Bhate, 2003a).

2.2.6 Management of Investigation-Derived Waste

Investigation-Derived Waste (IDW) generated during this project may include used personal protective equipment (PPE), decontamination fluids and solids (e.g., paper towels, rags, etc.), and groundwater monitoring well development and purge water.

IDW will be managed and characterized in accordance with HAFB SOP-9 of the HAFB Basewide QAPP (Bhate, 2003a). 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.

2.3 Sample Analysis

This section describes the objectives and procedures associated with the analytical program. The analytical strategies for the 20K OD Treatment 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 will be reviewed according to the HAFB Basewide QAPP (Bhate, 2003a).

Qualifiers may be applied to data that fails to satisfy the acceptance criteria as detailed in the HAFB 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 will be analyzed as follows:

- Metals by USEPA Method 6010B (except mercury by USEPA Method 7471A)
- Explosives by USEPA Method 8330 (except N-nitrosodimethylamine (NDMA) by USEPA Method 8270C-SIM)
- Perchlorate by USEPA Method 6860
- Nitrate by USEPA Method 300
- Phosphorus by USEPA Method 365.3
- Soil Moisture by USEPA Method 3550

The groundwater samples will be analyzed as follows:

- Metals by USEPA Method 6010B (except mercury by USEPA Method 7470A)
- Explosives by USEPA Method 8330 (except NDMA by USEPA Method 8270C-SIM)
- Perchlorate by USEPA Method 6860
- 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 HAFB 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 this SAP 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, will be used.

Samples selected for laboratory analysis will be labeled, handled, and prepared for shipment in accordance with HAFB SOP-1 of the HAFB Basewide QAPP (Bhate, 2003a). The samples will 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 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.

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3 DATA MANAGEMENT PLAN

This section describes the overall data management strategy and plan for the 20K OD Treatment Unit closure sampling and associated report.

3.1 Data Management System and Strategy

The data management plan will be used to accommodate and manage fixed-based laboratory generated data at standard turnaround time (2 weeks). Data to be generated includes chemical analytical data, as well as spatial and features information, and various supporting data, such as photographs and standard daily forms information.

3.2 Data Type

Analytical data will be generated by offsite laboratory analysis. Analytical data generated by the offsite laboratory will be initially managed by the laboratory's laboratory information management system (LIMS) and transferred to the project team for use via EDD and hard copy. Prior to project startup, formats for the offsite laboratory EDDs will be approved to ensure smooth transfer and importation of the data.

Upon project completion, the data management system will be used to perform final spatial analysis, as well as to support tabular and graphic report development for deliverables and miscellaneous project communications as needed.

3.2.1 Sample Identification System

Each soil, groundwater, and QA/QC sample collected will be identified on the sample label and chain-of-custody records, regardless of type. Sample documentation, handling, and shipping will be in accordance with HAFB SOP-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 sample collection activities at the treatment unit. The field duplicate samples will appear in sequence with the other samples.

The sample nomenclature for soil samples collected will be as follows:

20KOD-SO04

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:

20KOD-MW01

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

3.2.2 Data Recording

The following paragraphs describe the data recording activities that will be performed for field data, offsite and onsite laboratory analytical data, and photographs.

3.2.2.1 Field Data

All information pertinent to a field and/or sampling survey will be recorded on appropriate data sheets, or in the project field logbook as described Section 10.5 of the HAFB Basewide QAPP (Bhate, 2003a). Specific data sheets are required by certain SOPs. Samplers use a bound field logbook with consecutively numbered pages. Entries in the logbook will be made using indelible ink and will include 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 is made on the document or in the logbook, corrections will be made simply by crossing a line through the error in such a manner that the original entry can still be read, and the correct information added as the change. All corrections will be initialed by the author and dated.

Each page in the logbook will be signed or initialed by the person making the entries. In addition to the information entered into the logbook, the appropriate data forms must be filled out as each activity is completed.

3.2.2.2 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 will contain 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 will be presented in hard copy, if requested, and in Electronic Data Deliverable (EDD) formats (on CD). Electronic data shall be delivered in an appropriate format such that the data can be manipulated for archiving and presentation.

3.2.2.3 Photographs

Any photographic documentation will be 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

3.3 Data Reporting

Data obtained during sampling activities will be reported according to the HAFB Basewide QAPP (Bhate, 2003a). The data will be generated using rigorous, analyte-specific analytical methods where analyte identifiers and quantitations are confirmed and QA/QC requirements have been satisfied. For this project, regular, field duplicate, and MS/MSD samples are to be collected concurrently. The data will meet 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. Sampling results will be tabulated and summarized in the closure report for the treatment unit. An Environmental Restoration Program Information Management System (ERPIMS) submittal is not required for the closure of the 20K OD Treatment Unit.

3.3.1 Tabular Displays

Analytical results will be presented using summary tables, as appropriate, for clear presentation in the closure report. Complete analytical results will be provided in the laboratory report(s).

3.3.2 Graphical Displays

During the field effort, Figure 3 and Table 1 will be used by the field team to guide the sampling activities. Staff will hand-annotate the figure for interim documentation of notable spatial information, such as indicating which locations have been sampled and documenting in-field sample location adjustments.

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.

3.3.3 Data Archiving

Hardcopy and electronic data shall 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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4 HEALTH AND SAFETY REQUIREMENTS

Project Health and Safety practices will adhere to the Basewide HASP (Bhate, 2003b) for closure inspection and sampling activities. All work must be conducted in accordance with the USACE *Safety and Health Requirements Manual, EM 385-1-1*, 2008. It is anticipated that no greater than Level D PPE will be required to complete the site 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 will be completed. This is discussed in the Basewide HASP (Bhate, 2003b).

The perimeter of the site is already secured by fencing and caution signs. This fenced area will be considered the Exclusion Zone. The Support Zone will be located outside the fenced area. The Contaminant Reduction Zone and Support Zone will be established as guided by the Basewide HASP (Bhate, 2003b) and site prevailing conditions during the pre-final inspection.

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5 REFERENCES

Bhate Environmental Associates, Inc. (Bhate), November 2003a. *Final Basewide Quality Assurance Project Plan, Holloman Air Force Base, New Mexico*.

Bhate, December 2003b. *Final Basewide Health and Safety Plan, Holloman Air Force Base, Alamogordo, New Mexico*.

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USEPA, June 2008. Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review. 540-R-08-01.

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FIGURES

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TABLES

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Table 1. Soil Standards for Closure

Parameter	Method[1]	Laboratory Reporting Limit (mg/kg)	NMED Residential SSL or *EPA RSL*[3] (mg/kg)
Soil Moisture[4]	ASTM-D-2216	NA	NA
Perchlorate	6860	0.001	54.8
Nitrate	300	5	125,000
Phosphorus	365.3	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	77.9
Chromium	6010B	1.5	NA
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	7.71
EXPLOSIVES			
HMX	8330	0.10	3,060
RDX	8330	0.20	44.2
1,3,5-Trinitrobenzene (TNB)	8330	0.10	*2,200*
1,3-Dinitrobenzene (DNB)	8330	0.10	*6.1*
Tetryl	8330	0.20	244
Nitrobenzene (NB)	8330	2.0	49.4
2,4-Dinitrotoluene (DNT)	8330	0.10	15.7
2,6-Dinitrotoluene (DNT)	8330	0.10	61.2
Trinitrotoluene (TNT)	8330	0.20	35.9
Pentaerythritol tetranitrate (PETN)	8330	3.5	*120*
2-Nitrotoluene (NT) (*o*-nitrotoluene)	8330	0.20	29.1
3-Nitrotoluene (NT) (*m*-nitrotoluene)	8330	0.20	1,560
4-Nitrotoluene (NT) (*p*-nitrotoluene)	8330	0.20	244
Nitroglycerin	8330	2.0	6.11
4-Amino-2,6-Dinitrotoluene	8330	0.1	*150*
2-Amino-4,6-Dinitrotoluene	8330	0.1	*150*
N-Nitroso-dimethylamine (NDMA)	8270C-SIM	0.018	0.0954

1. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846
2. NMED SSLs, 2009.
3. In the absence of NMED SSLs, EPA RSLs (November 2011) are used. EPA RSLs are presented *italics and underlined*.
4. Soil Moisture analysis is required for calculating other analytical concentrations in soils.

NA = Not available

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Table 2. Water Standards for Closure

Parameter	Method[1]	Laboratory Reporting Limit (µg/L)	Water Quality Standard	
			NM WQCC Standard[2] (µg/L unless otherwise noted)	EPA MCL[3] (µg/L unless otherwise noted)
Perchlorate	6860	0.05	NA	NA
Nitrate	300	0.5 mg/L	10 mg/L (as nitrogen)	10 mg/L (as nitrogen)
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 (PETN)	8330	0.4	NA	NA
2-Nitrotoluene (NT) (*o*-nitrotoluene)	8330	0.4	NA	NA
3-Nitrotoluene (NT) (*m*-nitrotoluene)	8330	0.4	NA	NA
4-Nitrotoluene (NT) (*p*-nitrotoluene)	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 (NDMA)	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, May 2009.
NA = Not available

Table 3. Proposed Soil Sample Locations and Analyses for Closure Sampling

X Coord.	Y Coord.	Label	Metals	Explosives	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

(continued)

Table 3. Proposed Soil Sample Locations and Analyses for Closure Sampling (Continued)

X Coord.	Y Coord.	Label	Metals	Explosives	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

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

SW-846 Method	Analyte	Container	Preservative	Holding Time
6010B	Metals (dissolved) (except mercury)	250 mL plastic bottle	Field filtered, Ice to 4^oC pH <2 with HNO_3	6 months
7470A	Mercury	w/metals	Field filtered, Ice to 4^oC pH <2 with HNO_3	28 days
8330	Explosive Residues	1 L amber glass	None, cool, 4^oC	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^oC	48 hours
365.3	Phosphorus	250 ml glass	H_2SO_4	28 days
8270C-SIM	NDMA	Two 1 L amber	None, cool, 4^oC	7 days to extraction 40 days after extraction
2540C	TDS	1 L plastic	None, cool, 4^oC	7 days
Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846				

EXPANDED CLOSURE AND POST-CLOSURE PLAN
20,000-POUND OPEN DETONATION UNIT
RED LINE VERSION SHOWING CHANGES FROM JUNE 2011
HOLLOMAN AIR FORCE BASE, NEW MEXICO
NMED PERMIT NO. NM6572124422

February 2012

Prepared for

49 CES/CEAN
Holloman Air Force Base
New Mexico

Prepared by

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Contract No. W912PP-09-D-0003 DO 0010
NationView Project No. 8090013.010

U.S. Army Corps of Engineers
Albuquerque District

EXPANDED CLOSURE AND POST-CLOSURE PLAN
20,000-POUND OPEN DETONATION UNIT
RED LINE VERSION SHOWING CHANGES FROM JUNE 2011
HOLLOMAN AIR FORCE BASE, NEW MEXICO
NMED PERMIT NO. NM6572124422

February 2012

Prepared for

49 CES/CEAN
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Albuquerque District