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

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MAR 30 2015
NMED
Hazardous Waste Bureau

26 March 2015

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

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

Dear Mr. Kieling

Holloman Air Force Base is pleased to submit the response to comment associated with the 5 March 2015 comment from the EPA for the Amended Expanded Closure Plan regarding the background sampling locations at 20,000 Pound Open Detonation Unit.

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 me (575) 572-3931 or by email at deanna.rothhaupt@us.af.mil.

Sincerely

DEANNA ROTHHAUPT, GS-12, DAFC

Attachment:
Response to Comment for Amended Expanded Closure Plan for the 20,000-Pound Open Detonation Unit

cc:

(w/Atch)	(w/o Atch)	(w/Atch)
Mr. Cornelius Amindyas	Mr. Will Moats	Mr. Chuck Hendrickson
Hazardous Waste Bureau	Hazardous Waste Bureau	USEPA, Region 6 (6PD-F)
5500 San Antonio Dr. NE	5500 San Antonio Dr, NE	1445 Ross Ave. Ste 1200
Albuquerque NM 87109-4127	Albuquerque NM 87109-4127	Dallas TX 75202-2750

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Common Comment and Response Worksheet (Version 3)

							Document Title (version) Amended Expanded Closure Plan OD20K	Contract/TO Number/EPA I.D. # FA8903-13-C-0008/NM6572124422	
Item	**Source**	**Section**	**Page**	**Para**	**Line**	**Class**	**Comment**	**Response**	**NMED Concurence**
1	USEPA	Appendix A, Figure 5					The included Sampling and Analysis Plan (Appendix A) places soil samples at only 500-1000' from the OD unit. How can they really be unaffected, i.e., how can they have always been upwind of operations so that they have no airfall deposits from the unit? Since there is no reference in the text to a wind rose, and the proposed locations are in a semicircle around the unit (see Figure 5), EPA doesn't think airfall contamination has been considered. The background sampling locations need to be moved to locations representative of background."	Agreed. Based on both the wind rose for Holloman AFB (attached Figure 1) and information regarding the prevailing wind direction at Holloman provided on the website http://www.wrcc.dri.edu/htmlfiles/westwinddir.html#NEW MEXICO, the west-southwest direction from OD20K is selected for locations for background sampling. This direction is approximately perpendicular to the most prevailing direction of the wind (winds blowing from south-southeast) and at the same time the winds blowing from the east-northeast to west-southwest have the lowest wind speed as well as percentage. This means that the distance contaminated soil particles would travel in this (west-southwest) direction is the smallest compared with all other directions, and therefore the most appropriate for background sampling. Attached Figure 2 shows two possible locations of grids for background sampling. The distance between the OD20K and these two grids is 0.8 miles (red) and 1.3 (miles (blue). The grids are approximately 500 by 500 feet in size. In addition, two potential grids for background sampling were placed as far as possible from OD20K and the end of the test track within the Holloman AFB to minimize the potential impact from test track remnants.	
2	NMED	Appendix A, Figure 5					In other words: There would be some distance that ejected particles would travel from the detonation site. But EPA's main concern is contamination that falls out of the detonation smoke-clouds as they drift away from the site; since those distances can be pretty far. So the New Mexico Environment Department recommends that background samples be taken from areas with similar surface soils, not close to the unit and least likely to have been impacted by the smoke-cloud fallout (using a site wind rose or other site wind direction information). Examples: At the OB/OD unit at Fort Wingate, NM, background soil locations (for multiple soil types) are from 4,000 feet to 10,000 feet from detonation pits; at McAlester AAP, OK, the proposed background soil sample area is 2.5 - 3 miles from the two OD units. This also suggests that, using the wind rose, the location of the background soil samples should be upwind, and at a greater distance from the center of the ODU than the 500-1000 feet that you proposed in the Expanded Closure Plan that you submitted in October 2014. Please let me know what distance you came up with (via Email) so that I can discuss with NMED Management before you take the background samples. Thanks.		We've looked at the background sampling location revision in the attachment above, which you previously sent to me. Of the two proposed areas, we prefer Location B (in blue) in Figure 5. We have some concern for Location A (in red), which appears in the satellite photo to be in an area where surface soils are transitioning to open dunes. It would be best to sample in the same, or similar, soils as those at the OD Unit area. Location B seems to fit this criterion, and is also unlikely to have been affected by the OD operations by virtue of its distance from the OD Unit, [also taking into account the information provided by the Wind Rose].

<u>Change Out Pages</u>

Final Amended Expanded Closure Plan

OD20K 20,000-Pound Open Detonation Unit

Holloman Air Force Base New Mexico

October 2014

Based on both 5 March 2015 United States Environmental Protection Agency and New Mexico Environment Department comment for the Amended Expanded Closure Plan regarding the background sampling locations at OD20K 20,000 Pound Open Detonation Unit, and 25 March 2015 New Mexico Environment Department approval of the response to comment, the following pages were replaced in the Final Amended Expanded Closure Plan:

(1) Pages 2-3 and 2-4 in Amended Expanded Closure Plan (main text)
(2) Page 3-1 and 3-2 in Sampling and Analysis Plan (Appendix A)
(3) Figure 5 in Sampling and Analysis Plan (Appendix A)
(4) Pages 19, 20 and 75, 76 in OD20K UFP-QAPP (Appendix D)

Services (formerly the Defense Reutilization and Marketing Office [DRMO]) for disposal. The results of the removal of debris will be provided in the Closure Report.

2.6.3 Closure Sampling and Analysis

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

For closure, a records review was conducted to determine whether additional analyses are warranted to characterize the site according to the materials historically treated at the site. The records review performed two functions: 1) identified chemicals managed at the treatment unit (i.e., the chemical constituents of concern) and 2) identified potential chemical releases at the treatment unit.

A record of wastes brought in from 1996 through 2011 and detonated at OD20K was reviewed by a New Mexico Registered Professional Engineer (PE) and documented in a 2011 Memorandum and List of Materials Destroyed (**Appendix C**). The PE findings are also included in **Appendix C**. The list of chemical constituents of concern in the Amended SAP (**Appendix A**) for closure sampling performed in 2012 accurately reflects the review findings. Institutional knowledge and records do not indicate any spills or releases of oils or hazardous materials occurred at the Permitted Unit during the operating period.

The closure soil and groundwater sampling was performed in August 2012 in accordance with the NMED-approved Expanded Closure and Post-Closure Care Plan (NationView, 2012). Soil and ground water were analyzed for the following parameters (see the Amended SAP, **Appendix A,** for details):

- Metals (see full list in Amended SAP [**Appendix A**])
- Explosives (see full list in Amended SAP [**Appendix A**])
- Perchlorate
- Nitrate
- Phosphorus

Soil sampling was conducted to compare soil concentrations of identified analytes to the NMED Soil Screening Levels (SSLs) and United States Environmental Protection Agency (USEPA) Regional Screening Levels (RSLs) (as appropriate) for residential soil. The Amended SAP (**Appendix A**) details the 2012 methodology used for collecting and analyzing soil and groundwater samples, and the standards to which they were compared.

The August 2012 analytical results showed that concentrations of perchlorate in soils at four locations exceeded NMED SSLs and that perchlorate, nitrate and Total Dissolved Solids (TDS) concentrations in groundwater exceeded the corresponding USEPA Maximum Contaminant Levels (MCLs)**.** Since perchlorate background concentration in soil is not available, it is not possible to identify whether August 2012 perchlorate concentrations in soil are representative of background. *As a result, DGI will include the following initial tasks:*

- *Determination of background perchlorate concentration in soil - since perchlorate background concentration in soil is not available, it is not possible to identify whether August 2012 perchlorate concentrations in soil are representative of background. As a result, ten background soil samples will be collected at a distance of 1.3 miles in the*

west-southwest direction from the boundary of the OD20K 20,000-Pound OD Unit in areas unaffected by historical treatment operations and analyzed for perchlorate. The perchlorate background concentration will be calculated following the statistical methodology described in Permit Attachment J Sampling and Analysis Plan.

- *Additional determination of background concentrations of metals in soil - 2012 analytical results showed that concentrations of some metals in soils exceeded their respective site-specific background concentrations obtained from OD20K Background Study performed in 1997 (Holloman AFB, 1997). This was based on comparison of maximum detected site concentrations to the background reference values. Since OD20K Background Study included collection of only six soil samples in the vicinity of OD20K, two-sample hypothesis test was not used to determine if OD20K metal concentrations were elevated compared with background (the minimum number of samples for two-sample test is 8). Therefore, ten background soil samples that will be collected and analyzed for perchlorate during the DGI (the first bullet above) will also be analyzed for full list of metals (**Appendix A**, Section 1.4). This will allow the use of two-sample test for comparison of two distributions, the site data and background data, and the conclusion whether the clean closure of OD20K is achievable. The background concentrations of metals will be calculated following the statistical methodology described in Permit Attachment J Sampling and Analysis Plan.*
- *Verification of perchlorate concentrations in soil – four locations where 2012 sampling event showed exceedances for perchlorate will be sampled during the DGI to determine if soil analytical results are similar to 2012 sampling results.*
- *Verification of perchlorate and nitrate concentrations in groundwater - all four existing monitoring wells will be sampled during the DGI to determine if groundwater analytical results are similar to 2012 sampling results.*

Based on results of these initial tasks the DGI might include the following tasks:

- *If the result of background soil sampling for perchlorate shows that both 2012 and DGI perchlorate concentrations in soil are not elevated compared with background, it will be concluded that the perchlorate site concentrations are representative of background and additional soil sampling for perchlorate will not be performed.*
- *If perchlorate concentrations in soil are elevated compared with background then four soil samples from the surface interval 0-1 foot will be collected at a 20 feet step-out of each of the four 2012 soil sampling locations that exceeded NMED SSL. If the concentrations of perchlorate in soil exceed the residential SSL at the 20 feet step-out sampling locations, then additional soil samples will be collected at locations determined by stepping out an additional 10 feet from the perchlorate exceedance location. Based on soil sampling results, the perchlorate contamination in soil will be delineated and Human Health and Ecological Risk Assessment will be performed (see **Section 2.8**).*
- *If the DGI groundwater sampling results confirm the 2012 results, then five additional monitoring wells will be installed to a depth of approximately 50 feet in the vicinity of monitoring well HAFB-EOD-MW02 where 2012 groundwater sampling resulted in perchlorate and nitrate concentrations above the applicable screening levels. Based on groundwater sampling results, the perchlorate and nitrite contamination in groundwater*

3.0 SAMPLING AND ANALYSIS PLAN FOR DGI SOIL AND GROUNDWATER SAMPLING

3.1 Purpose of DGI Soil and Groundwater Sampling

The purpose of additional soil and groundwater sampling is to fill known data gaps and if necessary, to delineate the extent of contamination. DGI will include the following initial tasks:

- Determination of background perchlorate concentration in soil - since perchlorate background concentration in soil is not available, it is not possible to identify whether August 2012 perchlorate concentrations in soil are representative of background. As a result, ten background soil samples will be collected at a distance of 1.3 miles in the west-southwest direction from the boundary of the OD20K 20,000-Pound OD Unit in areas unaffected by historical treatment operations and analyzed for perchlorate. The perchlorate background concentration will be calculated following the statistical methodology described in Permit Attachment J Sampling and Analysis Plan.
- Additional determination of background concentrations of metals in soil - 2012 analytical results showed that concentrations of some metals in soils exceeded their respective site-specific background concentrations obtained from OD20K Background Study performed in 1997 (Holloman AFB, 1997). This was based on comparison of maximum detected site concentrations to the background reference values. Since OD20K Background Study included collection of only six soil samples in the vicinity of OD20K, two-sample hypothesis test was not used to determine if OD20K metal concentrations were elevated compared with background (the minimum number of samples for two-sample test is 8). Therefore, ten background soil samples that will be collected and analyzed for perchlorate during the DGI (the first bullet above) will also be analyzed for full list of metals (Section 1.4). This will allow the use of two-sample test for comparison of two distributions, the site data and background data, and the conclusion whether the clean closure of OD20K is achievable. The background concentrations of metals will be calculated following the statistical methodology described in Permit Attachment J Sampling and Analysis Plan.
- Verification of perchlorate concentrations in soil – four locations where 2012 sampling event showed exceedances for perchlorate will be sampled during the DGI to determine if soil analytical results are similar to 2012 sampling results.
- Verification of perchlorate and nitrate concentrations in groundwater - all four existing monitoring wells will be sampled during the DGI to determine if groundwater analytical results are similar to 2012 sampling results.

Based on results of these initial tasks the DGI might include the following tasks:

- If the result of background soil sampling for perchlorate shows that both 2012 and DGI perchlorate concentrations in soil are not elevated compared with background, it will be concluded that the perchlorate site concentrations are representative of background and additional soil sampling for perchlorate will not be performed.
- If perchlorate concentrations in soil are elevated compared with background then four soil samples from the surface interval 0-1 foot will be collected at a 20 feet step-out of each of the four 2012 soil sampling locations that exceeded NMED SSL. If the

concentrations of perchlorate in soil exceed the residential SSL at the 20 feet step-out sampling locations, then additional soil samples will be collected at locations determined by stepping out an additional 10 feet from the perchlorate exceedance location. Based on soil sampling results, the perchlorate contamination in soil will be delineated and Human Health and Ecological Risk Assessment will be performed (see **Section 2.8** in Amended Expanded Closure plan).

- If the DGI groundwater sampling results confirm the 2012 results, then five additional monitoring wells will be installed to a depth of approximately 50 feet in the vicinity of monitoring well HAFB-EOD-MW02 where 2012 groundwater sampling resulted in perchlorate and nitrate concentrations above the applicable screening levels. Based on groundwater sampling results, the perchlorate and nitrite contamination in groundwater will be delineated and Human Health and Ecological Risk Assessment will be performed (see **Section 2.8** in Amended Expanded Closure plan).

3.2 Data Gap Investigation Soil and Groundwater Sampling Strategy

3.2.1 Risk Screening Methodology

3.2.1.1 Soil

The residential SSL for perchlorate, (54.8 mg/kg) established in NMED's Risk Assessment Guidance for Site Investigations and Remediation (NMED, 2012) will be used as the action level for detections in soil. Project action limits and laboratory specific detection quantitation limits are provided in FPM's site-specific Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP) Worksheet #15 (**Appendix D** to Amended Expanded Closure Plan).

3.2.1.2 Groundwater

Groundwater sampling results for perchlorate and nitrate will be compared to USEPA MCLs (USEPA, 2014) (for drinking water) for perchlorate and nitrate (the standard for perchlorate is not provided in NMWQCC groundwater protection standards, while the standard for nitrate in NMWQCC is the same as the USEPA MCL for nitrate). Project action limits and laboratory specific detection quantitation limits are provided in site-specific UFP-QAP Worksheet #15 (**Appendix D** to Amended Expanded Closure Plan).

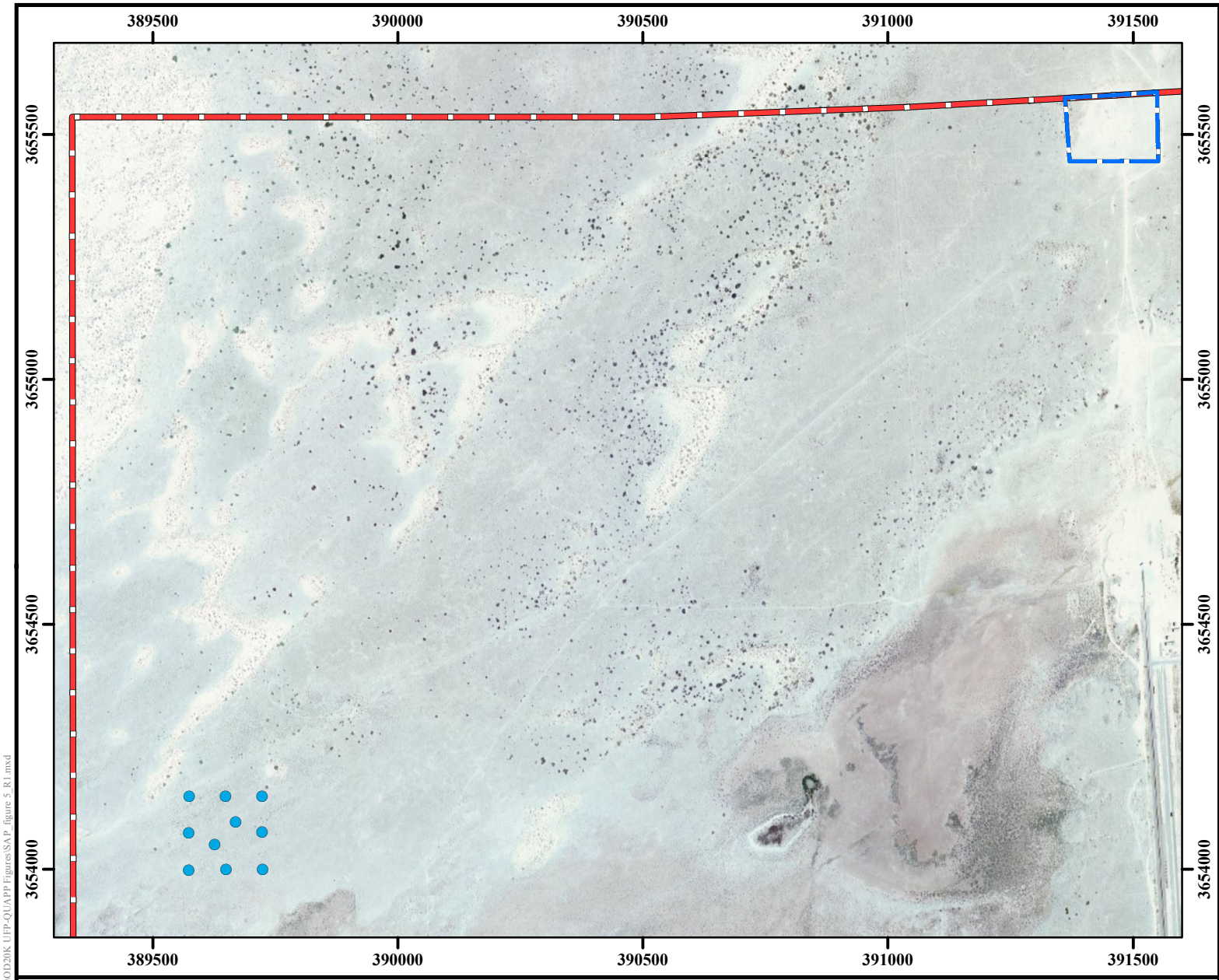
3.2.2 Sampling Location Design and Rationale

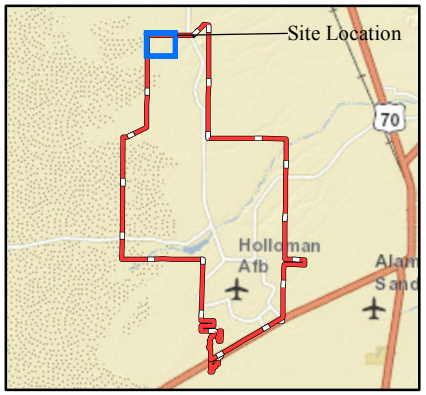
3.2.2.1 Soils

Ten background soil samples from the interval 0-6 inches will be collected at a distance of 1.3 miles in the west-southwest direction from the boundary of the OD20K in soil of similar lithology as within the OD20K for perchlorate and metals analysis. Approximate sampling locations are shown in **Figure 5**. Because visual inspection of the surface soil is necessary in order to obtain a background sample of similar lithology to that of the OD20K, the exact sampling locations will be determined during sampling.

In addition, soil samples will be collected from the surface interval 0-1 foot at four locations where 2012 sampling event showed exceedances for perchlorate to confirm 2012 results (**Figure 6**).

If result of background soil sampling for perchlorate shows that perchlorate concentrations in soil are elevated compared with background, four soil samples from the surface interval 0-1 foot





Legend

- Background Soil Sampling Locations
- OD20K 20,000-Pound Open Detonation Unit Boundary (6.2 acres)
- Installation Boundary

Performance Based Remediation
New Mexico-Arizona
Holloman Air Force Base
Alamogordo, NM

AFCEC

FIGURE 5

Background Soil Sampling Locations for Perchlorate and Metals Analysis

FPM Remediations, Inc.

2014

NOTES:
Revision Date: 3/26/2015

Coordinate System:NAD 1983 UTM Zone 13N
Projection: Transverse Mercator
Horizontal Datum: North American 1983
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -105.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter
Base Map Date: (c) 2010 Microsoft Corporation and its data suppliers
Base Map Source: ESRI Online Bing Data Source

1 inch = 1,000 feet

0 152 304 Meters

0 500 1,000 Feet

N W E S

Path: C:\Projects\New Mexico\GIS\OD20K UFP-QUAPP Figures\SAP_figure 5_R1.mxd

QAPP Worksheet #11 – Project/Data Quality Objectives

1. State the Problem

Perchlorate concentrations exceeding NMED SSLs have been observed in soil samples (SO06, SO09, SO21, and SO37) from the 2012 sampling event at the OD20K site. What is the nature and extent of perchlorate contamination in soils at the OD20K site? Is further corrective action necessary to address perchlorate exceedances in soils that may pose a threat to Human Health (HH) and/or the environment?

Perchlorate and nitrate concentrations exceeding screening levels have been observed in the groundwater sample at monitoring well HAFB-EOD-MW02 during the 2012 sampling event at the OD20K site. What is the nature and extent of perchlorate and/or nitrate exceedances in groundwater at the OD20K site? Is the perchlorate and/or nitrate exceedances site related or due to an offsite source? Is further corrective necessary to address perchlorate and/or nitrate exceedances in groundwater that may pose a threat to HH and/or the environment?

2. Identify the Goals of the Study

Since 2012 soil and groundwater sampling events resulted in closure standard exceedances, the goal of Data Gap Investigation (DGI) is to include additional tasks that will either confirm that additional sampling is not necessary (based on new background soil sampling and/or confirmation samples) or provide enough data for performing both a Risk Assessment for OD20K 20,000-Pound OD Unit and delineation of the extent of the contamination.

3. Identify Information Inputs

DGI will include the following initial tasks:

- Determination of background perchlorate concentration in soil - since perchlorate background concentration in soil is not available, it is not possible to identify whether August 2012 perchlorate concentrations in soil are representative of background. As a result, ten background soil samples will be collected at a distance of 1.3 miles in the west-southwest direction from the boundary of the OD20K 20,000-Pound OD Unit in areas unaffected by historical treatment operations and analyzed for perchlorate.
- Additional determination of background concentrations of metals in soil - 2012 analytical results showed that concentrations of some metals in soils exceeded their respective site-specific background concentrations obtained from OD20K Background Study performed in 1997 (Holloman AFB, 1997). This was based on comparison of maximum detected site concentrations to the background reference values. Since OD20K Background Study included collection of only six soil samples in the vicinity of OD20K, two-sample hypothesis test was not used to determine if OD20K metal concentrations were elevated compared with background (the minimum number of samples for two-sample test is 8). Therefore, ten background soil samples that will be collected and analyzed for perchlorate during the DGI (the first bullet above) will also be analyzed for full list of metals (Worksheet 15). This will allow the use of two-sample test for comparison of two distributions, the site data and background data, and the conclusion whether the clean closure of OD20K is achievable.

- Verification of perchlorate concentrations in soil – four locations where 2012 sampling event showed exceedances for perchlorate will be sampled during the DGI to determine if soil analytical results are similar to 2012 sampling results.
- Verification of perchlorate and nitrate concentrations in groundwater - all four existing monitoring wells will be sampled during the DGI to determine if groundwater analytical results are similar to 2012 sampling results.

Based on results of these initial tasks the DGI might include the following tasks:

- If 2012 perchlorate concentrations in soil are not elevated compared with background, it will be concluded that the perchlorate site concentrations are representative of background and additional soil sampling for perchlorate will not be performed.
- If perchlorate concentrations in soil are elevated compared with background and if soil sampling results at four locations (third bullet above) confirm 2012 results, then four soil samples from the surface interval 0-1 foot will be collected in the vicinity of each of the four 2012 soil sampling locations that exceeded NMED SSL. If the concentrations of perchlorate in soil exceed the residential SSL at sampling locations, then additional soil samples will be collected at locations determined by stepping out an additional 10 feet from the original perchlorate exceedance location. Based on soil sampling results, the perchlorate contamination in soil will be delineated and Human Health and Ecological Risk Assessment will be performed.
- If the DGI groundwater sampling results confirm the 2012 results, then five additional monitoring wells will be installed to a depth of approximately 50 feet in the vicinity of monitoring well HAFB-EOD-MW02 where 2012 groundwater sampling resulted in perchlorate and nitrate concentrations above the applicable screening levels. Based on groundwater sampling results, the perchlorate and nitrite contamination in groundwater will be delineated and Human Health and Ecological Risk Assessment will be performed.

4. Define the Boundaries of the Study

The spatial limits of work at the OD20K site are illustrated in **Figure 2**. New monitoring wells will be installed to delineate the boundaries of the perchlorate and nitrate exceedances in groundwater.

5. Develop the Analytical Approach

The following decision rules will be utilized to link potential results with conclusions or future actions.

<u>Soil Sampling Analytical Approach</u>

Decision Rule 1.

If perchlorate concentrations in soil are elevated compared with background and if soil sampling results at four 2012 exceedance locations confirm 2012 results, surface soil samples will be collected and analyzed for perchlorate at four locations around and approximately 20 feet from each previous (2012) exceedance location. The soils samples results will be evaluated to delineate the lateral and vertical extent of perchlorate exceedance for potential follow on corrective action (e.g., soil removal), as follows:

QAPP Worksheet #17 – Sampling Design and Rationale

Field activities at the OD20K site will consist of soil sampling, monitoring well installation and development if required, and groundwater sampling. Specific details of the sampling design and rationale are provided below. Additional details are provided in the Amended ECP and Amended SAP. .

Soil Sampling

Ten background soil samples from the interval 0-6 inches will be collected at a distance of 1.3 miles in the west-southwest direction from the boundary of the OD20K 20,000-Pound OD Unit in soil of similar lithology as within the OD20K for perchlorate and metals analysis. Because visual inspection of the surface soil is necessary in order to obtain a background sample of similar lithology to that of the OD20K, the exact sampling locations will be determined during sampling.

In addition, soil samples will be collected from the surface interval 0-1 foot at four locations where 2012 sampling event showed exceedances for perchlorate to confirm 2012 results.

If result of background soil sampling for perchlorate shows that 2012 perchlorate concentrations in soil are elevated compared with background and if soil sampling results at four locations confirm 2012 results, four soil samples from the surface interval 0-1 foot will be collected in the vicinity of each of the four 2012 soil sampling locations that exceeded the NMED SSL for perchlorate. These four samples will be collected at approximately 20 feet in north, south, east, and west directions with respect to the 2012 soils sampling location. If the concentrations of perchlorate in soil exceed the residential SSLs at a sampling location, then additional soil samples will be collected at locations determined by stepping out an additional 10 feet from the original perchlorate exceedance location.

Monitoring Well Installation and Groundwater Sampling

Initially all four existing monitoring wells will be sampled during the DGI to determine if groundwater analytical results are similar to 2012 sampling results. The 2012 results showed that monitoring well HAFB-EOD-MW02 had perchlorate and nitrate exceedances. If the DGI groundwater sampling results confirm the 2012 results, then five additional monitoring wells will be installed in the vicinity of monitoring well Holloman AFB-EOD-MW02. Based on the established groundwater flow direction towards the southwest, two monitoring wells will be located cross-gradient to the northwest of the existing well and two monitoring wells will be placed downgradient to the southwest. One monitoring well will be located upgradient to the northeast of the monitoring well HAFB-EOD-MW02. Each monitoring well will be separated by a minimum of 150 feet. The monitoring well locations depicted are tentative and may change depending on site conditions. Following well development, groundwater samples will be collected at the five new monitoring wells. Based on groundwater sampling results the perchlorate and nitrate contamination in groundwater will be delineated, and the appropriate remediation of contaminated areas will be proposed.

QAPP Worksheet #18 – Sampling Locations and Methods

Sampling Location	Matrix	Depth (inches)	Analytical Group	Concentration Level	No. of Samples[1]	Sampling SOP Reference[2]	Rationale for Sampling Location
OD20K	Soil	0-1 foot	Perchlorate	Low	30	SOP No. 1, No. 2 and No. 3	See **Worksheet #17**
OD20K	Soil	0-1 foot	Metals	low	10	SOP No. 1, No. 2 and No. 3	See **Worksheet #17**
OD20K	Aqueous	Depth to groundwater	Perchlorate and Nitrate	Low	9	SOP No. 3, and No. 9	See **Worksheet #17**

Notes:

1 The number. of samples collected is estimated and may vary depending on field conditions.

2 Specify the appropriate letter or No. from the Project Sampling SOP References table (**Worksheet #21**).